March 2019

MYANMAR LIVING CONDITIONS SURVEY 2017

REPORT 02

TECHNICAL REPORT

MYANMAR CSO
CENTRAL STATISTICAL ORGANIZATION

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This report has been possible because of the generous financial support of the governments of Australia, Denmark, Finland, Ireland, Korea, Sweden and the United Kingdom.

Acknowledgements

I would like to express my deepest gratitude to His Excellency Union Minister U Soe Win, Ministry of Planning and Finance, for his valuable support, guidance and encouragement though the process of undertaking the Myanmar Living Conditions Survey.

This is an exciting time for the development of statistics and the statistical system in Myanmar. A new statistics law has been formulated which strengthens the relationship of statistics producers and stakeholders. In addition, a National Strategy for the Development of Statistics (NSDS) has been formulated, setting a clear path and concrete milestones for developing quality and accurate official statistics in Myanmar.

Myanmar's official statistics need to be credible in order to fulfill their important task to describe the socio economic conditions in our country. They must be based on clear, publicly stated operating principles and methodologies. These conditions guarantee the quality of statistics and improve the trust between data providers and data users.

I would like to thank all those who have worked hard and with a firm commitment to undertake the MLCS 2017. The financial and technical support of the UNDP and the World Bank is greatly appreciated. I also express my gratitude to all the 13,730 households who supported the survey in the time-consuming data collection exercise. They have provided much-needed information that will be widely used by a variety of data users.

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Acronyms

CAFÉ	Computer Assisted Field-based data Entry (CAFE)
CSO	Central Statistical Organization
DG	Director General
DP	Development Partner
DoP	Department of Population
EA	Enumeration Area
GoM	Government of Myanmar
HIES	Household Income and Expenditure Survey
IHLCA	Integrated Household Living Conditions Assessment
MLCS	Myanmar Living Conditions Survey (2017)
MPLCS	Myanmar Poverty and Living Conditions Survey (2015)
NGO	Non-Governmental Organization
NSDS	National Strategy for the Development of Statistics
PAPI	Paper and Pencil Interviewing
PPS	Probability Proportional to Size
PSU	Primary Sampling Unit
QA	Quality Assurance
UNDP	United Nations Development Programme
WB	World Bank

Field Enumeration Summary

Number of EAs enumerated	1,145
Total number of households enumerated	13,730
Number of Replaced EAs	33
Number of EAs not visited at all	7
Number of refusing households	99
Number of household non-contacts after 3 calls	802
Number of derelict/empty dwellings	37
Number of EAs in which interpreter used[1]	99
Number of EAs in which Quality Assurance visits took place	65

1 Not necessarily all of the households in the EA needed interpretation, but at least one did.

01.

INTRODUCTION

1.1 Introduction

This report is one in a series of products that will be produced from the 2017 Myanmar Living Conditions Survey (MLCS). The objective of this report is to outline the survey procedures for readers who would like to know the MLCS 2017 activities in detail. The report outlines the work undertaken at all stages of the survey from questionnaire development and testing through to processing the data files.

The report focuses on various stages of the survey work, recruiting and hiring data collection and processing staff, training, questionnaire design, sample design and data processing procedures.

This report will be complimented by analytical products. Key indicators report has been published. Poverty profile report and a detailed socio-economic report will subsequently feature detailed analysis of living conditions in Myanmar based on MLCS 2017.

The MLCS 2017 is a comprehensive study of how people in Myanmar live. It was carried out by the Central Statistical Organization (CSO) with technical and financial support from the United Nations Development Programme and the World Bank. It collects data on the occupations of people, how much income they earn, and how they use this to meet the food, housing, health, education and other needs of their families. The data collected can be used to formulate responsive policies for the future development of the country.

The Myanmar Living Conditions Survey has the following objectives:

- To provide updated estimates of poverty and living conditions at the national, urban/rural and state/region level;
- To inform national data needs and selected SDG targets;
- To construct consumption weights for the national and regional Consumer Price Index (CPI) baskets; and
- To estimate private consumption expenditure for the System of National Accounts.

The MLCS builds off earlier household expenditure and living conditions surveys conducted in Myanmar, in particular the Integrated Household Living Conditions Assessment (2004/5 and 2009/10), the Household Income and Expenditure Survey (conducted 5 times, every 6 years between 1989 and 2012) and the Myanmar Poverty and Living Conditions Survey (2015). The Myanmar Living

Conditions Survey brings all these previous household surveys together into a single survey, and provides one comprehensive source of living conditions information.

The MLCS 2017 is representative of the Union Territory, its states and regions and urban/rural areas. It was enumerated in all the districts and 296 of the 330 townships of Myanmar. In total **13,730 households** participated in the survey. The survey was a representative sample for Myanmar of 1,145 enumeration areas.[2] The sample was based on the 2014 Population and Housing Census (Census) frame. Sampling weights were used to make estimates representative of the population and the sample provides **statistics for the fourteen states and regions and Nay Pyi Taw Council of Myanmar.**

The survey was conducted continuously over a 12-month period from late December 2016 to November 2017. Interviewing began in the winter season (December to February) continued throughout the dry season (March to May) and the monsoon season (June to October), ending in the winter season of 2017.

Throughout the development of the questionnaire there was a challenge to keep questions the same as MPLCS, to enable trend indicators to be created, or to alter/improve questions to take account of the changing circumstances in Myanmar. To get advice on this important task, wide ranging discussions were held with representatives from many Ministries, Development Partners, NGOs and academics working in Myanmar. In the **Data User Consultation meetings** the large groups were broken down into smaller working groups to discuss the following sections of the questionnaire:

- Household composition and demographics
- Education, literacy and training
- Health
- Housing
- Household Consumption Expenditure
- Household Durables
- Labour and Employment
- Agricultural activities
- Non-farm businesses
- Finance
- Shocks and coping strategies
- Migration & Remittances
- Other Income
- Community Questionnaire

In terms of a **Steering Committee,** the MLCS 2017 utilized the **Central Committee for Data Accuracy and Quality of Statistics.** The remit of this committee is to develop evidence-based policy and planning. The meetings are held to enable effective cooperation for accurate and quality statistics. The Vice President (II) is the Patron. The Union Minister of the Ministry of Planning and Finance Chairs the committee and the DG of CSO is the Secretary. The Union Ministers of the following Ministries are members:

2 Outreach activities took place over the 12 months of data collection but it was not possible to interview in Northern Rakhine and the Wa Self-Administered Area. These exclusions are fully documented in the forthcoming MLCS 2017 Survey Content and Quality Report and can be seen in the maps presented within this report.

- Ministry of Foreign Affairs
- Ministry of Home Affairs
- Ministry of Border Affairs
- Ministry of Information
- Ministry of Religious Affairs and Culture
- Ministry of Agriculture, Livestock and Irrigation
- Ministry of Transport and Telecommunication
- Ministry of Natural Resources and Environmental Conservation
- Ministry of Electricity and Energy
- Ministry of Labour, Immigration and Population
- Ministry of Industry
- Ministry of Commerce
- Ministry of Education
- Ministry of Health and Sports
- Ministry of Planning and Finance
- Ministry of Construction
- Ministry of Social Welfare, Relief and Resettlement
- Ministry of Hotels and Tourism
- Union Attorney General's Office
- Economic Related Ministries in all State and Regional Governments

The **NSDS cluster on Survey Coordination and Statistical Standard Cluster** is the **Technical Committee** for the MLCS 2017. Selected Donor Partners were additionally invited to some of the NSDS meetings, depending on the topics under discussion.

The sample of 13,730 households is nationwide, covering all districts and 296 townships of Myanmar. The fieldwork period was 12-months from December 14 2016 to December 13 2017 to ensure interviews took place in all seasons and captured the situation experienced by households at different times of the year.

The interview was undertaken by Paper and Pencil Interviewing (PAPI) with data entered into a laptop in the field (Computer Assisted field-based data entry, pioneered by the Living Standards Measurement Survey (LSMS) team of World Bank). The data entry system, implemented in CSPro software, enables data entry to first take place in the field to allow immediate automated consistency checks. Data is then transmitted via mobile internet to a central database. Second data entry takes place at CSO to rule out entry errors.

1. 2. Timing of Key Events

Event	Date	Section of the report
Questionnaire development	May 2016 – November 2016	3
Sample design and selection of EAs	May 2016 – October 2016	3
1st Data User Consultation Meeting	14 June 2016	1
Pretest	End of June 2016	3
1st Pilot	July 2016	3
2nd Data User Consultation Meeting	17 August 2016	1
2nd pilot	September 2016	3
Data entry system programming	Sept – November 2016	3
Listers training	October 2016	3
Main training (Supervisors, Enumerators and Data Entry Operators)	November 2016	3
Data collection began	14 December 2016	3
Data entry operator and checker trainings (CSO Head Quarter)	January 2017	3
1st Security meeting	27 February 2017	3
2nd Security meeting	12 June 2017	3
3rd Security meeting	17 October 2017	3
Data collection ended	13 December 2017	3
3rd Data User Consultation	29 January 2018	1
Weights finalized	30 January 2018	5

02.

SURVEY DESIGN

2.1. Introduction to the Sample

A nationally representative sample of households is interviewed each quarter in order to represent seasonality in all the survey indicators. The main geographic domains of analysis for the MLCS 2017 are the Union Territory and 14 states or regions of Myanmar. The survey results are also tabulated for the urban and rural domains at the national level.

The sample primary sampling units (PSUs) for this sample are the enumeration areas (EAs) defined for the 2014 Myanmar Population and Housing Census. In September 2014, the Department of Population of the Ministry of Immigration and Population selected a representative Master Sample of 4,000 EAs from the 2014 Census frame for the Myanmar household survey program. The sample clusters for the MLCS 2017 are selected from the Master Sample[3].

A stratified multi-stage sample design is used for the MLCS 2017. The Master Sample was stratified by state/region, urban and rural areas. The classification of the EAs in the 2014 Myanmar Census of Population and Housing frame by urban and rural stratum was based on the administrative structure of the hierarchical geographic areas in Myanmar; all EAs in administrative areas defined as wards are considered urban, and all EAs in village tracks are classified as rural. The distribution of the households in the 2014 Myanmar Census of Population and Housing frame by region, urban and rural stratum is shown in Table 2.1, based on the preliminary Census data.

Table 2.1

Distribution of Private Households by Region and Urban/Rural Stratum, Preliminary Results of 2014 Myanmar Census of Population and Housing

State/Region	Urban	Rural	Total	% by Region	% Urban
Kachin	91,907	174,945	266,852	2.5%	34.4%
Kayah	13,730	41,162	54,892	0.5%	25.0%
Kayin	63,951	237,614	301,565	2.8%	21.2%
Chin	19,022	71,475	90,497	0.8%	21.0%
Sagaing	179,736	909,647	1,089,383	10.1%	16.5%
Tanintharyi	63,170	207,729	270,899	2.5%	23.3%
Bago	234,228	891,334	1,125,562	10.4%	20.8%
Magway	128,363	777,702	906,065	8.4%	14.2%
Mandalay	406,173	898,061	1,304,234	12.1%	31.1%
Mon	111,929	303,825	415,754	3.8%	26.9%
Rakhine	74,120	493,336	567,456	5.2%	13.1%
Yangon	1,051,226	499,273	1,550,499	14.3%	67.8%
Shan	265,943	875,137	1,141,080	10.5%	23.3%
Ayeyarwady	198,294	1,286,144	1,484,438	13.7%	13.4%
Nay Pyi Taw	68,639	178,654	247,293	2.3%	27.8%
Total	**2,970,431**	**7,846,038**	**10,816,469**	**100.0%**	**27.5%**

3 The methodology for the master sample design is described in the report on "Recommendations for Developing Master Sample for National Household Surveys in Myanmar: Sampling and Estimation Methodology" (Megill, October 2014).

2.2. Selection of Sample EAs

The primary sampling units (PSUs) for the master sample are the census enumeration areas (EAs), with an average of about 135 households each (140 for urban EAs and 133 for rural EAs). In order to further examine the variability in the EAs by size, Table 2.2 shows the distribution of the frame of all enumerated EAs by size category and urban/rural stratum. More than half of the EAs are within the range of 100 to 149 households.

The EAs in the sampling frame are stratified by state/region, urban and rural strata. Within each stratum the EAs are ordered geographically by district, township, ward or village tract and EA code, in order to provide additional implicit stratification and ensure that the sample is geographically representative.

Table 2.2

Distribution of All Enumerated EAs by Size (Number of Private Households) and Urban/Rural Stratum, 2014 Census. Preliminary Results of 2014 Myanmar Census of Population and Housing

	Number of EAs		
EA Size	Urban	Rural	Total
0 household	52	102	154
1-9 households	89	194	283
10-19 households	104	201	305
20-49 households	341	999	1,340
50-99 households	1,614	6,993	8,607
100-149 households	11,883	33,064	44,947
150-199 households	6,349	15,003	21,352
200-249 households	977	1,643	2,620
250-299 households	231	308	539
300+ households	133	277	410
Total	**21,773**	**58,784**	**80,557**
Mean	140	133	135
Std. Dev.	140.2	133.3	135.2

A Master Sample of 4,000 enumeration areas (EAs) was selected from the Census 2014 frame. The Master Sample EAs within each stratum were selected systematically with probability proportional to size (PPS), where the measure of size is based on the number of households in the Census frame. The Master Sample EAs are divided into four nationally-representative replicates of 1,000 sample EAs each. The distribution of the sample EAs in the master sample by state/region, urban and rural stratum is shown in Table 2.3.

The sample EAs for the MLCS 2017 were selected as a subsample of the full Master Sample (all replicates), as described later in the section on Sample Selection Procedures. Within each sample EA selected for the MLCS 2017, the frame is updated with a new listing of households that is used at the last sampling stage for selecting a sample of 12 households in each sample EA.

The units of analysis for the MLCS 2017 are the individual households and persons who are usual residents of the households.

Table 2.3

Distribution of Myanmar Master Sample PSUs by Region and Urban/Rural Stratum

	Master Sample EAs		
State/Region	Urban	Rural	Total
Kachin	80	96	176
Kayah	40	60	100
Kayin	52	136	188
Chin	40	64	104
Sagaing	76	280	356
Tanintharyi	56	124	180
Bago	100	264	364
Magway	60	264	324
Mandalay	160	232	392
Mon	80	140	220
Rakhine	44	216	260
Yangon	272	128	400
Shan	112	252	364
Ayeyarwady	72	328	400
Nay Pyi Taw	64	108	172
Total	**1,308**	**2,692**	**4,000**

In order to determine the final design of the sample, the MPLCS data was tabulated to examine the sampling errors, confidence intervals and design effects for key estimates from that data. This analysis can be seen in detail in Annex A. Table 2.4 shows the final allocation of EAs and households by strata.

2.3. Final Design of MLCS 2017 Sample

Table 2.4

MLCS 2017 Final Sample Design by State/Region, Urban and Rural Stratum

State/Region	Total		Urban		Rural	
	Sample clusters	Sample households	Sample clusters	Sample households	Sample clusters	Sample households
Kachin	72	864	36	432	36	432
Kayah	72	864	28	336	44	528
Kayin	72	864	24	288	48	576
Chin	72	864	24	288	48	576
Sagaing	72	864	20	240	52	624
Tanintharyi	72	864	28	336	44	528
Bago	72	864	24	288	48	576
Magway	72	864	20	240	52	624
Mandalay	72	864	36	432	36	432
Mon	72	864	32	384	40	480
Rakhine	72	864	16	192	56	672
Yangon	96	1,152	64	768	32	384
Shan	96	1,152	36	432	60	720
Ayeyarwady	96	1,152	24	288	72	864
Nay Pyi Taw	72	864	32	384	40	480
Total	**1,152**	**13,824**	**444**	**5,328**	**708**	**8,496**

The samples EAs for MLCS 2017 were selected from all replicates (1, 2, 3 & 4) of the Master Sample EAs. Since the Master Sample EAs were selected with PPS within each stratum, the subsamples of EAs for the MLCS 2017 were selected from the Master Sample with equal probability within each region, urban/rural stratum. This ensured that the first stage probabilities for the MLCS 2017 sample EAs were PPS within each stratum, thus improving the efficiency of the sample design by reducing the variability of the household weights within each stratum.

In order to maintain the implicit stratification of the Master Sample for the MLCS 2017, the Master Sample EAs were sorted in the same order in which they were selected from the census sampling frame, that is, by stratum (region, urban/rural), district, township, ward or village tract code, and EA code. Then the subsamples of EAs for the MLCS 2017 within each stratum were selected from the master sample using systematic random sampling with equal probability. The sampling procedure involved the following steps:

(1) All the master sample EAs in each stratum were kept in the same order in which they had been selected. Assigned a serial number from 1 to n_h to the Master Sample EAs in the stratum.

(2) To obtain the sampling interval for selecting the subsample of n'_h EAs within a stratum (I_h), divided the number of Master Sample EAs in the stratum (n_h) by the number of EAs in the subsample for the MLCS 2017 (n'_h) found in Table 2.4 and keep at least two decimal places:

$(I_h) = n_h / n'_h$

(3) Selected a random number (R_h) with at least 2 decimal places, between 0.01 and I_h. The EAs selected in the subsample for the MLCS 2017 were identified by the following selection numbers:

$S_{hi} = R_h + [I_h \times (i\text{-}1)]$, rounded up,

where i = 1, 2, 3,..., n'_h

The i-th selected EA is the one with a serial number equal to S_{hi}.

