



Oxford Policy Management

Antananarivo Urban Poverty and Resilience Study

Survey Completion Report

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Preface

OPM is very grateful for the inputs, support and guidance provided during the planning and implementation of this project.

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List of abbreviations

CAPI	Computer-Assisted Personal Interviewing
EA	Enumeration Area
ENSOMD	Enquête National Sur Le Suivi Des OMD
INSTAT	Institut National de la Statistique
OPM	Oxford Policy Management
QA	Quality Assurance
LSMS	Living Standards Measurement Surveys
ZD	Zones de Denombrement

1 Introduction

The World Bank, in collaboration with Oxford Policy Management (OPM), developed a living standards measurement survey (LSMS) at the household level to investigate the relationship between household living standards and location risk in Antananarivo, Madagascar. This project is a sister project of those measuring living standards in cities conducted by OPM in Dar-es-Salaam, Tanzania (2014-2015) and in Durban, South Africa (2015).

The overall objective of the Antananarivo Urban Poverty and Resilience Study is to identify policy actions that have a high potential to improve the quality of life and increase the resilience of the poor in Antananarivo and to inform the national government and municipal authorities on how to better target and finance poverty reduction programmes.

The survey will hope to meet these objectives by:

- i. Collecting data to allow for poverty and vulnerability analysis in order to better understand the spatial distribution of poverty in Antananarivo;
- ii. Collecting data to allow for the analysis of the availability of infrastructure, access to basic services, as well as the incidence of natural hazards; and
- iii. Collecting data to allow for the analysis of the ability of the poor to protect against risk and cope with disasters.

OPM was responsible for implementing the survey in Antananarivo. The assignment included a listing exercise in 200 Enumeration Areas (EA) and the administration and data processing of 2,400 household interviews in Antananarivo, using Computer Assisted Personal Interview (CAPI) technology. The project started in August 2016 and ended in January 2017.

In particular, OPM was responsible for:

- Support to the development of the instruments (listing, household and community questionnaires);
- Pre-testing of the instruments;
- Design of the CAPI instruments;
- Training of the fieldwork team;
- Data collection;
- Management of the field operation;
- Quality assurance; and
- Data management and validation.

This survey completion report describes the implementation of the survey work and provides contextual knowledge that will enable the reader to better understand the data. The rest of the report is structured as follows: Section 2 describes the planning and preparation process, Section 3 the training plan of the fieldwork team, Section 4 Sampling Procedure, Section 5 Fieldwork Organisation and Execution, and Section 6 the main challenges faced during the fieldwork and Section 7 lists known issues with the data.

2 Fieldwork Planning and Preparation

The fieldwork planning and preparation started in August 2016 and lasted until the beginning of the field worker training in October 2016. During the preparation period particular attention was paid to a thorough contextualisation and translation of the questionnaire instruments¹, the recruitment of experienced field workers and the facilitation of access to communities in the sample. The preparation phase included a five-day pre-testing exercise during which instruments and protocols were tested.

2.1 Questionnaire and protocol contextualisation and CAPI programming

OPM together with ATW consultants and the World Bank team, reviewed and contextualised the instruments and processes for the survey. Furthermore OPM translated the questionnaire into both French and Malagasy (led by ATW consultants), programmed the questionnaires into the CAPI software *Survey Solutions*, and built data consistency and interviewer performance checking systems in Stata. The OPM team driving this process was comprised of Andreas Kutka (Survey Advisor), Sean O'Leary (Project Manager) and Andres Arau (Data Manager), who sought feedback on this process from Kirsten Hommann and Rawaa Harati from the World Bank Team.

OPM started adapting the instrument to the Madagascar and Antananarivo context by first reviewing the instruments used in the Dar-es-Salaam (Tanzania) and Durban (South Africa) LSMS surveys and the changes suggested by the World Bank team.

To support the contextualisation OPM and the World Bank team also reviewed established surveys in Madagascar in particular the *Troisième Recensement Général de la Population et de l'Habitation de Madagascar* (the national census) and the *Enquête Nationale Sur Le Suivi Des OMD (ENSOMD) 2012/13*, a national survey used by the Government of Madagascar to review progress against the Millennium Development Goals. Additionally OPM and the World Bank team also reviewed the draft census questionnaire to ensure compatibility and to enable future poverty mapping.