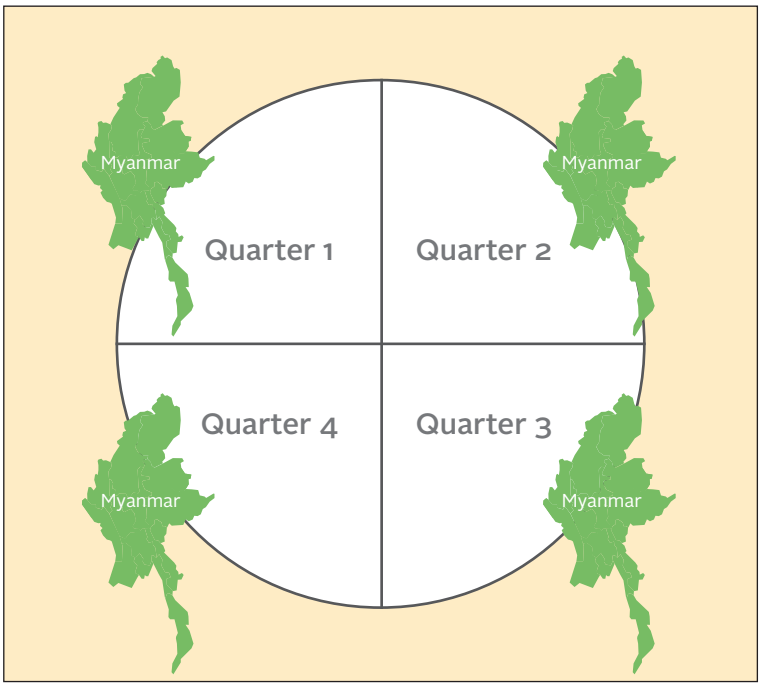
A SPSS Complex Samples application was developed to facilitate the selection of a subsample of EAs by stratum for the MLCS 2017 from the Master Sample based on the methodology specified above. The number of sample EAs that were selected from the Master Sample in each stratum are shown in Table 2.4. The selection of sample EAs for the MLCS 2017 was conducted by the Department of Population, with participation by CSO staff.

2.4. Selection of quarterly Sub-samples

The sample for MLCS 2017 has a nationally representative subsample of EAs in each quarter. Given the systematic selection of EAs within each stratum, the subsample of EAs for each quarter was selected from the full sample systematically with equal probability. Sequential numbers from 1 to 4 were assigned to all the sample EAs within each stratum, in the same order in which they were selected. This sampling procedure ensures that each systematic subsample within a stratum is geographically representative.

Diagram 2.1

Each quarter of MLCS 2017 sample is nationally representative of Myanmar



Care was taken to try not to change the quarter in which EA was assigned to and by the end of fieldwork only 26 (2%) of EAs had not been enumerated in their issued quarter. This was mainly due to flare-ups in the security situation and the need to remain flexible. Table 2.5 shows the 26 EAs with the issued quarter number and then the actual quarter in which the interviews took place.

Table 2.5

Issued and actual quarter differences by cluster

	Cluster	Issued Quarter	Actual Quarter	State/Region	Urban/Rural
1	16	4	3	Kachin	Rural
2	67	2	1	Kachin	Urban
3	74	2	1	Kayah	Urban
4	98	4	3	Kayah	Rural
5	100	3	2	Kayah	Rural
6	146	2	1	Kayin	Urban
7	169	3	2	Kayin	Rural
8	177	2	3	Kayin	Rural
9	211	3	4	Kayin	Urban
10	276	4	3	Chin	Rural
11	280	4	3	Chin	Rural
12	400	4	3	Tanintharyi	Rural
13	431	3	4	Tanintharyi	Rural
14	439	2	3	Bago	Rural
15	492	3	2	Bago	Rural
16	722	2	1	Rakhine	Urban
17	775	3	4	Rakhine	Rural
18	778	4	3	Rakhine	Rural
19	782	2	1	Rakhine	Urban
20	784	2	1	Rakhine	Rural
21	890	2	1	Shan	Urban
22	936	2	1	Shan	Urban
23	941	2	1	Shan	Rural
24	945	1	2	Shan	Rural
25	946	2	1	Shan	Urban
26	965	2	4	Shan	Rural

2.5. Segmenting EAs containing a large number of households

There were some large EAs in the sample, with more than 300 households, where it would have taken a considerable amount of time to complete a listing. In these cases the EA was subdivided into smaller segments, and one segment was selected to be listed.

To do this the listers first made a sketch map and conducted a quick count of the number of housing units in order to subdivide the EA into segments of approximately equal size (about 100 households each). It was important that the segments had well-recognized boundaries such as

roads, paths, streams, etc., so it was not always possible to define segments with equal size. Each segment was labelled. The listers then telephoned CSO to receive a random number and then the selected segment was based on the number given. In total only 12 of 1,145 completed EAs involved segmentation. These can be seen in Table 2.6.

Table 2.6

Segmented EAs

	Cluster	State/Region	District	Urban/Rural	Number of segments	Actual Quarter
1	20	Kachin	Myitkyina	Rural	2	1
2	24	Kachin	Myitkyina	Urban	2	2
3	523	Magway	Magway	Rural	2	3
4	736	Rakhine	Sittwe	Rural	10*	2
5	814	Yangon	Yangon (North)	Urban	2	2
6	819	Yangon	Yangon (North)	Urban	2	2
7	828	Yangon	Yangon (East)	Urban	2	1
8	832	Yangon	Yangon (East)	Urban	2	1
9	849	Yangon	Yangon (East)	Urban	3	4
10	885	Yangon	Yangon (West)	Urban	3	4
11	938	Shan	Lashio	Rural	5	1
12	961	Shan	Kyukme	Rural	2	3

* This EA had more than 1,000 households

2.6. Listing and household selection

A sample of 12 households was selected systematically from the Listing Form for each sample EA. All the households in occupied housing units were assigned a Serial Number from 1 to the total number of households listed. To select the 12 households the lister used a Household Selection Table that specified the 12 serial numbers to be selected based on the total number of households listed. For example (see below) if there were 19 households in the EA then the Lister ticked in column 8 of the Listing Form (Annex B) the households numbered 1,4,5,6,8,10,11,13,14,16,18,19 in Column 7 (the Serial Number).

HOUSEHOLD SELECTION TABLE - EXAMPLE

Number of households listed in the EA	Selected Households												Replacements			
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
16	1	2	3	5	6	7	9	10	11	13	14	15	4	8	12	16
17	2	4	5	6	8	9	10	12	13	14	16	17	3	7	11	15
18	1	2	3	5	7	8	10	11	12	14	16	17	4	9	13	18
19	**1**	**4**	**5**	**6**	**8**	**10**	**11**	**13**	**14**	**16**	**18**	**19**	3	7	12	17

The Household Selection Table (generated using an Excel spreadsheet) also identified an additional four sample households that the supervisor used for replacing households that could not be interviewed after several attempts. For each replacement the reason for the original non-interview was entered on a single front page of a questionnaire so that the weights could be adjusted correctly later.

The sample household replacement procedures were controlled as part of the Quality Assurance procedures to try and avoid selection bias in the field. There were only 8 EAs in which there were more than four non-interviews in the sample EA (all urban) and this is why the sample size is 13,730, rather than 13,740 (1,145 EAs x 12 interviews per EA).

Table 2.7

EAs with more than four non-interviews after using all four replacement households

	Cluster	Number of interviews achieved	Number of interviews not achieved	State/Region
1	827	11	1	Yangon
2	842	11	1	Yangon
3	877	9	3	Yangon
4	878	11	1	Yangon
5	881	11	1	Yangon
6	884	11	1	Yangon
7	885	11	1	Yangon
8	588	11	1	Mandalay

2.7. Questionnaire design and content

The guiding principles when developing the questionnaire were fourfold:

1. **Subject breadth:** A multi-topic questionnaire should be produced with the aim of getting a better understanding of the correlates of poverty in its many dimensions. In this light the questionnaire should fit information needs coming from sectors (line and core ministries).
2. **Comparability:** The questionnaires should, as much as possible, produce comparable core indicators to those from HIES, IHLCA and MPLCS. Deviations from comparability should be clearly noted from the outset.
3. **SDGs:** Selected indicators should be collected to form the baseline for UN Sustainable Development Goals (SDG).
4. **Community focus:** There should be a strong community questionnaire to capture prices, service delivery, facilities and infrastructure available in each EA.

With these aims in mind an extensive review of indicators and objectives of the questionnaire was undertaken. This was conducted through a consultative process with all relevant stakeholders. Three large and inclusive Data User Consultation meetings were held.

1st meeting on June 14 2016 had the aim of introducing the basic principles of the survey and discussing the broad contents.

2nd meeting on August 17 2016 discussed each section in detail by breaking down into small working groups.

3rd meeting on January 29 2018 discussed the content of the analytical reports.

The MLCS 2017 was also presented during the statistical standards and coordination working group meetings.

Although the questionnaire is the measuring instrument upon which the success of the survey operation depends, its development and testing are the least scientifically rigorous component of the survey process. Despite valuable research on question form and response mode issues conducted by many investigators (e.g. Cantril, 1944; Payne, 1951; Sudman and Bradburn, 1982[4]), the creation of a survey questionnaire remains largely an art, based primarily on past experience with only a few "common sense" principles as guidance.

The MLCS 2017 questionnaire went through several developmental stages. The initial version of the questionnaire was reviewed by the MLCS team and other advisors to determine whether it would obtain the data required for the survey, trying to gauge whether enumerators would be able to handle the questions with ease. A pretest and two pilots were conducted to determine whether the individual questions and the questionnaire as a whole worked as intended. During the pretesting and piloting fieldwork Rating Forms[5] recorded instances of problems with individual questions relating to the following four issues:

4 Cantril, H., ed. (1944). Gauging Public Opinion. Princeton University Press, Princeton, New Jersey, U.S.A. Payne, S.L. (1951). The Art of Asking Questions. Princeton University Press, Princeton, New Jersey, U.S.A. Sudman, S., and Bradburn, N.M. (1982). Asking Questions. A Practical Guide to Questionnaire Design. Jossey-Bass, San Francisco, California, U.S.A.

5 Rating Forms based on recommendations from Cannell, C.F., Lawson, S.A., and Hausser, D.L. (1975). A Technique for Evaluating Interviewer Performance. Survey Research Center, University of Michigan, Ann Arbor, U.S.A.

- **Questions were difficult to ask.** Enumerators had problems reading a question because it had a complex sentence structure or because it contained tongue twisters or words that were difficult to pronounce.

- **Comprehension problems** occurred because of the use of vocabulary that was too difficult for the respondent or because the question did not specify clearly what information was needed.

- **A lack of a common understanding** occurred when terms or concepts used in a question were understood differently by different respondents, or the question was not interpreted as intended.

- **Difficulty in cognitive processing of information.** This difficulty arose when the respondent was unable or unwilling to exert the level of effort needed to provide an adequate answer. Sometimes the information is simply inaccessible to the respondent. Often, the information is accessible, but the effort needed to retrieve and process it is greater than the respondent was willing to make.

In addition to checking individual questions, the pretest and pilots also assessed the questionnaire as a whole. Did the questionnaire flow smoothly from one topic to the next? Did the skip patterns work as intended? Did the juxtaposition of certain questions cause problems? Was it too long?

By the end of the consultation and testing process the MLCS 2017 household questionnaire contained 13 modules with a total of 294 questions. Table 2.8 outlines the main modules of the questionnaire. The full questionnaire can be seen in Appendix 1.

Table 2.8

Overview of the MLCS 2017 Household Questionnaire and Length of Interviewing Time.

	Module	Number of questions	Average time taken (minutes) to administer
1	Household member roster	27	10
2	Education, Literacy, Numeracy and training	24	9
3	Health	16	7
4	Housing	30	6
5a	Food Consumption in the Last 7 Days	9	38
5b	Food Consumed away from Home	5	1
5c	Non food consumption expenditure in last 30 days	3	8
5d	Non food consumption expenditure in last 6 months	6	9
6	Household Durables	5	10
7	Labour and Employment	60	11
8a	Parcel Roster	23	2
8b	Harvest and agricultural labour	9	6
8c	Inputs	2	4
8d	Livestock	22	3
8e	Aquaculture and fishing	12	1
8f	Agric and fishing machinery and equipment	3	2
9	Ownership of non-farm businesses	20	3
10	Finance	4	4
11	Shocks and coping strategies	2	3
12	Money senders in last 12 months	10	2
13	Other income	2	1
	TOTAL	**294**	**140 minutes**

It was agreed from the outset that in order to maintain the quality of the data collected the household questionnaire should be no more than three hours of interviewing per household.

In addition to the household questionnaire, a community questionnaire consisting of 114 questions over twelve modules was administered in each survey cluster. The community questionnaire covered, among other things, information on availability of infrastructure, government services, communal resources and local prices. Table 2.9 provides an overview of the questionnaire which can be seen in Appendix 2.

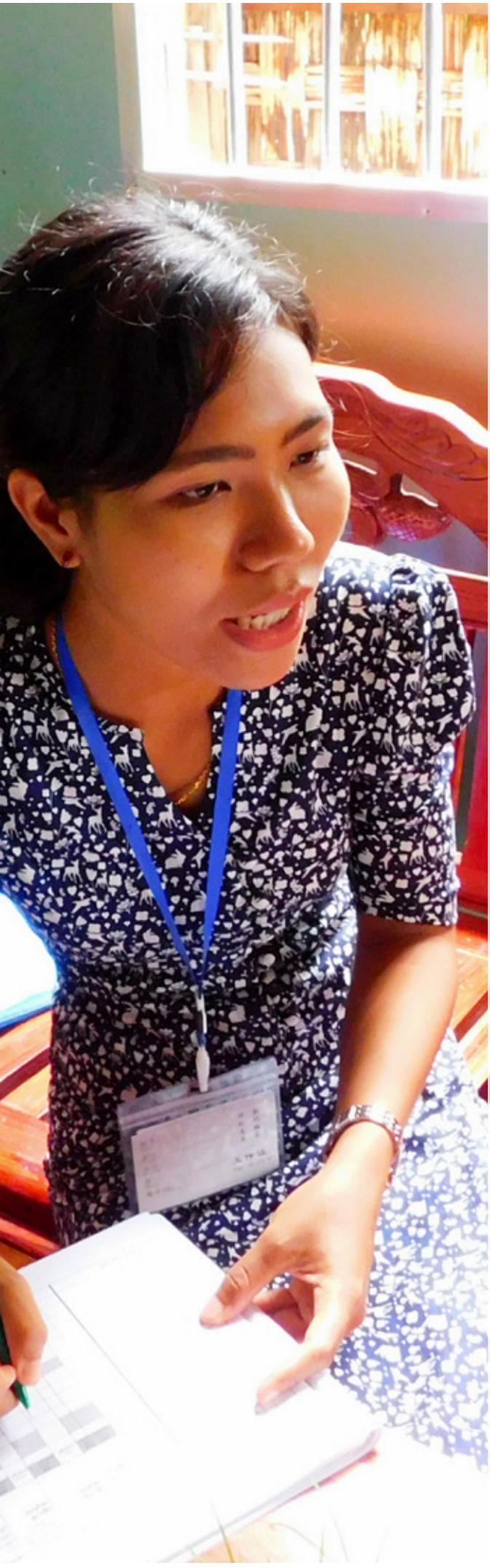
Table 2.9

Overview of the MLCS 2017 Community Questionnaire.

	Module	Number of questions
1	Key informant list	5
2	Village Profile	23
3	Electricity	8
4	Access to facilities	8
5	Economic Activity	4
6	Health	4
7.	Communal Organizations	2
8.	Programmes	2
9	Agricultural Inputs	4
10	Shocks	1
11	Schools	39
12	Prices	14
	TOTAL	114

* Time was not recorded in the community questionnaire.

The Field Manual (Appendix 3) provides a more comprehensive description of each survey section and how they were enumerated.



03.

FIELD ORGANIZATION

3.1. Data collection staff

One aim of the MLCS 2017 project was to establish a cadre of professional enumerators and supervisors who would focus exclusively on survey preparation and implementation for the duration of the project. A second aim was that the structure of the teams should strengthen the state/region level long term involvement in survey operations.

The structure for the MLCS data collection consisted of two teams. One team consisted of two listers and the second of one supervisor, one data entry operator and three enumerators.

Diagram 3.1

Structure of MLCS data collection teams

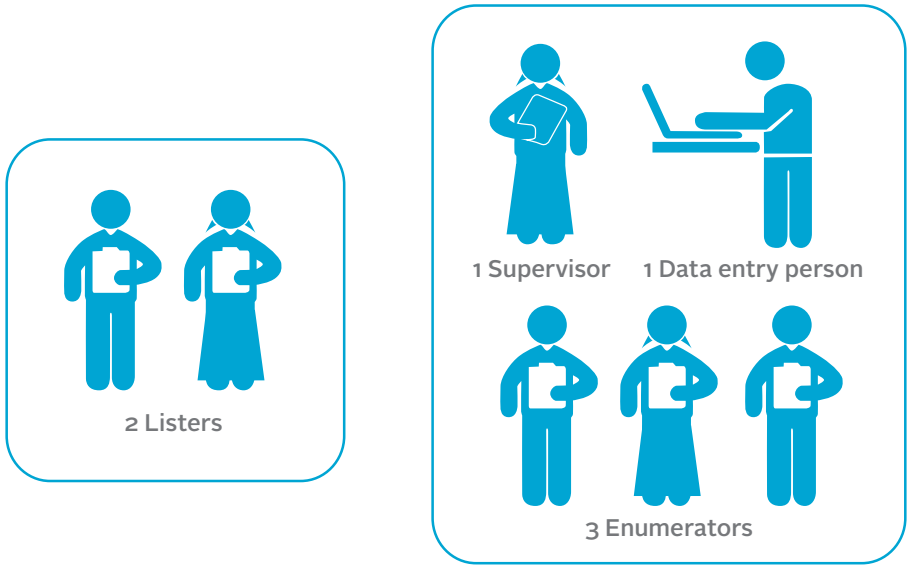


Table 3.1

Summary of field staff tasks and training periods

Role in the survey	Main task	Number in each team	When trained
Lister	Go into the EA one month before the interviewing team and update the household numbers based on the Census 2014 maps	2	October 2016 for one week
Supervisor (CSO staff)	Organize logistics for their team. Monitor all activities	1	July 2016 for two weeks in Mandalay September 2016 for two weeks in Taunggyi November 2016 for four weeks in Nay Pyi Taw
Enumerator	Interview households	3	November 2016 for four weeks in Nay Pyi Taw
In-field data entry operator	Enter data into laptop in the field to ensure logic and completeness of each household questionnaire	1	November 2016 for four weeks in Nay Pyi Taw

Previous CSO surveys had involved shorter enumeration periods with large number of enumerators and field supervisors. These were government staffs who were temporarily assigned away from their normal jobs to conduct temporary field work. Instead, MLCS 2017 was a longer term survey (12 months) with teams of full time enumerators, supervisors and data entry personnel. The supervisors were recruited from CSO state/region offices and dedicated to the survey for the whole year, becoming survey implementation experts for CSO to draw on for future surveys. While enumerators, in-field data entry operators and listers were recruited externally.

The recruitment of enumerators, in-field data entry operators and listers was undertaken in two stages:

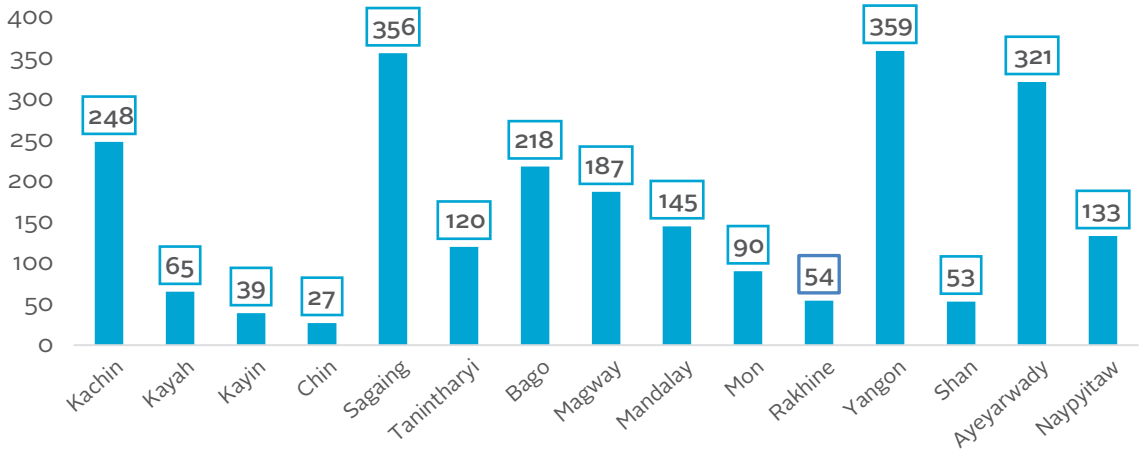
1. A request for curriculum vitae's
2. An interview for those passed the first phase of selection.

All selected candidates were required to be educated to university level and be fluent in the ethnic language relevant to the State/Region in which they would work. The State/Region coordinators conducted interviews. The CSO Board of Directors and Survey Department staff then reviewed the short list to make the final selection. In total, for the 140 posts, 2,415 applications were received. This made the first phase of selecting curriculums a time consuming process.

Figure 3.1 shows the large number of applicants came from Yangon, Sagaing, Ayeyarwady and Kachin. The pool of candidates was lowest in Kayah, Kayin and Chin. This was mainly due to the need for language skills in Myanmar and the local language.

Figure 3.1

Number of applicants for interviewing and listing jobs by State/Region



3.2. Data processing

A further aim of the MLCS 2017 project was to strengthen CSO's data processing systems and facilities. Computer Assisted Personal Interviewing (CAPI) could have been an option for MLCS 2017. However an evaluation by the MLCS team concluded that time constraints made it too risky to move ahead on that basis.

With the objective of using best practices and getting quality data, MLCS 2017 data was entered twice:

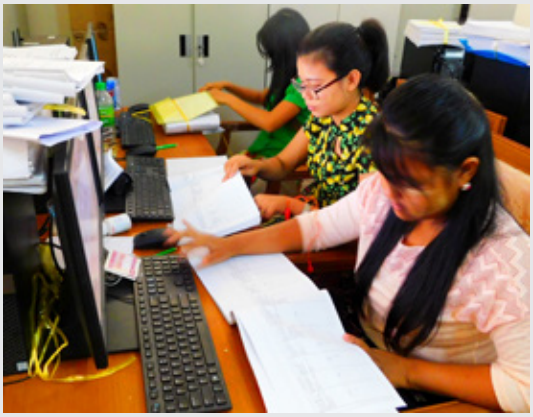
1. In the field data entry was undertaken to check for enumeration errors (logic, completeness, etc.) ensuring timely quality assurance and correction of data.
2. In the office data entry was done to correct data entry errors.

MLCS implemented a system (using a CSPro 6.3 application) of blind verification where differences between the first and second data entry are captured in a report and these reports are given to a third person to resolve.

First data entry in the field

A laptop with an external number pad was configured for the in-field data entry. The laptop was configured to access the internet using 3G technology (via smartphones). Questionnaires were entered while the team was still in the EA. The team worked on error reports to fix problems on the spot. Once the data had passed all error checks it was sent to CSO HQ.

Second data entry at CSO



Once the paper questionnaires had been delivered to CSO HQ the data was entered again.

A data checker looked at the error reports generated by differences between the first and second data entry error and resolved issues by referring to the questionnaire. The correct values were entered into the system by the second data entry operator.

Table 3.2

Summary of Data Processing staff based in Nay Pyi Taw

Role in the survey	Main task	When trained
10 Data entry operators	Enter data into a computer at CSO	February 2017 for two weeks in Nay Pyi Taw
3 Data checkers	Check error reports generated by double data entry process and resolve errors.	

3.3. The survey teams

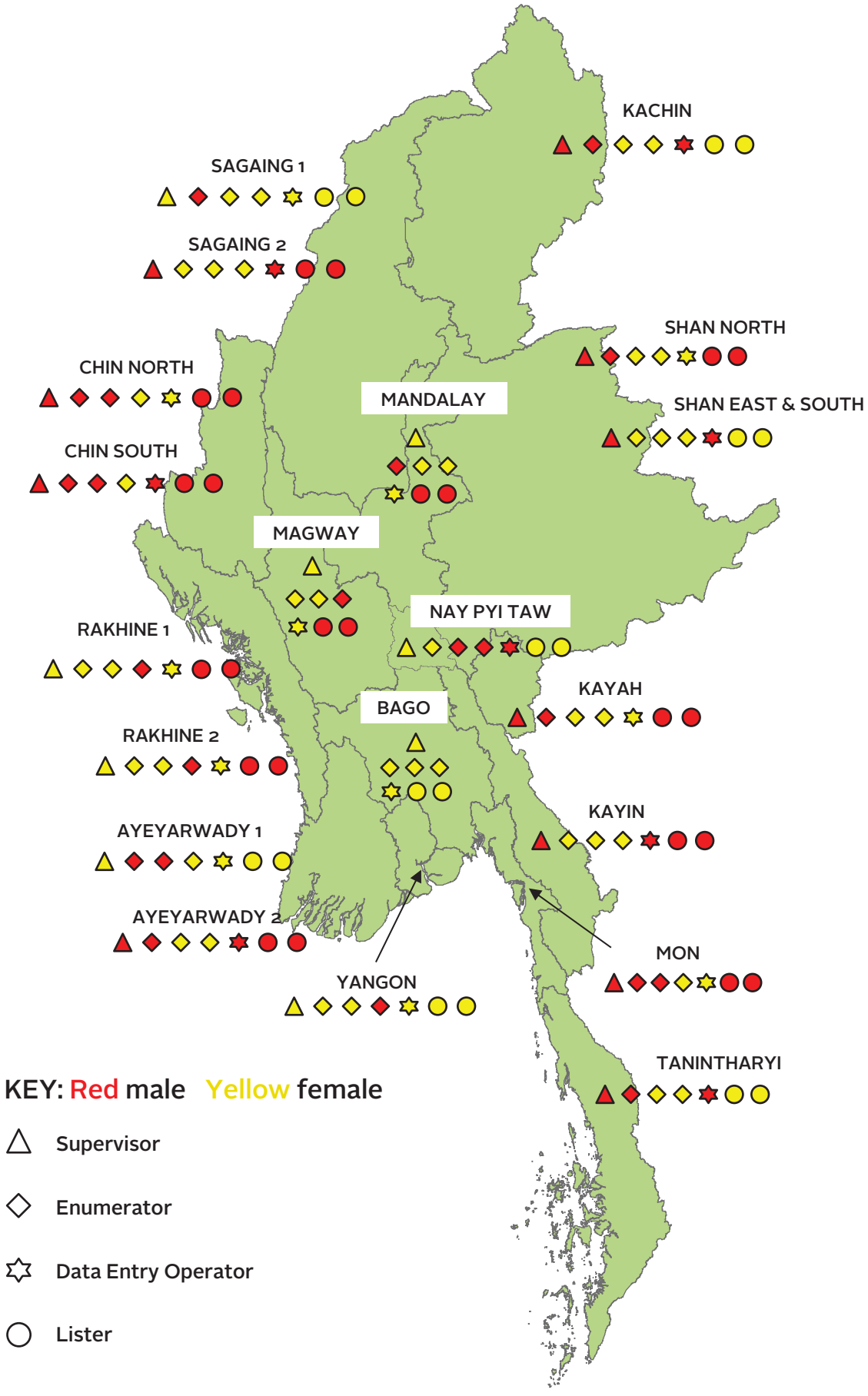
A total of **153 people** worked to collect and process MLCS 2017 data (125 were hired and 28 were CSO staff). More detail by State/Region can be seen in Annex D. Twenty interviewing teams were created to collect the data. Each State/Region had one traveling team (one supervisor, three enumerators and one data entry operator). Five States/Regions had two teams - Ayeyarwady, Chin, Rakhine, Sagaing and Shan. The reason to have two teams in some States/Regions was a combination of:

- Analysis on MPLCS (see Annex A) revealing large Design Effects showing high clustering of poverty in some State/Regions.
- Difficult transport links between EAs requiring more time to travel within a State/Region.

The gender distribution among the different roles can be seen in the map on the next page.

Map 3.1

Gender distribution of the supervisors, enumerators, in-field data entry operators and listers by team



3.4. Training

The Supervisors and Enumerators played a critical role in the success of MLCS 2017. They were required to perform multiple tasks with a high level of accuracy, including:

- physically locate the sampled household
- contact the household and explain the purpose of the MLCS
- enumerate household members
- motivate the respondent to participate
- ask questions in the required manner
- put the respondent at ease
- accurately record respondent's answers

Enumerators can influence responses through their personal attributes and their behaviours, otherwise known as an "interviewer effect" and one important aim of the training was to unify approaches to the questionnaire to ensure the interviewer effect was minimized. The various training events have been identified earlier in this report. Training took place over a period of six months. CSO Survey Department ran and organized the training events and was supported by external trainers[6].

Written tests and practical work during the listing training

All training involved a lot of practical work in the field. Selection of staff was based on the results of written tests.

An additional 38 reserve people were trained (twenty enumerators, ten data entry operators and eight listers). Over the 12 month data collection some of these reserve staff were used (see Section 3.7).

6 Daw Htar Htar Ei, Ms Valerie Evans, Ms Rachel Smith-Govoni, Dr Reena Badiani Magnusson, Daw Mar Mar Thwin supported by the World Bank. Mr Felix Schmieding, U Sa Si Thu Htike San, Mr Harold Coulombe, Mr Juste Nitiema, Dr Mya Mya Thet and Ms Dilrukshi Fonseka supported by UNDP.

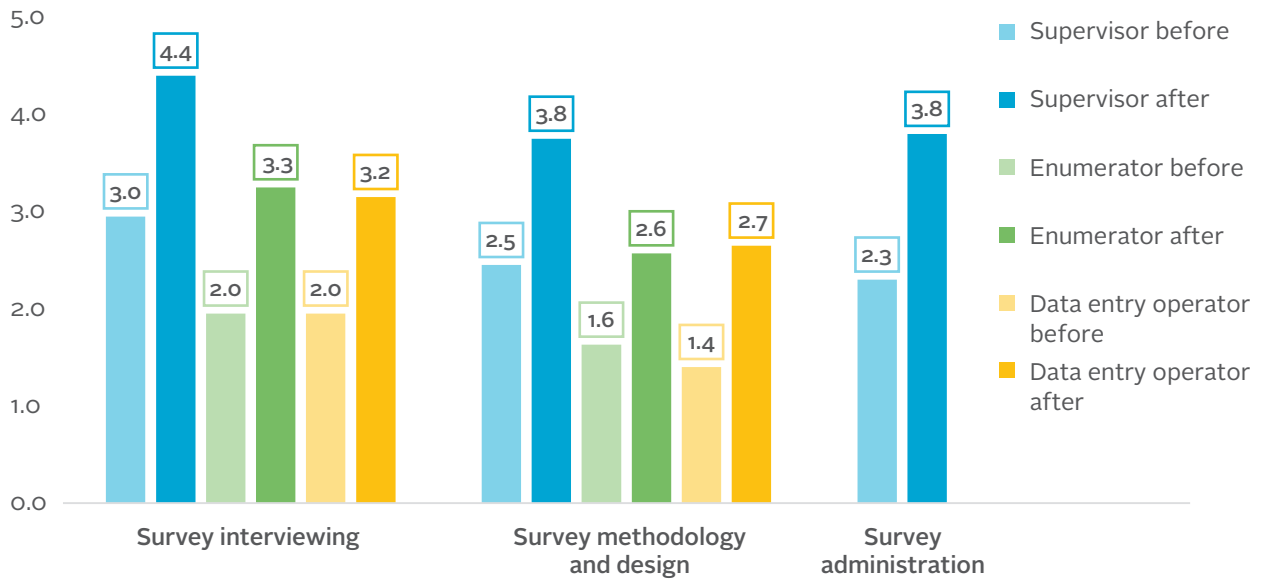
At the end of the MLCS main training (2nd December 2016) an assessment was conducted to examine **self-assessed** level of experience before and after the MLCS training in the areas of:

- Survey interviewing/data collection
- Survey methodology and design
- Survey administration (for Supervisors only).

On the questionnaire the respondents were asked to rate their level of experience from a scale (1 no experience to 5 very experienced). The results in Figure 3.2 show that in all aspects the supervisors, enumerators and data entry operators believed that their skill level had improved.

Figure 3.2

Level of experience before and after training by aspect of the survey process and role



It is pleasing to see that after a total of two months training the Supervisors rated their skills in relation to interviewing very highly (4.4 out of 5). Enumerators rated their skill level at 3.3 after their month of training. Considering this was, for many of them, their first time at such a complex, long survey this was a good achievement. After 12 months in the field on MLCS it is expected that this cadre of enumerators are now highly experienced and will be a valuable source for future surveys in Myanmar.

3.5. Replacement of EAs that could not be enumerated

In order to be considered nationally representative, the MLCS aimed to reach all hard to reach areas and population that were included in the sample – and to do so with consistent listing and enumeration. There were two issues that were taken into account when assessing access to areas:

1. Security context: was it safe for listers, enumerators and respondents to conduct an interview?
2. Could accurate data be collected?

To enable this assessment, at the beginning of each quarter, Enumeration Areas were placed into one of four categories:

1. EA with no foreseen issues;
2. EA where teams would run into serious security issues that are unlikely to be resolved in the duration of the project;
3. EA where teams may proceed with dialogue and further information gathering;
4. EA on permanent hold until a strategy is devised that allows for quality data to be collected.

This categorization was designated by two teams:

1. CSO interviewing staff and Regional Coordinators who gathered information on the ground.
2. A three person external team who used a variety of other sources to evaluate the latest situation.

Field teams were informed about these assessments, and individual strategies are taken to deal with them. Field teams were informed that their safety was the priority and asked to hold-still and check back with local authorities and the headquarters team in case they had any reservations about entering an area.