In order to preserve comparability to the largest extent possible the instruments for this survey were based on the LSMS surveys conducted in Dar-es-Salaam and Durban and only adapted where the context of Madagascar or Antananarivo made this necessary, or where additional modules were required. When updating the instruments, sections, questions or responses were borrowed – where possible – from the established national household survey mentioned above.

Questionnaire instruments were translated into French and Malagasy by ATW consultants. During the translation process, French and Malagasy translations from the Madagascar national household surveys were used as a reference. The French and Malagasy translations were displayed along with the English phrasing in the CAPI questionnaires. During the pre-testing, training and the fieldworker training, the translation of every question was cross-checked by the entire team and updates were made on a consensus basis, ensuring that the original meaning was preserved and crucially that there was no ambiguity in understanding.

During the entire preparation phase, all changes to the instruments were done directly in the CAPI software. The interface of the questionnaire designer in *Survey Solutions* allowed easy and fast editing of the instruments. No paper version of the instrument was maintained. Data users are encouraged to refer to the PDF export of the electronic questionnaires, or preferably to install the

¹ The questionnaire was translated into both French and Malagasy

software and review the instruments on an android based tablet/phone using the [Tester](#) component of *Survey Solutions*.

2.2 Pre-test

OPM carried out a 5 day field pre-test in September 2016. The pre-test was essential for improving the survey and questionnaire design and to gain a better understanding of the challenges of fieldwork implementation in Antananarivo.

The pre-test was carried out from the 19th to the 23rd of September 2016 in Antananarivo. The pre-test was led by three OPM staff members – Sean O’Leary, Andreas Kutka and Andres Arau, supported by Andrianina Rakotoarimanana from ATW consultants and Kirsten Hommann and Rawaa Harati from the World Bank, who were accompanied by a number of experienced supervisors from ATW consultants.

The pre-test began with a two day training in which the questionnaire content and fieldwork procedures were explained to the supervisors. Following the training, teams of two or three were formed, such that each team included a native Malagasy speaker and a member from either OPM or the World Bank. Teams reconvened in the late afternoon for daily de-brief and feedback sessions.

For the three field days of the pre-test, the teams visited EAs which were outside of the sample and in different areas of Antananarivo, so that the questionnaires and procedures could be tested in a variety of field circumstances. These included, high/medium income areas, low income areas and flood-prone areas.

Attention was given to the allocation of modules, so that every module was tested by different teams in different settings. Teams recorded the timing for each section when testing the interviews. Concerns about the length of the questionnaire and the need for additional work on questionnaire design were shared with the World Bank team and fed into the remainder of the design phase.

Furthermore the pre-test was used as an opportunity to make updates to the questionnaire, and to identify and resolve issues in the translation and the CAPI coding.

2.3 Review of EA sample

OPM, with the support of ATW consultants, reviewed the sample of 200 EAs received from the World Bank in September 2016 in order to ensure that the sample was comprised only of inhabited EAs of a meaningful size. An initial desk-based screening of the EAs revealed that a number of EAs were too large to be listed within the parameters of the project and needed to be segmented. Furthermore, the desk-based review revealed that in some cases the EAs boundaries did not match perfectly the ‘intended’ boundaries (such as roads or water ways), and in some cases boundaries passed directly through residential buildings and other structures.

Based on this desk-based review, the World Bank team provided a set of revised shapefiles. EAs where the geographical area was too large, or that were comprised of too many households, were segmented. The shapefiles were also adjusted such that the shapefile boundaries better matched the likely intended boundaries of the respective EAs.

2.4 Recruitment of fieldworkers

Recruitment of fieldworkers was led by ATW consultants and supported by the OPM team. ATW consultants has prior experience in delivering socio-economic surveys in Madagascar and retains a large database of experienced fieldworkers and supervisors.

The final team was selected at the end of the training based on: active participation during the training; ability to follow fieldwork procedures and administer interviews during the training practice days; ability to use CAPI; availability throughout the fieldwork; and other positive personality traits such as good overall attitude, diligence and willingness to learn and follow procedure.