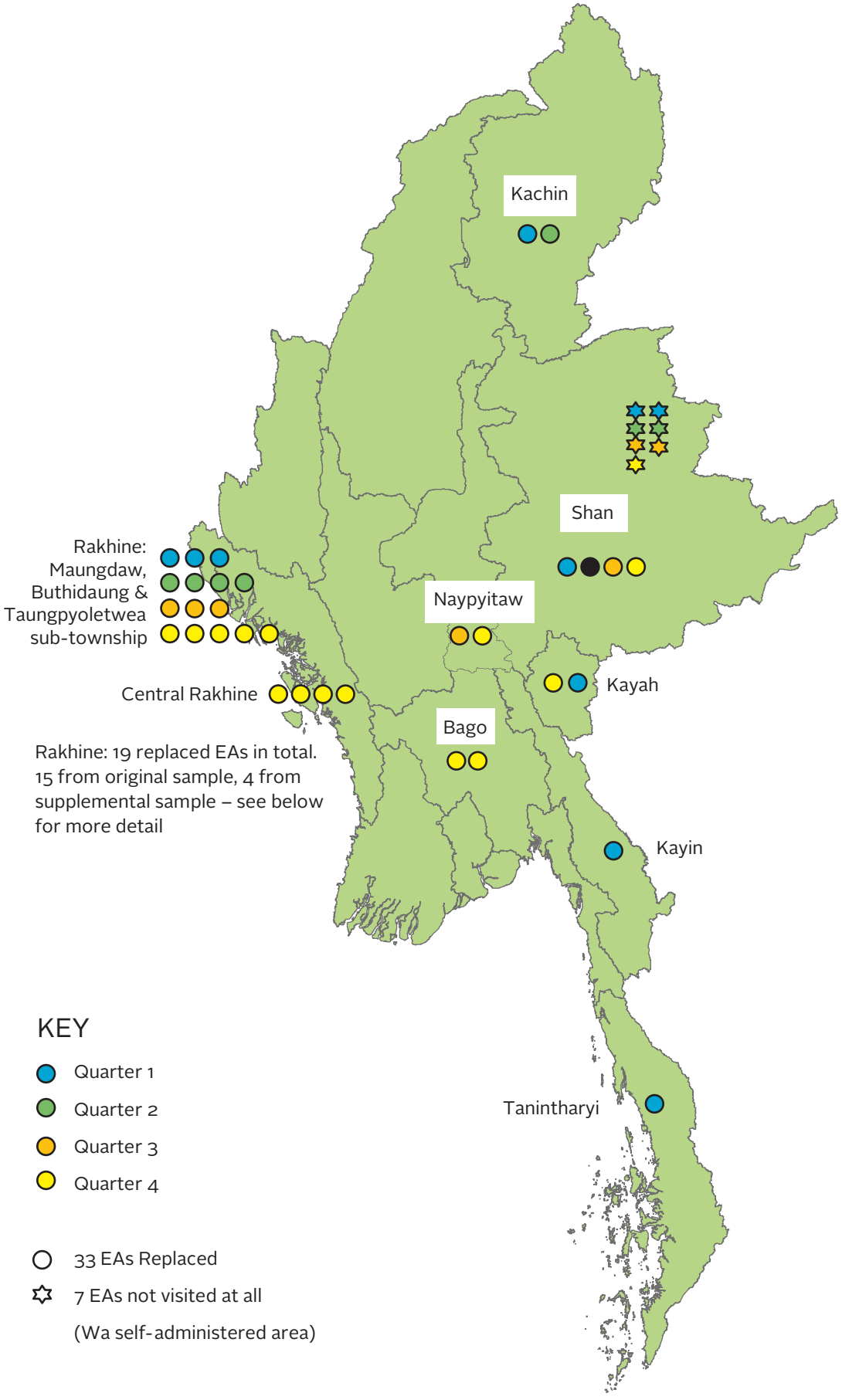
Annex C shows the EAs that could not be enumerated because of security or access problems in detail. By the end of data collection 33 EAs had been replaced and 7 were not visited at all. The distribution by State/Region and quarter can be seen on Map 3.2. In order to minimize bias in the sample, the replacement of sample EAs was only considered in extreme cases after attempts had been made to reach and enumerate the sample EA.

In order to maintain the geographical representativeness of the sample, the replacement EA for a sample EA that could not be enumerated was selected from other Master Sample EAs in the same stratum (state/region, urban/rural) and within the same township when possible. In these cases all of the Master Sample EAs from the same stratum and township were identified, and one of these EAs selected at random with equal probability (since the Master Sample EAs had already been selected with PPS).

If an entire township could not be accessed because of security problems, a neighboring township was identified, and a random EA selected from the Master Sample EAs for that township. Since the Master Sample EAs were selected using PPS, the measure of size (number of households in the frame) for the replacement EA was used for calculating the weights, as specified in Section 5.

Map 3.2

Replaced and not visited EAs by State/Region and Quarter



In terms of the distribution of the households in the areas that were not covered by the survey, Map 3.2 clearly shows that the worst affected areas were three townships in the Northern part of Rakhine: Maungdaw, Buthidaung and Taungpyoletwea (Sub-Tsp).

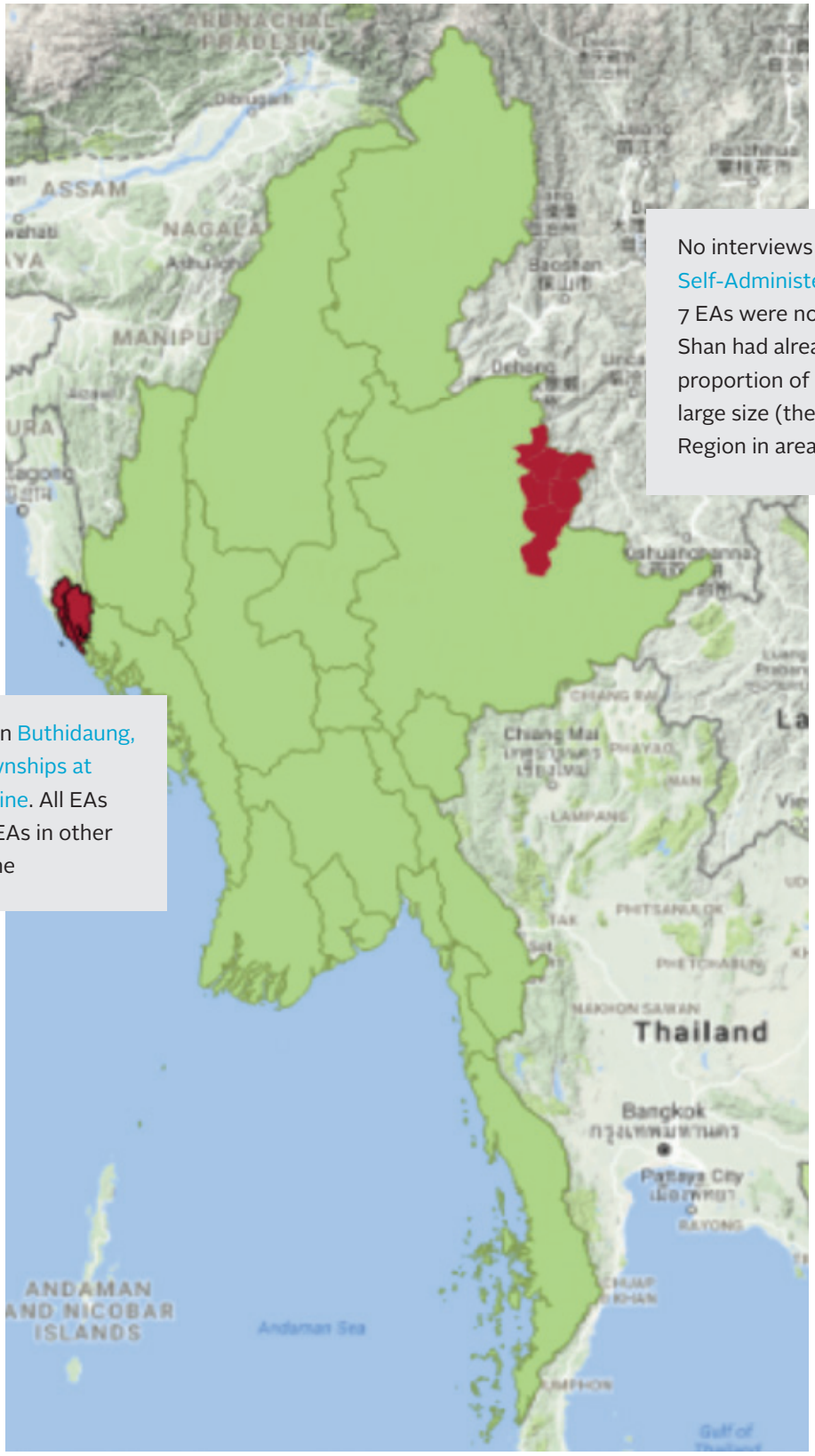
In the original sample selection no areas of Myanmar were excluded from the selection process and as a result these three townships were included in the sample. Despite a processes of review and plans to conduct interviews in these townships throughout the 12 month period it was not possible to enumerate any sample EAs in these three townships, so they are not represented in the MLCS 2017 data.

The final enumerated sample for Rakhine consists of 72 EAs, the same as the original sample allocation, because of a supplemental sample that was selected to compensate for the missing Northern Rakhine sample EAs. Although the supplemental sample maintained the effective sample size, it does not reduce the bias. The total number of households in the frame for these three townships is 92,615, and the total number of households in the frame for all of Rakhine State is 553,991, so the percentage of households in the three townships is 16.7% of the state total. This is a significant part of the population of Rakhine.

In Quarter 4 it was not possible to interview in four largely Muslim EAs in Sittwe and Mrauk-U in Central Rakhine. In quarters 1, 2 and 3 interviews had successfully been undertaken with Muslims in these areas. However tensions increased greatly following attacks on police posts on August 25th 2017 and the subsequent exodus of the Muslim population from northern Rakhine. The four central Rakhine EAs were replaced. The final weighted estimate of the total number of households in these townships from the MLCS 2017 data was slightly higher that the corresponding frame, so the sample in these areas should be fairly representative.

Map 3.3

Areas of Myanmar not enumerated in MLCS 2017



No interviews in the Wa Self-Administered Area. The 7 EAs were not replaced as Shan had already had a larger proportion of EAs due to its large size (the largest State/ Region in area in Myanmar).

No interviews in Buthidaung, Maungdaw townships at Northern Rakhine. All EAs replaced with EAs in other parts of Rakhine

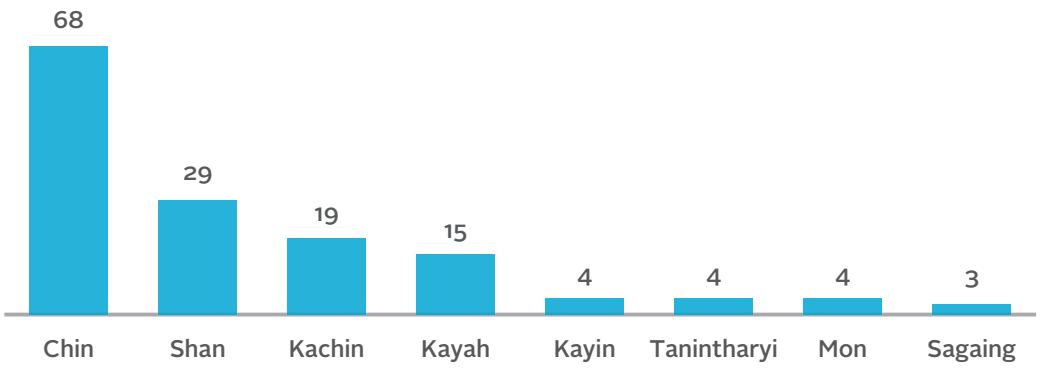
3.6. Use of interpreters during interviews

There were 99 (out of 1,145) EAs in which the survey teams could not administer the questionnaire in Myanmar language. In such areas, CSO hired local interpreters, usually recruited at a town closest to the enumeration areas. Efforts were made to ensure that the interpreters had sufficient understanding of the questionnaire and spoke both the local language and dialect and Myanmar language comfortably. The local interpreters were given training by field supervisors on interpreting the questionnaire and were provided explanations of the protocols and procedures for enumerating households.

Chin had the highest rate of interpreters being used with 68% of the EAs requiring interpretation (556 households). It was not always the case that all 12 of the selected households in the EA required interpretation.

Figure 3.3

Percentage of EAs within each State/Region where interpreters were used



Most interviews were conducted in the Myanmar language (87.1%).

Table 3.3

Language in which interview was conducted

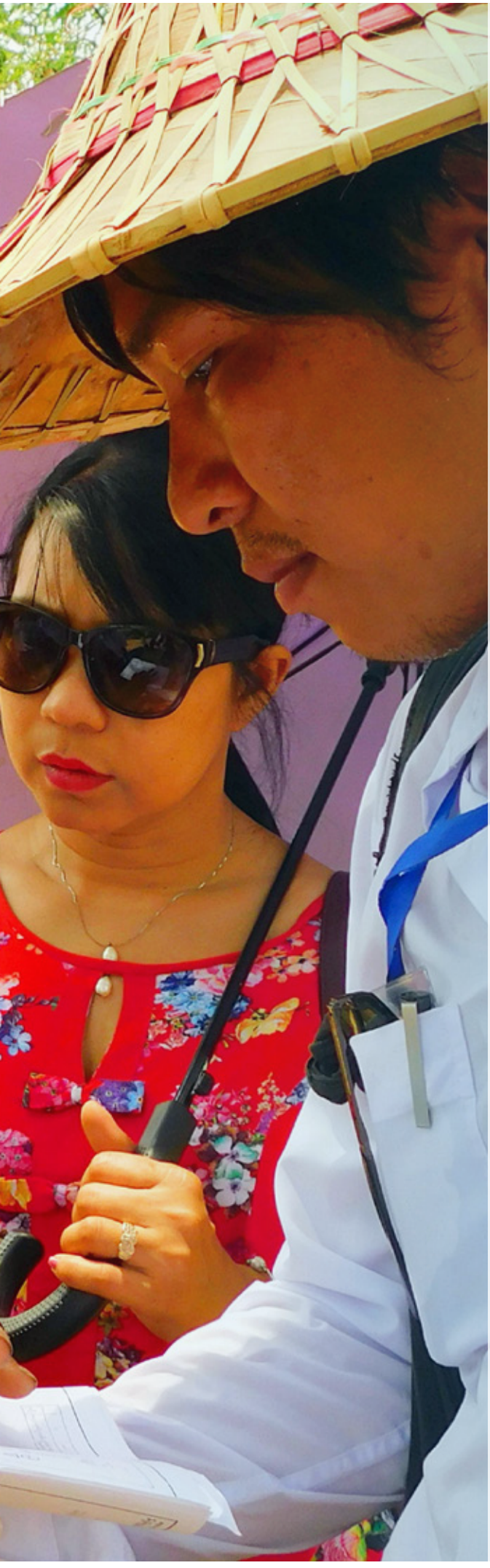
Language	Percentage
Myanmar	87.1
Kachin	0.2
Kayin	1.0
Chin	0.6
Mon	0.4
Rakhine	3.8
Shan	2.9
Dawei	2.4
Other[7]	1.5
Total	**100.0**

3.7. Replacing survey staff

Due to personal reasons and a motorbike accident only one in field data entry-operators and one lister could not complete the assigned EAs during the fieldwork duration. The data entry person was replaced with a reserve person that had been trained in Nay Pyi Taw in November. The replacement lister was also a reserve person that had been trained at the listers training in October.

7 Mainly Shan hill tribal languages and Chinese.


Golden Key's Family Farmer Diverse
We Distribute Quality Product



04.

QUALITY ASSURANCE

4.1 Field Trips

Quality Assurance on MLCS 2017 took place through two main mechanisms:

- Field trips
- Reports generated from the data entry program

By the end of fieldwork all 20 teams had been visited by CSO, UNDP or World Bank staff. The actual visits can be seen in Table 4.1.

During these visits the Quality Assurer used the visit to discuss if there were any specific problems or questions. They asked the data entry operator to show them the status report on the laptop and also checked that data entry had been completed before the team left the EA. In addition, the following specific items were checked:

Listing

- Could the 12 selected households ticked in Column 8 of the Listing Form be found on the map, including any new buildings.
- Was Column 7 (serial number) numbered in sequence?
- Did the final number written in Column 7 match the number written in "Total Number of Households in the EA" on the Front Page of the Listing Form?
- Was the ticking in Column 8 for the 12 households correct according to the Household Selection Table?
- Asked the village head/elder/representative that met the listing team whether the listers had walked around every street of the EA to update the map.
- Asked a village head/elder/representative whether there were cases of multiple households residing in one building to check that they were listed as separate households on the Listing Form.

Interviewing

- Went to one or two selected households to ensure that the household interviewed was actually the household selected on the Listing Form, i.e. to ensure they didn't go to an easier/nearer household instead.
- Checked 1-2 household questionnaires from each enumerator, watching out for inconsistencies and paying attention to supervisor corrections.

- Checked supervisor conversions in Section 5A.
- Checked in the Community Questionnaire whether the market price section had the correct fixed/non-fixed codes and whether the non-fixed units corresponded with those used in the household questionnaire.