2.5 Equipment of fieldworkers

In order to improve response rates to the household questionnaire, the fieldwork team was equipped with a laminated copy of a letter from the World Bank offering support to the study and explaining its purpose, and with a laminated ID card to identify them as researchers for ATW consultants.

Tablets/smartphones and back-up battery packs were issued to all fieldworkers in addition to a bag to carry their equipment, pen and paper and other sheets to help organise the fieldwork. Tablets were also issued in a cover that could be used to shield the tablet from sunlight. Fieldworkers were asked to keep tablets out of sight whenever possible to avoid presenting a target for criminals.

3 Training of the field teams

OPM in collaboration with ATW consultants and the World Bank team, delivered the training of fieldworkers in Antananarivo. Separate training sessions were held for the listing and household instruments and procedures. Training sessions included class room training, class room practicing, role plays, mock interviews, scenario discussions, and field pilot and feedback sessions. Fieldwork and security protocols were also discussed and trained extensively.

3.1 Training on listing instrument and procedures

The listing training took place from 4th to 8th October and a total of 30 listers, 6 supervisors and 4 monitoring staff participated in the training. The listing training was led by Sean O'Leary and Katharina Keck from OPM and supported by Andrianina Rakotoarimanana from ATW consultants.

The listing training was divided into three main parts: (a) 1.5 days classroom training; (b) 2.5 days of field practice in testing EAs, with feedback sessions; and (c) a 1 day joint guided listing in sample EAs. After the first 4 days of training the final group of listers were selected based on their skills and level of understanding of the assigned tasks. OPM's listing manager, Katharina Keck, joined the fieldworkers for the first week of listing fieldwork and monitored the listing process. The training schedule is given in Table 1 below.

Table 1 Listing training schedule

Day	Location	Activities
4 th October	Classroom	<ul style="list-style-type: none"> - Introduction to the survey - Use of tablets and software (Survey Solutions, Google Maps) - Handing out of equipment - Key concepts
5 th October	Classroom/ Field	<ul style="list-style-type: none"> - Q&A - Key concepts, dwelling types and procedures in theory - Dwelling types and procedures in practice - Feedback session
6 th October	Field	<ul style="list-style-type: none"> - Dwelling types and procedures in practice - Feedback session
7 th October	Field	<ul style="list-style-type: none"> - Dwelling types and procedures in practice - Feedback session
8 th October	Field	<ul style="list-style-type: none"> - Joint listing - Feedback session

Particular attention was paid to covering the large diversity of EAs in Antananarivo, which required different ways of identifying and accurately describing dwellings.

At the end of the listing training, 20 interviewers and 4 supervisors were hired for the listing fieldwork.

3.2 Training on household instrument and procedure

The household training took place from 11th to 22nd October and was led by Andres Arau from OPM and supported by Andrianina Rakotoarimanana from ATW consultants and Juan Munoz and Rawaa Harati from the World Bank.

A total of 50 interviewers, 6 supervisors and 2 monitoring staff started the training and supervisors and fieldworkers were selected on the basis of previous experience and aptitude demonstrated during the training. Given the difficulty of the questionnaire (in particular sections such as the Consumption Expenditure module), OPM developed a training schedule that covered the different sections of the questionnaire, but also placed a heavy emphasis on providing context through field work scenario discussions and role plays.

Training sessions included class room training, class room practicing, equipment practice, role plays, mock interviews, scenario discussions, field tests and debriefing and feedback sessions. The questionnaire was fine-tuned during the training on the basis of feedback from the fieldworkers, last minute modifications made by the World Bank team and problems encountered during the pilot.

The final team was selected at the end of the training based on: active participation during the training; ability to follow fieldwork procedures and administer interviews during the field practice days; ability to use CAPI; availability throughout the fieldwork; and other positive personality traits such as good overall attitude, diligence and willingness to learn and follow procedures. Some fieldworkers had to be sent home during the training or piloting due to poor performance or poor attitude, whilst others quit due to the difficulty of the questionnaire. The final team consisted of 30 interviewers and 6 supervisors.