Table 4.1

Quality Assurance Visits

	State/Region	Supervisor	Date of visit	Quality Assurers	EAs visited
1	Kachin	U Hla Myo Than	24.2.2017	Daw Win Pa Pa Zaw Daw Khin Sett Yi	010101115001 010101124016 010102104002 010155701005
			10-14. 11. 2017	DG Dr Wah Wah Maung Daw Khin Sett Yi	010101102003 010101116007
2	Kayah	U Thet Naing Win	2-3.3.2017	U Sa Si Thu Htike San	020101101004 020101101012
			3.5.2017	DG Dr Wah Wah Maung Daw Win Pa Pa Zaw	020101111003
			25-11-2017	Daw War War Myint Daw Thet Htar Nwe	020202706001 020101101014
3	Kayin	U Khun Tue Naung Lay	6-9.2.2017	DG Dr Wah Wah Maung Daw Phyu Pyar Tun Ms Rachel Smith-Govoni Mr Rivandra Royono	030301103001 030301105023 030101773003 030101106003 120308119008
4	Chin (North)	U Lwin Naing	25-29. 11. 2017	Daw Khin Sett Yi Ms Rachel Smith-Govoni	040101103005 040201101001 040101105003
	Chin (South)	U Than Myint	26-27.1.2017	Daw Hsu Hnin Wai Ms Rachel Smith-Govoni	040304732001 040304101004
5	Sagaing	Daw Khaing Thandar Thein	21.2.2017	Mr Felix Schmieding	120102708020
		U Tin Tun Aung Hlaing	26.7.17	Daw Ohn Mar Myint Ms Rachel Smith-Govoni	050301125008 050301102002
6	Tanintharyi	U Win Zaw Oo	17.1.2017	Mr Felix Schmieding U Sa Si Thu Htike San Ms Hyeran Kim	060201703012
			11-18.11. 2017	Daw Ohn Mar Myint Daw Phyu Pyar Tun	060202715010 060202703009
7	Bago	Daw Mya Mya Thin	15-17.2.2017	Daw War War Myint Daw Thet Htar Nwe Mr Rivandra Royono	070101123008 070105302001 070106735002 070104743008
			26.11.2017	Dr Reena Badiani Magnusson Mr Clarence Tsimpo Nkengne	070305726009
8	Magway	Daw Khin Phway Phway Zaw	23.2.2017	Visit by UNDP Country Director	080501102004
			22.5.2017	Daw Khin Sett Yi Ms Diane Steele Ms Rachel Smith-Govoni	08013108001 08010375003

	State/Region	Supervisor	Date of visit	Quality Assurers	EAs visited
9	Mandalay	Daw Ei Ei Min	24.5.2017 26.5.2017	Daw Khin Sett Yi Ms Diane Steele Ms Rachel Smith-Govoni	09102114002 09201105010 09701725001
10	Mon	U Oo Thant	14-17.2.2017	DG Dr Wah Wah Maung Daw Thet Htar Nwe Daw Ohmar Soe	100201719004 100105103002 100202103005 100204702009
			23.10.2017	Dr Reena Badiani Magnusson	100104201002
11	Rakhine	Daw Nilar Thein	17.1.2017	Daw Khin Sett Yi Ms Rachel Smith-Govoni	110101130002
			18-19.1.2017		110201764004
		Daw Kyi Kyi Than	26.5.2017	Mr Felix Schmieding U Sa Si Thu Htike San	110202715004
12	Yangon	Daw Yadaner Win Aung	16.12.2016	Daw Khin Sett Yi Daw Hsu Hnin Wai Mr Juste Nitiema	120302718002
			5.1.2017	Mr Felix Schmieding U Sa Si Thu Htike San	120102102011
			23.1.2017	Daw Htar Htar Ei	120301112002
			4.2.2017	Ms Rachel Smith-Govoni Daw Htar Htar Ei	120205104007 120406119014
			2.5.2017	DG Dr Wah Wah Maung Daw Win Pa Pa Zaw	120103102005
			14.2.2017	Ms Rachel Smith-Govoni Daw Htar Htar Ei	120308119008
			21.2.2017	Mr Felix Schmieding U Sa Si Thu Htike San	120108708020
			4.4.2017	Daw Htar Htar Ei	120204114040
			1.5.2017	Daw Htar Htar Ei Ms Rachel Smith-Govoni	120214106013 120203104012
			6.5.2017	Daw Htar Htar Ei	120410105005
13	Shan (North)	U Win Zaw Htay	6.5.2017	DG Dr Wah Wah Maung Daw Win Pa Pa Zaw	130103710007
			3.2 2017	Daw Win Pa Pa Zaw Daw Khin Sett Yi	130401107013 130401112022
	Shan (South)	U Thet Aung	17.12.2016	Ms Rachel Smith-Govoni	130102720007
14	Ayeyarwady	Daw Maw Maw Khin	18-22.9.17	Daw Khin Sett Yi Daw Than Than Soe	140402109001 140302107001 140303739005
		U Soe Htet Paing	13-14.2.2017	Mr Felix Schmieding U Sa Si Thu Htike San	140201772003
15	Nay Pyi Taw	Daw Maw Maw Nyein	13.1.2017	Daw Thet Htar Nwe Ms Rachel Smith-Govoni	150102708021
			5.5.2017	Daw Khin Sett Yi Ms Rachel Smith-Govoni	150202703008

4.2. QA reports generated from the in-field data entry program

Within the CSPro program a number of tables were produced at the enumerator level and on a weekly basis (see Annex 5). Tables were provided to the MLCS central team on a weekly basis to examine if issues were arising. Before each QA visit the Quality Assurers reviewed the most recent tables for the team they were visiting.

The main tables produced were:

- **Number of interviews completed each week:** Enabling the team to see if any team or enumerator were particularly slow and to investigate the cause for this.
- **Average Household Size:** Compared to other data sources, such as the Census 2014, LFS etc. and examined if particular enumerator were recording fewer people in the household and whether this could be explained.
- **Average number of items consumed in the last 7 days:** Taken from Section 5A this counts the number of different types of food consumed over one week. The number of items may change by season as some products become available and others are no longer available. The number of items may also differ by region or in remote areas where fewer items are available. As Section 5A is time consuming (an average of 38 minutes) examining this data helped identify whether enumerator fatigue had become an issue.
- **Average number of items purchased in the last 7 days:** Taken from Sections 5C & 5D this counts the number of different types of products purchased and again can be examined to see whether fatigue over the 12 months of the survey is an issue.
- **Average number of durable goods owned:** Taken from Section 6 this can be compared to other data sources, MPLCS, DHS etc.
- **Average time taken to complete interviews:** The average time taken to complete an interview was two hours and twenty minutes. This data could be examined to see if any enumerators were completing interviews particularly quickly.

The reports were examined every week and occasionally action had to be taken as a consequence of seeing the results. For example in February 2017 the QA report showed one Ayeyawaddy team was late delivering questionnaires. A QA trip was undertaken to examine the delay and identified a misunderstanding about the purpose of in-field data entry. This was rectified by the team and the problem didn't arise again. In April the QA report identified an enumerator in Naypyitaw whose interviews averaged one hour 23 minutes in length (almost one hour faster than the overall average time). A specific QA visit was carried out to examine his interviewing style and give the enumerator advice how to improve his work. In July the QA report showed a noticeable reduction in the number of food items consumed for one of the Shan teams. The Supervisor was contacted and made aware of the issue and told to follow the work of his enumerators. The work improved again after this intervention.

05.

WEIGHTING AND SAMPLING ERROR CALCULATION

5.1 Weighting procedures

In order for the MLCS 2017 sample estimates to be representative of the population, it was necessary to multiply the data by a sampling weight, or expansion factor. The basic weight for each sample household is 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 are maintained in an Excel spreadsheet with information from the sampling frame for each sample EA so that the corresponding overall probability and corresponding weight can be calculated.

Based on the Myanmar Master Sample design and the sampling procedures for the MLCS 2017, the overall probability of selection for the MLCS 2017 sample households can be expressed as follows:

$$p_{hi} = \frac{n_h \times M_{hi}}{M_h} \times \frac{n'_h}{n_h} \times p_{Shi} \times \frac{m_{hi}}{M'_{hi}} = \frac{n'_h \times M_{hi}}{M_h} \times p_{Shi} \times \frac{m_{hi}}{M'_{hi}},$$

where:

p_{hi} = probability of selection for the sample households in the i-th sample EA in stratum h for the MLCS 2017

n_h = number of sample EAs selected in stratum h for the Master Sample, specified in Table 2.3

M_h = total number of households in the 2014 Census frame for stratum h

M_{hi} = total number of households in the 2014 Census frame for the i-th sample EA in stratum h

n'_h = number of MLCS 2017 sample EAs selected from the Master Sample for stratum h, specified in Table 2.3

p_{Shi} = probability of selection for the selected segment in large sample EA that is subdivided; this probability is equal to 1 for all EAs that are not segmented

m_{hi} = number of sample households selected in the i-th sample EA in stratum h (12)

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

The different components of this probability of selection correspond to the individual sampling stages. The probability of selecting a segment in a large EA (p_{Shi}) depends on the type of selection procedure that is used. If the sample segment is selected with PPS, this probability would be calculated as follows:

$$p_{Shi} = \frac{M''_{hij}}{M''_{hi}},$$

where:

M''_{hij} = total number of housing units or households from the quick count for the j-th selected segment in the i-th sample EA in stratum h

M''_{hi} = total number of housing units or households from the quick count for the i-th sample EA in stratum h

If one segment is selected randomly with equal probability, this probability would be calculated as follows:

$$p_{Shi} = \frac{1}{S_{hi}},$$

where:

S_{hi} = total number of segments in the i-th large sample EA in stratum h

The basic sampling weight, or expansion factor for the MLCS 2017 sample households, is calculated as the inverse of this probability of selection. Based on the previous expression for the probability, the weight can be simplified as follows:

$$W_{hi} = \frac{M_h \times M'_{hi}}{n'_h \times p_{Shi} \times M_{hi} \times m_{hi}},$$

where:

W_{hi} = basic weight for the MLCS 2017 sample households in the i-th sample EA in stratum h

5.2. Weighting to take account of non-response

For the MLCS 2017 the sample households which could not be interviewed were replaced with one of the four replacement households selected from the Household Selection Table. It is important to adjust the sample household weights to take into account the non-interview households in each sample EA. Since the weights are calculated at the level of the sample EA, it would be advantageous to adjust the weights at this level. The final weight (W'_{hi}) for the sample households in the i-th sample EA in stratum h can be expressed as follows:

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

where:

m'_{hi} = total number of valid (occupied) sample households selected in the i-th sample EA in stratum h for the MLCS 2017

m''_{hi} = total number of sample households with completed MLCS 2017 interviews in the i-th sample EA in stratum h, including replacements

If each non-interview household is replaced within a sample EA, the weight adjustment factor would be equal to 1.

By the end of the data collection 13,730 households were successfully interviewed from the sample size of 13,824 original households. The completed interviews included 348 replacement households. The distribution of the final sample households interviewed by replacement status is presented in Table 5.1

Table 5.1

Completed Household Interviews for MLCS 2017 by State/Region

	Total expected interviews	Number of actual interviews from Original EAs	Number of actual interviews from Replacement EAs
Kachin	864	840	24
Kayah	864	840	24
Kayin	864	852	12
Chin	864	864	-
Sagaing	864	864	-
Tanintharyi	864	852	12
Bago	864	840	24
Magway	864	864	-
Mandalay	864	863	-
Mon	864	864	-
Rakhine	864	684	180
Yangon	1,152	1143	-
Shan	1,152	1020	48
Ayeyarwady	1,152	1152	-
Nay Pyi Taw	864	840	24
Total	**13,824**	**13,382**	**348**

5.3. Final Response Rate

The final household response divides the number of actual interviews achieved (13,730) by the total number of attempts to interview (14,668) producing **a final household response rate of 93.6%.**

5.4. Survey Estimate from MLCS 2017 data

The most common estimates calculated from the MLCS 2017 data are in the form of totals and ratios. The survey estimate of a total can be expressed as follows:

$$\hat{Y} = \sum_{h=1}^{L} \sum_{i=1}^{n_h} \sum_{j=1}^{m_{hi}} W'_{hi}\, y_{hij} \ ,$$

where:

L = number of strata (state/region, urban/rural) for the domain

y_{hij} = = value of variable y for the j-th sample household in the i-th sample EA in stratum h

The survey estimate of a ratio is defined as follows:

$$\hat{R} = \frac{\hat{Y}}{\hat{X}} \ ,$$

where $\hat{Y}$ and $\hat{X}$ are estimates of totals for variables y and x, respectively, calculated as specified previously.

In the case of a stratified multi-stage sample design, means and proportions are special types of ratios. In the case of the mean, the variable x, in the denominator of the ratio, is defined to equal 1 for each element so that the denominator is the sum of the weights. For a proportion, the variable x in the denominator is also defined to equal 1 for all elements; the variable y in the numerator is binomial and is defined to equal either 0 or 1, depending on the absence or presence, respectively, of a specified characteristic for the element.

5.5. Calculation of Sampling Errors

Tables with calculated sampling errors and confidence intervals for all survey estimates in the MLCS 2017 Report can be found on the CSO website.

The standard error, or square root of the variance, is used to measure the sampling error, although it may also include a small variable part of the non-sampling error. The variance estimator should take into account the different aspects of the sample design, such as the stratification and clustering. Stata (using a linearized Taylor series variance estimator) has been used to calculate the variances for survey data from stratified the multi-stage sample designs of MLCS 2017.

For each estimate the output tables show the standard error, coefficient of variation (CV), 95 percent confidence interval, the design effect (DEFF) and the number of observations. The design effect is defined as the ratio of the variance of an estimate from a complex (stratified, multi-stage) sample to the variance of a simple random sample of the same size. It is a relative measure of the sampling efficiency. Most of the design effects are greater than 1 given the clustering effects in the sample design.

The variance estimator of a total can be expressed as follows:

$$V(\hat{Y}) = \sum_{h=1}^{L} \left[\frac{n_h}{n_h - 1} \sum_{i=1}^{n_h} \left(\hat{Y}_{hi} - \frac{\hat{Y}_h}{n_h} \right)^2 \right],$$

where:

$$\hat{Y}_{hi} = \sum_{j=1}^{m_h} W'_{hi}\, y_{hij}$$

$$\hat{Y}_h = \sum_{i=1}^{n_h} \hat{Y}_{hi}$$

The variance estimator of a ratio can be expressed as follows:

$$V(\hat{R}) = \frac{1}{\hat{X}^2} \left[V(\hat{Y}) + \hat{R}^2\, V(\hat{X}) - 2\, \hat{R}\, COV(\hat{X}, \hat{Y}) \right],$$

where:

$$COV(\hat{X}, \hat{Y}) = \sum_{h=1}^{L} \left[\frac{n_h}{n_h - 1} \sum_{i=1}^{n_h} \left(\hat{X}_{hi} - \frac{\hat{X}_h}{n_h} \right) \left(\hat{Y}_{hi} - \frac{\hat{Y}_h}{n_h} \right) \right]$$

$V(\hat{Y})$ and $V(\hat{X})$ are calculated according to the formula for the variance of a total.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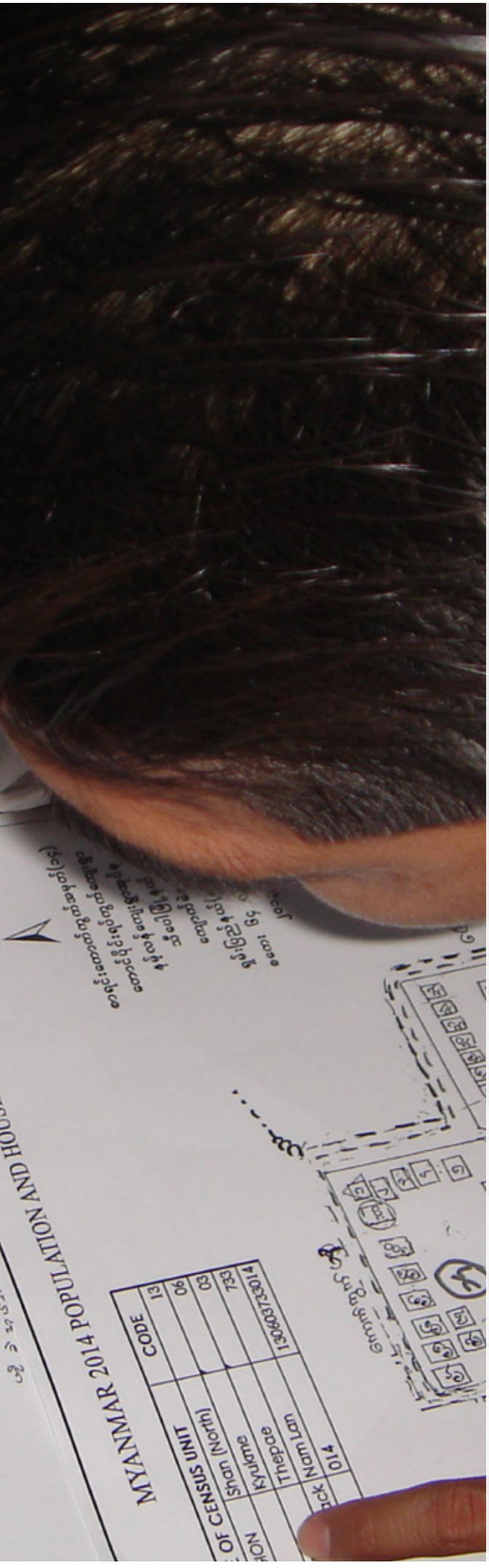
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ANNEXES

Annex A: Sample size determination for MLCS 2017

It was useful to tabulate the sampling errors, confidence intervals and design effects for key estimates from MPLCS in order to examine the sample size requirements for the MLCS 2017 and study the efficiency of the sample design.

The design effect is defined as the ratio of the variance of an estimate from the actual sample design and the corresponding variance from a simple random sample of the same size; it is a measure of the relative efficiency of the sample design, which mostly depends on the clustering effect.

The previous national household surveys in Myanmar that included information related to household expenditure and the measurements of poverty were the *2005 and 2010 Integrated Household Living Conditions Assessment Survey (IHLCA),* and the *2015 Myanmar Poverty and Living Conditions Survey (MPLCS).* One limitation of the IHLCA sample design is that no recent Census of Population and Housing was available for constructing the sampling frame at that time. The primary sampling units (PSUs) selected at the first stage were townships, resulting in an extremely clustered sample. Two townships were selected per district, so there were a total of 124 sample PSUs. There were three additional stages of selection, but much of the sampling errors will come from the between-PSU variance component, resulting in very high design effects, indicating that the sample design is very inefficient. The data from the 2010 IHLCA were used for calculating the sampling errors, which confirmed that the design effects were very high, so these survey data could not be used to estimate the level of precision that can be expected from the MLCS 2017. On the other hand, the 2015 MPLCS sample design was based on the new Master Sample selected from the 2014 Myanmar Census of Population and Housing frame, which is also being used for selecting the sample EAs for the MLCS 2017. Therefore the 2015 MPLCS data were used for tabulating sampling errors and design effects for key indicators in order to simulate the level of precision that can be expected from alternative sample designs for the MLCS 2017.

In order to calculate the sampling errors for estimates from the 2015 MPLCS data, it is first necessary to understand the sample design for this survey. Therefore a brief description of the sample design is presented here. A more detailed description of the sample design and estimation procedures for the 2015 MPLCS is included in the report on "Sample Design and Estimation Procedures for the 2015 Myanmar Poverty and Living Conditions Survey" (Megill, September 2015).

The geographic domains of analysis for the MPLCS were five agro-ecological zones that were combinations of states/regions, as defined in Table A1; the state of Yangon is considered an individual domain. The sampling strata were defined as the urban and rural areas of each state/ region, the same as the stratification of the Master Sample. A total of 60 sample EAs were allocated to each zone except for Yangon, where 64 sample EAs were selected. With a sample of 12 households selected per sample EA, this resulted in a sample size of 768 households for Yangon and 720 households for each of the remaining zones, for an overall sample size of 3,648 households.

Table A1

Distribution of Sample EAs and Sample Households for the MPLCS by Region, Urban and Rural Stratum

Zone	State	Urban		Rural		Total	
		Sample	Sample	Sample	Sample	Sample	Sample
Hills and Mountains	Kachin	4	48	5	60	9	108
	Kayah	2	24	2	24	4	48
	Kayin	3	36	7	84	10	120
	Chin	2	24	2	24	4	48
	Shan	8	96	25	300	33	396
Dry zone	Sagaing	4	48	14	168	18	216
	Magway	3	36	12	144	15	180
	Mandalay	8	96	14	168	22	264
	Nay Pyi Taw	2	24	3	36	5	60
Delta	Bago	5	60	17	204	22	264
	Mon	3	36	6	72	9	108
	Ayeyarwady	5	60	24	288	29	348
Coastal	Tanintharyi	6	72	14	168	20	240
	Rakhine	7	84	33	396	40	480
Yangon	Yangon	45	540	19	228	64	768
Total		**107**	**1,284**	**197**	**2,364**	**304**	**3,648**

In allocating the sample EAs within each zone to the urban strata, the proportion of urban households in each zone was first multiplied by a factor of 1.3 for all zones except Yangon in order to increase the overall number of sample urban households compared to a strictly proportional allocation. Since the Yangon zone is predominantly urban, the sample allocation by stratum for this zone was based on a simple proportional allocation. At the national level, this resulted in a total sample of 107 urban EAs and 197 rural EAs, with a corresponding overall sample size of 1,284 urban households and 2,364 rural households. Within the urban and rural stratum of each zone the sample EAs were then allocated proportionately to the corresponding strata in each state/region. The final allocation of the sample EAs and households for the 2015 MPLCS by state/region, urban and rural strata is presented in Table 2.4.

For calculating the sampling errors it is important that the variance estimator take into account the effects of the stratification and clustering in the sample design. The Complex Samples module of SPSS was used for tabulating the standard errors, 95% confidence intervals and design effects for selected indicators based on the stratified multi-stage sample design. It uses a linearized Taylor series variance estimator, which is described later in the section on "Calculation of Sampling Errors".

The measures of precision were tabulated for the estimates of the average per capita expenditures and the poverty rate at the national level, for the urban and rural strata and by state/region, from the 2015 MPLCS data. The results for the estimates of average per capita expenditure by domain are presented for illustrative purposes. It should be pointed out that since the sample within each zone was allocated to the state/regions proportionately to their size, the smallest states/regions within each zone will have a relatively small sample size. The estimates at the regional level cannot be

considered reliable since the sample was designed for zone-level domains. However, the estimates of the sampling errors and design effects at the regional level were still useful for conducting a simulation study of the expected level of precision for key estimates from the MLCS 2017 data based on different sampling alternatives, as described in the next section.

Sample Size and Allocation for MLCS 2017

The sample size for household surveys such as the MLCS 2017 is determined by the accuracy required for the survey estimates for each domain, as well as by the logistical, timing and resource constraints. The accuracy of the survey results depends on both the sampling error, which can be measured through variance estimation, and the non-sampling error, which results from all other sources of error, including response and measurement errors as well as coding, keying and processing errors. The sampling error is inversely proportional to the square root of the sample size. On the other hand, the non-sampling error may increase with the sample size, since it is more difficult to control the quality of a larger survey operation. It is therefore important that the overall sample size be manageable for quality and operational control purposes. This is especially important given the challenge of collecting accurate information on household income and expenditures, as well as crop production.

The geographic domains of analysis for the MLCS 2017 are the 15 states or regions of Myanmar, identified in Table 2.4. The urban and rural areas will also be domains at the national level. It is necessary to ensure that each of these domains have a sufficient number of sample households to obtain reliable survey estimates at the domain level. One important consideration in the allocation of the sample by state/region is that the sample size for a particular domain does not depend on the total population of the domain. The only exception would be if there were extremely small domains where the overall sampling rate was greater than 5%, which is not the case for the states/regions. Since a similar level of precision is required for each state/region, a similar number of sample EAs and households should be selected in each. It would only be necessary to increase the sample size slightly for any state/region which has a greater variability in socioeconomic characteristics, or a larger design effect from the clustering of the sample, as explained later.

Each state/region is further divided into urban and rural sampling strata, corresponding to the stratification of the master sample by state/region, urban and rural areas. This stratification will improve the statistical efficiency of the sample design, but the MLCS 2017 results will not be obtained at the sampling stratum level.

Another important consideration in the sample design is how many households to select in each sample cluster (EA). For this type of socioeconomic survey it has been found in various countries that the optimum number of sample households to be selected per cluster is generally close to 12, so it was decided to select 12 households per EA for the MLCS 2017. This provides an effective balance between the number of sample EAs and the number of sample households per EA, and provides a reasonable dispersion of the sample. If the number of sample households per EA were to be increased, this would result in higher design effects and sampling errors.

In order to spread the sample evenly to the 12 months within each state/region, the total number of sample EAs allocated to each state/region should be a multiple of 12. A nationally-representative subsample of EAs will be assigned to each quarter, and these EAs will be evenly allocated to the months within the quarter, in order to ensure that seasonality is effectively represented throughout the year. Given that a similar level of precision will be required for the survey estimates from each state/region, a similar sample size is needed for each of these domains. However, the sample

size may be increased some for states/regions that have a greater design effect or variability in socioeconomic characteristics. In reviewing the sampling errors and design effects for the estimates of average per capita expenditure from the 2015 MPLCS data, it was found that Yangon, Shan and Ayeyarwady have the higher design effects and variability, so it was decided to allocate a slightly larger sample for these domains. Two different sampling alternatives were compared to study the corresponding level of precision as well as considerations for the relative costs and data quality related to non-sampling error.

Under the first sampling alternative, 6 sample EAs would be enumerated in most states/regions each month, except for Yangon, Shan and Ayeyarwady, where 8 sample EAs would be covered each month. With the selection of 12 sample households per EA, this sampling alternative would result in a total sample of 72 sample EAs and 864 sample households for most states/regions; and 96 sample EAs and 1,152 sample households for Yangon, Shan and Ayeyarwady. At the national level the total sample size for the 12-month period would be 1,152 sample EAs and 13,824 sample households. The urban and rural strata are only considered domains of analysis at the national level. However, the urban and rural strata are defined at the state/region level in order to improve the efficiency of the sample design. One consideration for the allocation of the sample to the urban and rural strata is that there is generally more variability in socioeconomic characteristics within the urban areas, and the cost of the fieldwork is also generally lower in urban areas. For this reason a weight of 2 was applied to the number of urban households in the proportional allocation of the sample to the urban and rural strata of each state/region, except for Yangon, where a strictly proportional allocation was used given that this state is predominantly urban. This sample allocation strategy is designed to increase the proportion of urban households in the MLCS 2017 sample. In this way the proportion of urban households in the sample was increased to 38.5%, compared to 27.5% urban households in the 2014 Census sampling frame. Since the weights applied to the survey data for sample households will be based on the corresponding probabilities of selection, the weighted results for the urban and rural domains will be consistent with the distribution of the frame. This first sampling strategy results in an urban sample of 443 EAs and 5,316 households, a rural sample of 709 EAs and 8,508 households. The allocation of sample EAs and households by state/region and urban/rural stratum under the first sampling alternative is shown in Table 7.4.

The SPSS Complex Samples module was used for calculating the sampling errors from the 2015 MPLCS data for the estimates of average per capita expenditure and the poverty rate at the national level, urban and rural domains, and by state/region. The sampling error tables for the estimates of average per capita expenditure by domain are shown below.

Table A2

Estimates, sampling errors, coefficients of variation (CVs), 95% confidence intervals, design effects and number of observations for average per capita expenditure by domain from 2015 MPLCS data

Domain	Estimate	SE	CV	95% confidence interval		DEFF	No. observations (households)
				Lower	Upper		
Myanmar	871,088	15,241.7	0.017	841,082	901,093	2.9	3,648
Residence							
Urban	1,127,467	36,556.3	0.032	1,055,500	1,199,434	2.8	1,332
Rural	767,877	13,829.4	0.018	740,651	795,102	3.1	2,316
State/Region							
Kachin	822,715	82,633.6	0.100	660,038	985,393	3.7	108
Kayah	862,419	131,179.6	0.152	604,171	1,120,667	2.5	48
Kayin	748,983	65,127.7	0.087	620,768	877,197	2.1	120
Chin	423,978	6,738.1	0.016	410,713	437,243	0.04	48
Sagaing	794,379	37,530.9	0.047	720,493	868,264	3.0	216
Tanintharyi	931,848	62,629.6	0.067	808,552	1,055,144	1.6	240
Bago	756,272	36,440.5	0.048	684,532	828,011	3.5	264
Magway	863,130	31,562.6	0.037	800,994	925,266	2.0	180
Mandalay	901,817	32,837.2	0.036	837,172	966,463	2.1	264
Mon	709,485	37,785.3	0.053	635,099	783,872	2.4	108
Rakhine	737,927	46,822.7	0.063	645,749	830,105	1.3	480
Yangon	1,222,255	61,071.1	0.050	1,102,026	1,342,483	2.9	768
Shan	740,687	35,188.3	0.048	671,413	809,961	3.7	396
Ayeyarwady	859,982	47,293.8	0.055	766,877	953,088	5.4	348
Nay Pyi Taw	1,079,307	35,617.9	0.033	1,009,187	1,149,426	0.5	60

These results were used for the simulation study to estimate the expected level of precision based on the two sampling alternatives. The estimated measures of precision from this simulation study are shown in Tables A4 and A5.

In the case of the second sampling alternative, the sample size would be increased to enumerate 8 sample EAs each month in all states/regions except for Yangon, Shan and Ayeyarwady, where 12 sample EAs would be covered each month. This sampling alternative would result in a total sample of 1,152 sample households for most states/regions, and 1,728 sample households for Yangon, Shan and Ayeyarwady. The total sample size at the national level for the 12-month period would be 1,584 sample EAs and 19,008 sample households. The allocation of the sample to the urban and rural strata within each state/region was based on a similar strategy as that described for the first sampling alternative. This resulted in an urban sample of 620 EAs and 7,440 households, a rural sample of 964 EAs and 11,568 households. The allocation of sample EAs and households by state/region and urban/rural stratum under the second sampling alternative is shown in Table A3.

Table A3

Sampling Alternative 2 – Allocation of Sample Clusters and Households for MLCS 2017

State/Region	Total		Urban		Rural	
	Sample clusters	Sample households	Sample clusters	Sample households	Sample clusters	Sample households
Kachin	96	1,152	48	576	48	576
Kayah	96	1,152	40	480	56	672
Kayin	96	1,152	36	432	60	720
Chin	96	1,152	32	384	64	768
Sagaing	96	1,152	28	336	68	816
Tanintharyi	96	1,152	36	432	60	720
Bago	96	1,152	32	384	64	768
Magway	96	1,152	24	288	72	864
Mandalay	96	1,152	48	576	48	576
Mon	96	1,152	40	480	56	672
Rakhine	96	1,152	24	288	72	864
Yangon	144	1,728	100	1,200	44	528
Shan	144	1,728	56	672	88	1,056
Ayeyarwady	144	1,728	36	432	108	1,296
Nay Pyi Taw	96	1,152	40	480	56	672
Total	**1,584**	**19,008**	**620**	**7,440**	**964**	**11,568**

In order to determine the approximate level of precision that can be expected based on these alternative sample designs, a simulation study was carried out using the sampling error and design effect results from the 2015 MPLCS data. Given that the sample EAs for both the 2015 MPLCS and the MLCS 2017 are selected from the Master Sample based on the 2014 Myanmar Census of Population and Housing, the stratification is the same, and 12 households are selected per sample EA for both surveys, the design effects for key indicators should be similar.

The ratio of the variance (square of the standard error) for a survey estimate based on the proposed sample design for the MLCS 2017 to the corresponding variance based on the 2015 MPLCS data can be expressed as follows:

$$\frac{Var_{MLCS17}(\hat{\theta})}{Var_{MPLCS15}(\hat{\theta})} = \frac{\frac{\sigma_\theta^{\,2}}{n_{MLCS17}} \times DEFF_{MLCS17}}{\frac{\sigma_\theta^{\,2}}{n_{MPLCS15}} \times DEFF_{MPLCS15}},$$

where:

$Var_{MLCS17}(\hat{\theta})$ = approximate variance (square of standard error) for a survey estimate based on a particular sampling alternative for the MLCS 2017

$Var_{MPLCS15}(\hat{\theta})$ = variance for estimate from the 2015 MPLCS data based on the actual sample design

$\sigma_\theta^{\,2}$ = population variance (square of standard deviation) of variable; in the case of the estimate of a proportion (p), $\sigma_\theta^{\,2} = p \times (1-p)$

n_{MLCS17} = proposed number of sample households (for domain of estimation) in the MLCS 2017 based on a particular sampling alternative

$n_{MPLCS15}$ = actual number of sample households (for domain of estimation) for 2015 MPLCS

Assuming that the standard deviations of the variables and the design effects of the estimates are similar for the two surveys, this ratio of the variances simplifies as the number of sample households in the 2015 MPLCS to the corresponding number of sample households in the MLCS 2017 for the same domain. From this ratio of the sample sizes for the two surveys, we can calculate the approximate standard error for an estimate that would result from the two different sampling alternatives for the MLCS 2017 as follows:

$$se_{MLCS17}(\hat{\theta}) = \sqrt{Var_{MLCS17}(\hat{\theta})} \approx \sqrt{Var_{MPLCS15}(\hat{\theta}) \times \frac{n_{MPLCS15}}{n_{MLCS17}}} = se_{MPLCS15}(\hat{\theta}) \times \sqrt{\frac{n_{MPLCS15}}{n_{MLCS17}}}$$

This formula was used with the 2015 MPLCS estimates of standard errors in order to determine the approximate level of precision for the estimates by domain based on the two sampling alternatives described above. This study was based on the tabulated sampling errors for average per capita expenditure and the poverty rate from the 2015 MPLCS data.

A practical measure of precision for comparing the expected results from the two sampling alternatives is the margin of error, which is equal to half of the width of the confidence interval (that is, the +/- value). In the case of a 95% confidence level, the margin of error is calculated as follows:

$$ME_{MLCS17}(\hat{\theta}) = 1.96 \times se_{MLCS17}(\hat{\theta}) = 1.96 \times se_{MPLCS15}(\hat{\theta}) \times \sqrt{\frac{n_{MPLCS15}}{n_{MLCS17}}}$$

In the case of an indicator which is a proportion, it is useful to compare the margins of error from the different sampling alternatives. However, for indicators which are in the form of averages or totals, it is more relevant to compare the relative margin of error, which is equal to the margin of error divided by the value of the estimate, expressed as a proportion or percentage.

The results from this simulation study for the estimates of the average per capita expenditure by state/region from the two sampling alternatives for the MLCS 2017 are presented in Table A4.