The language of instruction during the training was French with accompanying training in Malagasy, particularly in cases where concepts were difficult to understand in French. However, the CAPI instruments displayed both French and Malagasy, as well as the original in English. This enabled concepts to be clarified and the translations to be honed during the training and piloting. If issues were found with the Malagasy or French translation of the instruments, the translation was improved through consensus in the classroom. Furthermore, inconsistencies in the questionnaire or CAPI instruments were flagged and addressed during the training and piloting on an on-going basis.

Table 2 Household questionnaire training schedule

Day	Location	Activities
11 th October	Classroom	<ul style="list-style-type: none"> - Introduction to study - Introduction to CAPI - Roster - Background - Household characteristics - Health - Education - Debrief
12 th October	Field	<ul style="list-style-type: none"> - Field practice for roster, background, education, health - Debrief from field practice
13 th October	Classroom	<ul style="list-style-type: none"> - Consumption expenditure - Debrief
14 th October	Classroom	<ul style="list-style-type: none"> - Consumption expenditure - Remittances - Debrief

Day	Location	Activities
15 th October	Field	<ul style="list-style-type: none"> - Field practice for consumption expenditure, remittances - Debrief
17 th October	Classroom	<ul style="list-style-type: none"> - Definition of household head and main respondent - Labour - Assets - Debrief
18 th October	Classroom	<ul style="list-style-type: none"> - Housing - Residential history - Debrief
19 th October	Classroom	<ul style="list-style-type: none"> - Shocks - Observations - Community - Questionnaire start/outcome - Review and quiz
20 th October	Classroom/field	<ul style="list-style-type: none"> - Field practice - Introduction to quality assurance system - Debrief
21 st October	Field	<ul style="list-style-type: none"> - Field practice - Performance management/communication - Debrief
22 nd October	Field	<ul style="list-style-type: none"> - Field practice - Training of supervisors and team structures - Debrief

4 Sampling procedure

A multi-stage random selection process was used to select households for interview for the Antananarivo Urban Poverty and Resilience Study. The following sampling stages were completed: (1) Selection of EAs; (2) Selection of dwellings; (3) Selection of Households; (4) Selection of Random Respondent. These calculations are necessary to be able to calculate a household sample weight. Due to the complex multi-stage nature of sampling that was used for this study, sample weights are required to correct for the potential that individual study units, i.e. households are selected with unequal sampling probabilities.

What follows provides a description of this process.

4.1 Selection of EAs

In the first stage selection of EAs was performed by the World Bank using a master sample frame of all EAs in Antananarivo provided by the *Institut National de la Statistique (INSTAT)*. This came in the form of a shapefile detailing all EAs within Antananarivo and also provided both the population estimates as well as estimates of the number of roofs in each EA.

This allowed for 200 EAs to be selected using the **Probability Proportional to Size (PPS)** sampling technique to be implemented. PPS sampling is advantageous as it allows the sampling expert to make distinctions between EAs that may be small, large and very large in size. PPS is more efficient than implementing a simple random sample as it allows the sampling expert to assign unequal probabilities of selection to different EAs in the population of all EAs. Specifically EAs that have larger populations are assigned a higher probability of selection, to account for the fact that individual dwellings in larger EAs will have a lower probability of selection in the second stage.

Figure 1 shows the first and last rows of the master sampling frame for EAs that is available for Antananarivo. It consists of 1,801 *Zones de Denombrement (ZDs)* recently defined by INSTAT in preparation for the national census. (The census has not yet been conducted and in fact may not end up being conducted at all.