Table A4

Simulation of Expected Level of Precision for MLCS 2017 Estimates of Average per Capita Expenditure by State/Region for Two Sampling Alternatives, Based on 2015 MPLCS Data

State/Region	DEFF (MPLCS)	Sampling alternative 1		Sampling alternative 2	
		Sample households	Relative ME	Sample households	Relative ME
Kachin	3.7	864	7.0	1,152	6.0
Kayah	2.5	864	7.0	1,152	6.1
Kayin	2.1	864	6.4	1,152	5.5
Chin	1.0*	864	3.5	1,152	3.0
Sagaing	3.0	864	4.6	1,152	4.0
Tanintharyi	1.6	864	6.9	1,152	6.0
Bago	3.5	864	5.2	1,152	4.5
Magway	2.0	864	3.3	1,152	2.8
Mandalay	2.1	864	3.9	1,152	3.4
Mon	2.4	864	3.7	1,152	3.2
Rakhine	1.3	864	9.3	1,152	8.0
Yangon	2.9	1,152	8.0	1,728	6.5
Shan	3.7	1,152	5.5	1,728	4.5
Ayeyarwady	5.4	1,152	5.9	1,728	4.8
Nay Pyi Taw	1.0*	864	2.4	1,152	2.1

*The estimates of the DEFF that were calculated with a value of less than 1 were rounded up to 1 in order to provide more realistic results.

Under both sampling alternatives the relative margins of error are under 10%, indicating an acceptable level of precision. As expected, since the sample size is larger under the second sampling alternative, the margins of error are slightly lower than those from the first sampling alternative. However, the gain in precision from the corresponding increase in sample size is relatively small. The design effect for Ayeyarwady is relatively high (5.4), indicating a larger clustering effect for average per capita expenditure in this state, and a larger variability between the clusters. The design effects calculated from the 2015 MPLCS data for two states were less than 1, which is unusual and cannot be expected to happen again, so these design effects were rounded up to 1 for the simulation study. The sample size for the 2015 MPLCS for some states was relatively small, so the corresponding estimates of the design effects are less robust and more variable. It is expected that the design effects from the MLCS 2017 data will have less extreme values compared to the 2015 MPLCS.

The results of the simulation study on the expected levels of precision for estimates of the poverty rate by state/region based on the two sampling alternatives are presented in Table 8. The margins of error for the poverty rate by state/region are less than 8% under both sampling options, so the level of precision is also acceptable for this indicator. The design effect for Ayeyarwady (9.8) is even higher than for the estimate of average per capita expenditure, indicating that there is also a relatively high level of clustering for poverty in this state.

Table A5

Simulation of Level of Precision for MLCS Estimates of Poverty Rate by State/Region for Two Sampling Alternatives, Based on 2015 MPLCS Data

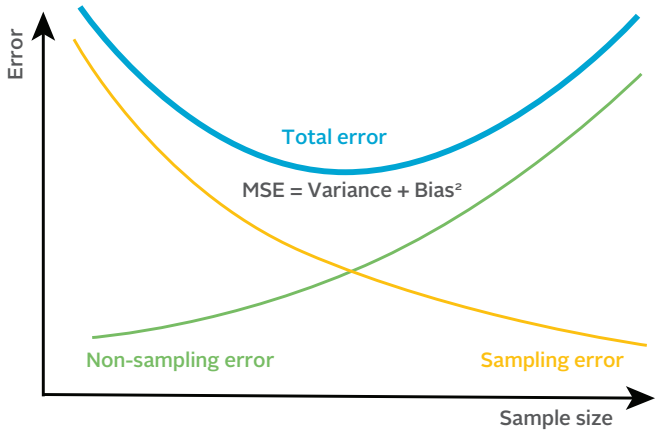
State/Region	DEFF (MPLCS)	Sampling alternative 1		Sampling alternative 2	
		Sample households	Margin of error	Sample households	Margin of error
Kachin	3.6	864	6.0	1,152	5.2
Kayah	2.3	864	6.1	1,152	5.3
Kayin	2.2	864	5.2	1,152	4.5
Chin	1.0*	864	2.2	1,152	1.9
Sagaing	2.2	864	3.7	1,152	3.2
Tanintharyi	2.3	864	5.5	1,152	4.7
Bago	3.3	864	4.6	1,152	4.0
Magway	2.8	864	4.0	1,152	3.5
Mandalay	2.0	864	3.5	1,152	3.0
Mon	3.2	864	4.6	1,152	4.0
Rakhine	2.1	864	6.8	1,152	5.9
Yangon	1.2	1,152	3.1	1,728	2.5
Shan	3.2	1,152	5.2	1,728	4.2
Ayeyarwady	9.8	1,152	6.9	1,728	5.6
Nay Pyi Taw	3.4	864	3.9	1,152	3.4

*The estimates of the DEFF that were calculated with a value of less than 1 were rounded up to 1 in order to provide more realistic results.

In determining the most effective sampling alternative, it is also important to consider the effects of non-sampling error on the accuracy of the survey results. The accuracy of survey estimates depends on the total error, which is measured by the mean square error, defined as follows:

$$MSE = Variance + Bias^2$$

The variance is the square of the standard error, so it is based on the sampling variability; the variance decreases in relation to the sample size. The bias comes mostly from systematic non-sampling errors. As the sample size increases the non-sampling error and corresponding bias tend to increase since it is more difficult to manage and control the quality of a larger survey operation. The following graph shows the relationship of the sample size to both sampling and non-sampling errors:



It can be seen in this graph that the when the sample size is increased beyond a certain point the accuracy of the survey estimates actually begins to decrease because of the increased non-sampling errors.

Given the relatively small reduction in the margins of error under the second sampling alternative, and considering the effects of potentially higher non-sampling errors, the World Bank Consultants recommended that the first sampling alternative with a total sample size of 1,152 clusters and 13,824 households be used for the MLCS 2017.

Summary

The overall sample size depends on the level of precision that is required for individual domains, which in the case of MLCS 2017 is States and Regions. One could use the Multi Indicator Cluster Survey (MICS) formula below for determining the sample size an individual domain, you would then need to add up the sample size for all the domains to the national level.

$$n = \frac{4\mathrm{r}\,(1-\mathrm{r})\,\mathrm{f}\,(1.1)}{(0.12r)^{2}\;\mathrm{p}\;n_h}$$

where:

n = is the required sample size

4 = is a factor to achieve the 95% confidence level

r = is the predicted or anticipated prevalence (coverage rate) for the indicator being estimated

1.1 = is a factor necessary to raise the sample size by 10% for non-response

f = is a shortened symbol for design effect (deff)

0.12r = is the margin of error to be tolerated at the 95% level of confidence, defined as 12 percent of r (12 percent thus represents the relative sampling error of r)

p = is the proportion of the total population upon which the indicator, r, is based, and

n_h = is average household size.

This formula estimates the sample size for one domain, applying only to one indicator.

An important consideration is that we are tabulating many different indicators from the MLCS data and each indicator would need a different sample size. Although you could choose the largest sample size needed for all the indicators, this would result in a very large sample size that is not affordable, so there is a need to compromise after examining the sample size requirements for the different indicators as well as the survey budget.

In the case of the MLCS 2017 sample design, we did not have to use a formula such as that above based on guessing the different parameters, because we had actual data from the MPLCS 2015 and these data provided a much more accurate estimate of the level of precision through the simulation study described above.

Annex B: MLCS 2017: Listing Form

State/Region			
District			
Township			
Ward/Village tract			
EA			

Total Number of Households in the EA

Lister Name _____

Listing Date _____

1	2	3	4	5	6	7	8
Building code from map	Address / Description of Building	Number for units without physical number	Status of Building **Residential .....1** Only Commercial ...2 END Only Institution.....3 END	Status of Residential building **Occupied .....1** Unoccupied....2 END Destroyed....3 END	Name of Head of Household	Serial Number (only if 1 in col 4 AND 1 in col 5)	Tick if selected (1-12) from Household Selection Table

Annex C: Non-enumerated and non-visited EAs and reason

	CLUSTER	EACODE	STATE/REGION	DISTRICT	TOWNSHIP	VILLAGE/WARD	U/R	Reason for replacing
1	25	10106712001	Kachin	Myitkyina	Gawt Maw	Hsawlaw Ward	2	SECURITY ISSUES KIA
2	65	10304718002	Kachin	Bhamo	Mansi	Mai Bat	2	SECURITY ISSUES KIA
3	140	20202703001	Kayah	Bawlakhe	Hpasawng	Ba Han Lawt	2	SECURITY ISSUES KNPP
4	141	20202706001	Kayah	Bawlakhe	Hpasawng	Mawchi	2	SECURITY ISSUES KNPP
5	216	30452717001	Kayin	Kawkareik	KYAIK DONE (Sub-township)	Khwar Hay	2	SECURITY ISSUES KNU
6	432	60353701014	Tanintharyi	Kawthoung	Karathuri	Ma Thay	2	MAP/DATABASE PROBLEM FROM CENSUS
7	433	70101102039	Bago	Bago	Bago	Myo Twin (East-Kha Gway)	1	FOREST – NO HOUSEHOLDS
8	500	70406777701	Bago	Thayarwady	Nattalin	Pyin Ma Khaung	2	FOREST – NO HOUSEHOLDS
9	725	110101705010	Rakhine	Sittwe	Sittwe	Aung Daing	2	CENTRAL RAKHINE, SECURITY ISSUE IN Q4
10	730	110102737002	Rakhine	Sittwe	Ponnagyun	Kar Di	2	CENTRAL RAKHINE, SECURITY ISSUE IN Q4
11	2102	110101727029	Rakhine	Sittwe	Sittwe	Bu May	2	CENTRAL RAKHINE, SECURITY ISSUE IN Q4
12	2107	110203718003	Rakhine	Mrauk-U	Minbya	Shwe Ta Mar	2	CENTRAL RAKHINE, SECURITY ISSUE IN Q4
13	757	110301102005	Rakhine	Maungdaw	Maungdaw	Myo Ma (South)	1	NORTHERN RAKHINE
14	758	110301708001	Rakhine	Maungdaw	Maungdaw	Kha Maung Seik	2	NORTHERN RAKHINE
15	759	110301723001	Rakhine	Maungdaw	Maungdaw	DonePaik	2	NORTHERN RAKHINE
16	760	110301744001	Rakhine	Maungdaw	Maungdaw	Myaw Taung	2	NORTHERN RAKHINE
17	761	110301758004	Rakhine	Maungdaw	Maungdaw	Ka Nyin Taw	2	NORTHERN RAKHINE
18	762	110301769005	Rakhine	Maungdaw	Maungdaw	(Du) Chee Yar Tan	2	NORTHERN RAKHINE
19	763	110301784003	Rakhine	Maungdaw	Maungdaw	Kyauk Pan Du	2	NORTHERN RAKHINE
20	764	110302103001	Rakhine	Maungdaw	Buthidaung	Myo Thit	1	NORTHERN RAKHINE
21	765	110302714001	Rakhine	Maungdaw	Buthidaung	Nga Yant Chaung	2	NORTHERN RAKHINE
22	766	110302727004	Rakhine	Maungdaw	Buthidaung	AwRaMa(a)Yee	2	NORTHERN RAKHINE
23	767	110302739003	Rakhine	Maungdaw	Buthidaung	Ka Kyet Bet Kan P	2	NORTHERN RAKHINE

	CLUSTER	EACODE	STATE/REGION	DISTRICT	TOWNSHIP	VILLAGE/WARD	U/R	Reason for replacing
24	768	110302758001	Rakhine	Maungdaw	Buthidaung	Hpa Yar Pyin Thein Tan	2	NORTHERN RAKHINE
25	769	110351703005	Rakhine	Maungdaw	Taungpyoletwea(Sub-Tsp)	Kun Thee Pin	2	NORTHERN RAKHINE
26	2110	110301765005	Rakhine	Maungdaw	Maungdaw	Pan Taw Pyin	2	NORTHERN RAKHINE
27	2111	110302748001	Rakhine	Maungdaw	Buthidaung	Pyin Chaung	2	NORTHERN RAKHINE
28	925	130206707004	Shan (South)	Loilen	Mongkung	Hkay Ong Awayt	2	SECURITY ISSUES RCSS, POPPY GROWING
29	928	130253701009	Shan	Loilen	Kar Li (Sub-tsp)	Keng Lun	2	SECURITY ISSUES SSA, POPPY GROWING
30	929	130255703003	Shan	Loilen	Mongsan (Hmonesan) (Sub-tsp)	Hopong	2	SECURITY ISSUES SSA, POPPY GROWING
31	942	130404726001	Shan	Lashio	Tangyan	Tawng Hyoe	2	NEAR WA AREA, NO ACCESS
32	978	135003701016	Shan (E)	Mine Lar (Wa D)	Nam pan	War Maing Phar Kyan	2	WA AREA, NO ACCESS
33	979	135601704003	Shan	Wan Hong	Mong Hsat	Mong Yan (Tar Ku)	2	WA AREA, NO ACCESS
34	980	136002703001	Shan	Minemaw	Nhar Wee	Waine Kaung	2	WA AREA, NO ACCESS
35	981	136006708002	Shan	Minemaw	Mut Right	Sa Out	2	WA AREA, NO ACCESS
36	982	136011703006	Shan (N)	Minemaw	Kaut Maing	Sa Maung Laing	2	WA AREA, NO ACCESS
37	983	136105704003	Shan	Wain Kaung	Pan Yan	Young Sai	2	WA AREA, NO ACCESS
38	984	136206702001	Shan	Mine Pauk	Mine Nyin	Nang Paw	2	WA AREA, NO ACCESS
39	1100	150103101013	Naypyitaw	Naypyitaw(North)	Oaktarathiri	Oke Ta Ra Thi Ri	1	ONLY GOVERNMENT OFFICE BUILDINGS
40	1139	150203101001	Naypyitaw	Naypyitaw(South)	Za Bu Thi Ri	Zay Ya Theik Di	1	PRESIDENTS COMPOUND

Annex D: CSO and non CSO people used in listing and survey teams

	Number of issued EAs	Number of survey teams	Number of listing teams	Number of supervisors - CSO	Number of enumerators	Number of in field data entry	Number of listers - CSO	Number of listers - non-CSO	Total team members
Kachin	72	1	1	1	3	1	1	1	7
Kayah	72	1	1	1	3	1	-	2	7
Kayin	72	1	1	1	3	1	-	2	7
Chin	72	2	2	2	6	2	-	4	14
Sagaing	72	2	2	2	6	2	1	3	14
Tanintharyi	72	1	1	1	3	1	1	1	7
Bago	72	1	1	1	3	1	1	1	7
Magway	72	1	1	1	3	1	-	2	7
Mandalay	72	1	1	1	3	1	-	2	7
Mon	72	1	1	1	3	1	1	1	7
Rakhine	72	2	2	2	6	2	-	4	14
Yangon	96	1	1	1	3	1	1	1	7
Shan	96	2	2	2	6	2	1	3	14
Ayeyarwady	96	2	2	2	6	2	1	3	14
Naypyitaw	72	1	1	1	3	1	-	2	7
Total	1152	20	20	20	60	20	8	32	140

Annex E: QA results generated from in-field data entry program

Figure 1a:

Average household size by week of fieldwork

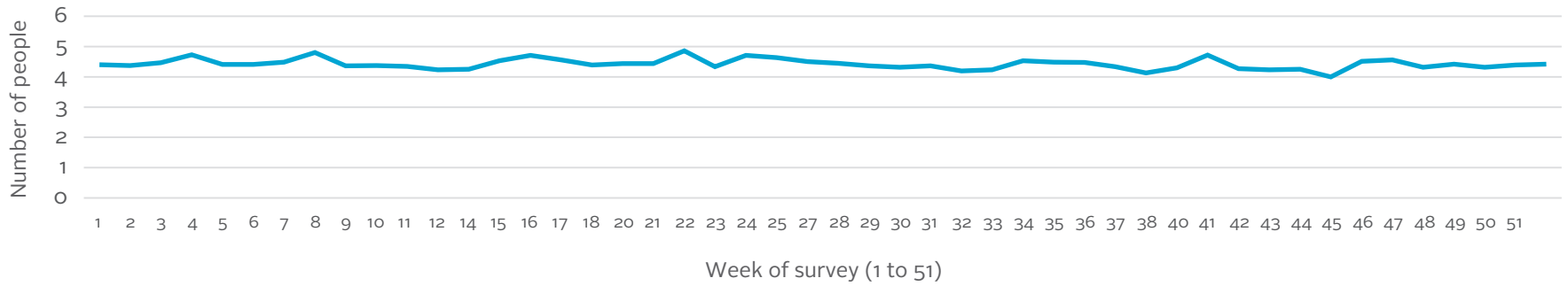


Figure 1b:

Average household size by enumerator

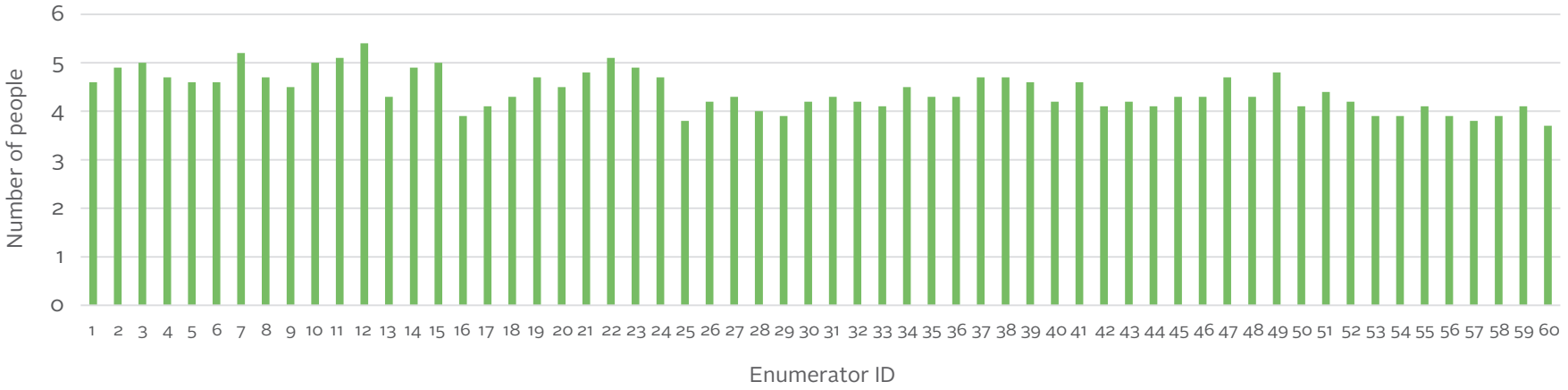


Figure 2a:

Average number of food products consumed in last 7 days by week of interview

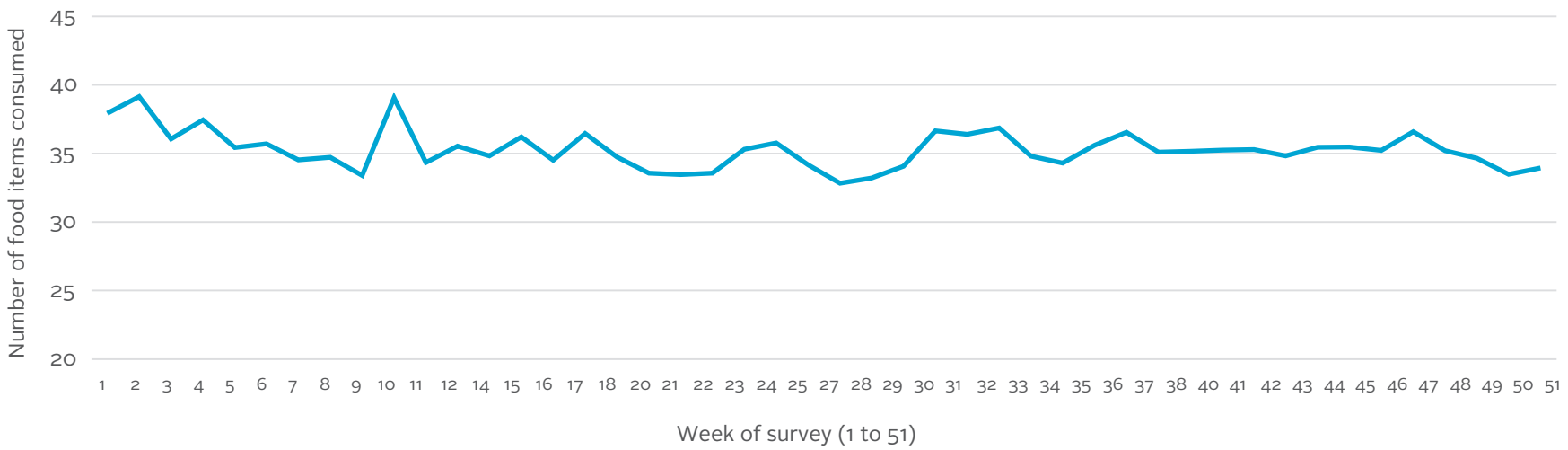


Figure 2b:

Average number of food products consumed in last 7 days by enumerator

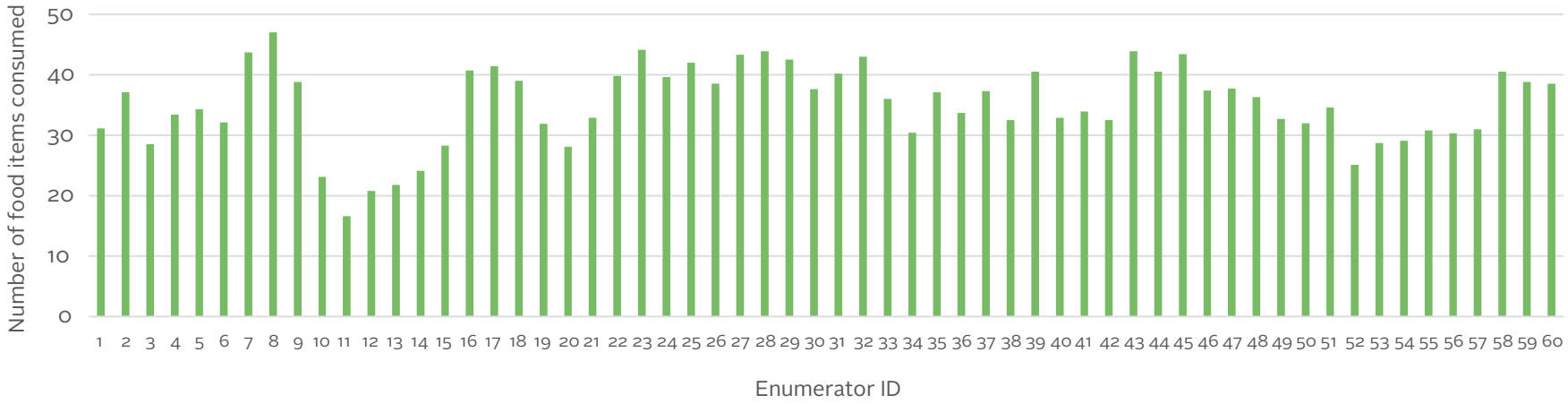


Figure 3a:

Average number of non food products purchased by week of interview

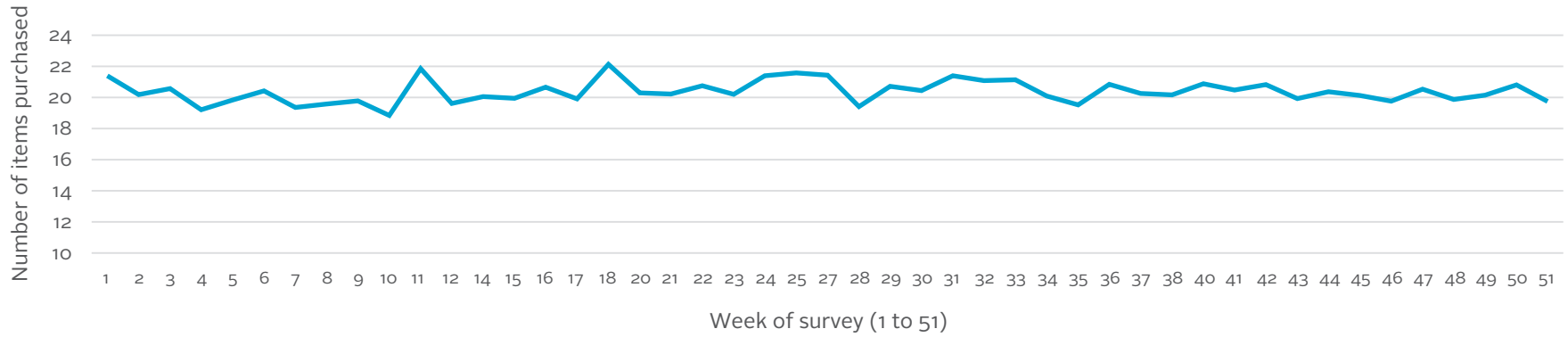


Figure 3b:

Average number of non food products purchased by Enumerator

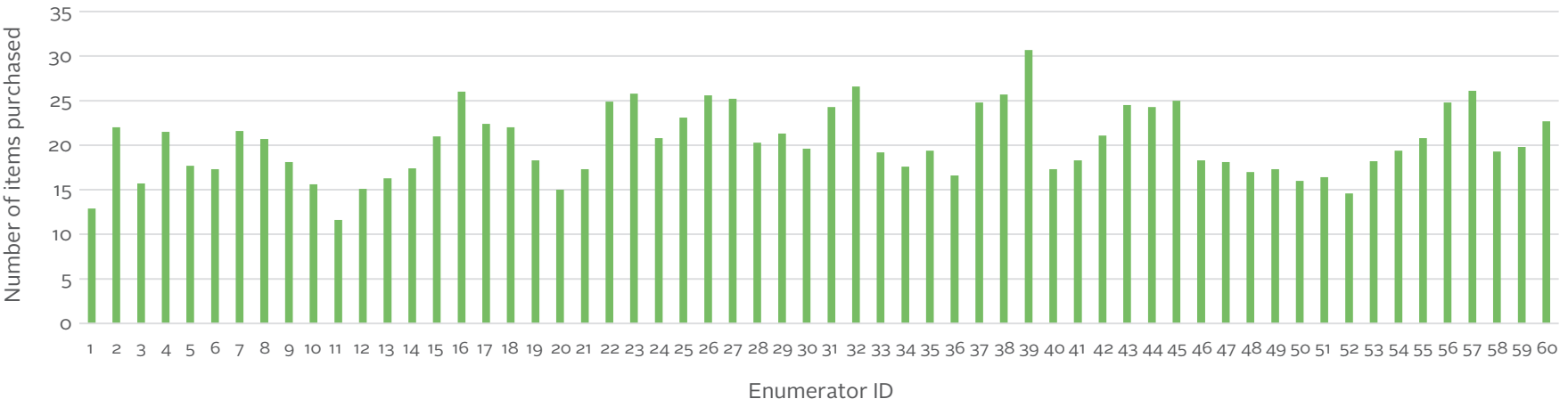


Figure 4a:

Average number of durables owned by week of interview

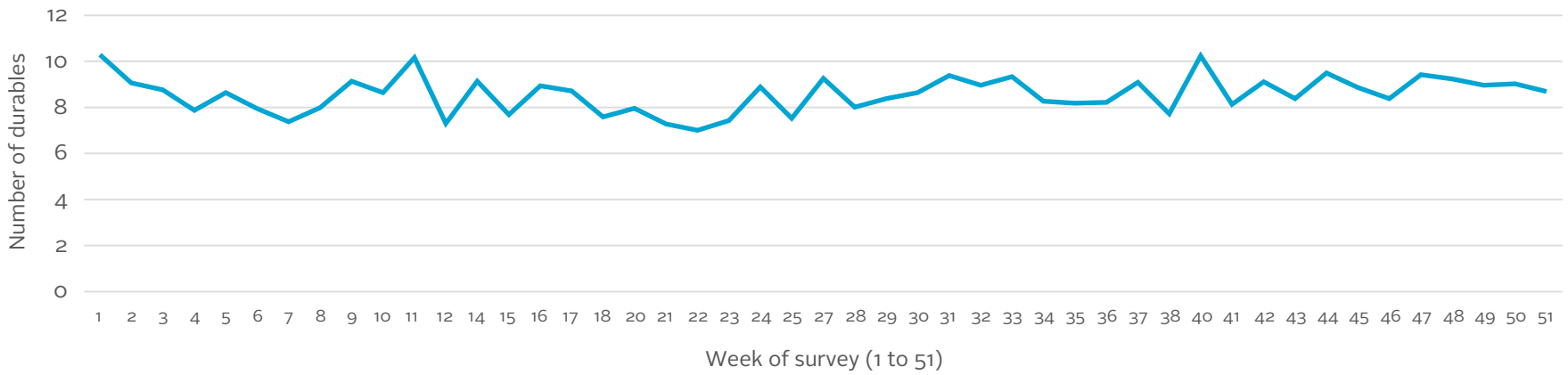


Figure 4b:

Average number of durables owned by enumerator

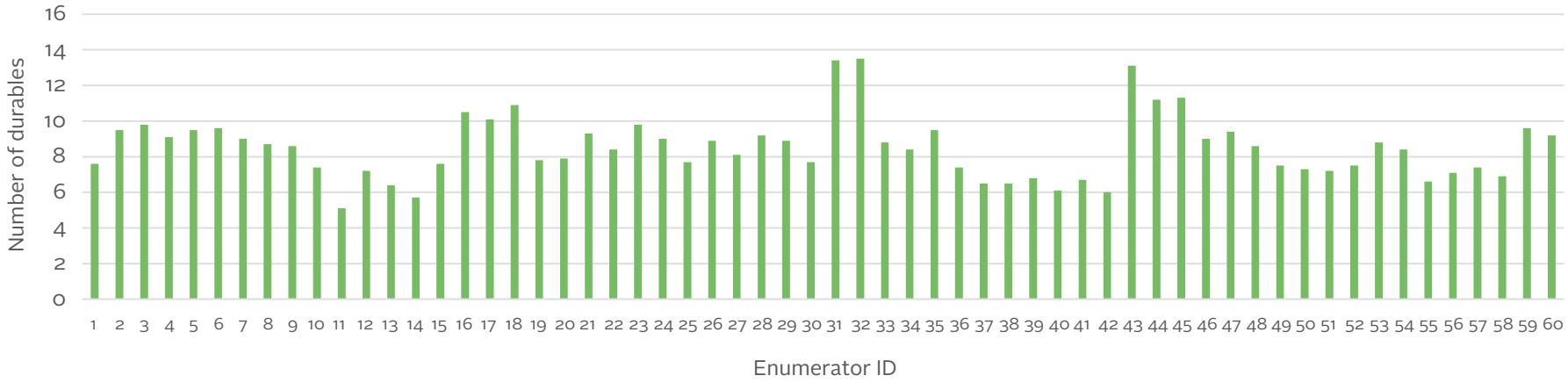


Figure 5a:

Average length of interview (minutes) by week of fieldwork

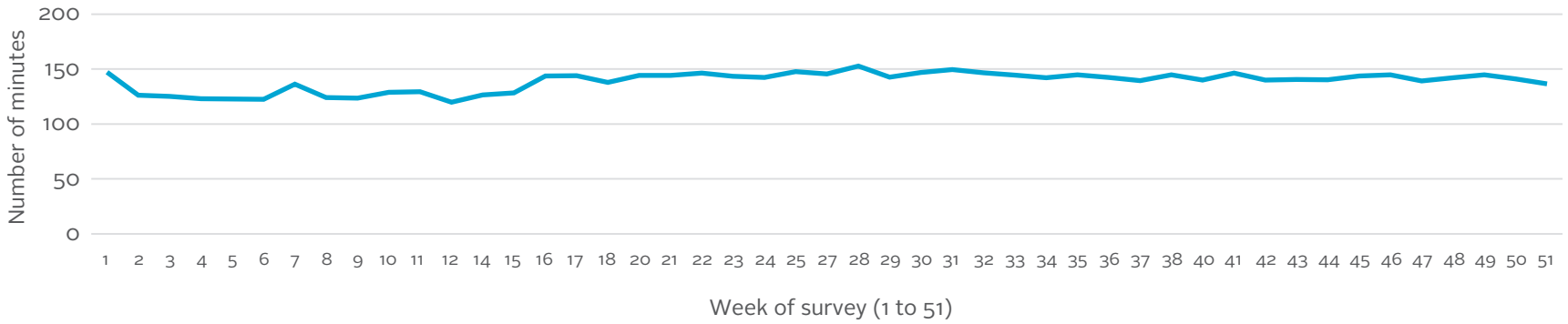
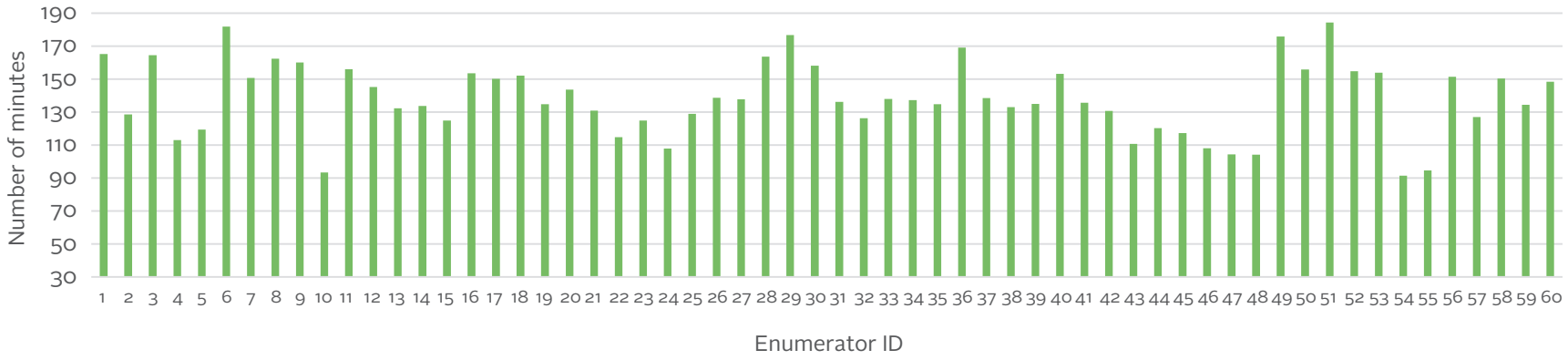


Figure 5b:

Average length of interview (minutes) by enumerator



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