Figure 1 List of Antananarivo Enumeration Areas

Number	Code District	District	Code CA	Commune/Arrondissement	Numéro ZD	Code ZD	Code Milieu	Milieu	Pop	Toit
1	101	Antananarivo Renivohitra	101001	1er Arrondissement	1	101001001	1	Urbain	1,298	276
2	101	Antananarivo Renivohitra	101001	1er Arrondissement	2	101001002	1	Urbain	1,370	312
3	101	Antananarivo Renivohitra	101001	1er Arrondissement	3	101001003	1	Urbain	1,407	258
4	101	Antananarivo Renivohitra	101001	1er Arrondissement	4	101001004	1	Urbain	1,348	226
5	101	Antananarivo Renivohitra	101001	1er Arrondissement	5	101001005	1	Urbain	1,359	198
6	101	Antananarivo Renivohitra	101001	1er Arrondissement	6	101001006	1	Urbain	1,315	201
7	101	Antananarivo Renivohitra	101001	1er Arrondissement	7	101001007	1	Urbain	1,452	214
8	101	Antananarivo Renivohitra	101001	1er Arrondissement	8	101001008	1	Urbain	1,350	222
1794	117	Antananarivo Atsimondran	117430	Tsiarany	9	117430009	2	Rural	825	167
1795	117	Antananarivo Atsimondran	117430	Tsiafahy	10	117430010	2	Rural	800	153
1796	117	Antananarivo Atsimondran	117430	Tsiafahy	11	117430011	2	Rural	804	116
1797	117	Antananarivo Atsimondran	117430	Tsiafahy	12	117430012	2	Rural	826	158
1798	117	Antananarivo Atsimondran	117430	Tsiafahy	13	117430013	2	Rural	824	161
1799	117	Antananarivo Atsimondran	117430	Tsiafahy	14	117430014	2	Rural	817	142
1800	117	Antananarivo Atsimondran	117430	Tsiafahy	15	117430015	2	Rural	861	144
1801	117	Antananarivo Atsimondran	117430	Tsiafahy	16	117430016	2	Rural	900	172

The first columns are the geographic codes of each ZD – Antananarivo is divided into 4 districts and 48 *Communes/Arrondissements* (neighbourhoods). The last two columns are a preliminary estimate of the total population and a quick count of the number of roofs in the ZD.

Before selecting the EAs for the sample, the ZDs should be sorted into strata in a way that is relevant to the analytical objectives of the survey. Similar surveys recently conducted in Dar-es-Salaam and Durban used two basic criteria for this purpose: [1] the distance to the PSU to the city centre and [2] a classification of the dwellings and infrastructure as formal or informal, based on satellite imagery. In this survey, we're interested in identifying the ZDs where the last big storm had affected large number of people, because we want to take into account risk in our analysis.

The INSTAT helped us implement the first criterion very precisely, by way of appending to the sample frame two additional columns with the Latitude and Longitude of each ZD's centroid. The risk criteria, has been taken from an evaluation report prepared by the BNGRC after the Chedza storm in 2015. We used the number of victims in each commune as a risk indicator. The formal/informal criterion seems much harder to implement, though. In the absence of reliable information on infrastructure at the ZD level (the last census dates back to 1991), we won't be able to go beyond a notional classification of the 42 neighbourhoods, based on expert opinion, so we are not using this criteria in our sample frame.

Figure 2 The distance to centre layers

Ring		From	To
1	Core	0	5
2	Mid	>5	10
3	Distant	>10	∞

We consider the train station as the centre of the city. The “core” consists of any ZDs in a 5 km or less distance from the center of the city. The “mid” is between 5 and 10 km from the center, and finally “distant” is 10 km or more from the city center. For the risk criteria, we create a dummy for “sinistred” and “not sinistred”. The ZD is considered risky if the percentage of affected (sinistred) is more than 2.2%. Combining these two criteria, we end up with 6 strata, to each we attribute a certain number of ZDs. We have a total of 200 ZDs:

Figure 3 Strata

Stratum			Pop	Toit	N ZDs	Pop %	n ZDs
1	Not sinistred	Core	108,565	11,327	80	4.8%	20
2	Not sinistred	Mid	551,689	72,432	422	24.2%	40
3	Not sinistred	Distant	763,033	119,139	667	33.4%	30
11	Sinistred	Core	463,796	53,912	331	20.3%	50
12	Sinistred	Mid	276,757	32,429	201	12.1%	30
13	Sinistred	Distant	117,989	13,657	100	5.2%	30
Total			2,281,829	302,896	1,801	100.0%	200

Within each stratum, the ZDs were selected with Probability Proportional to Size (PPS), using as a measure of size a quick estimation of the population made by INSTAT as a part of the cartographic operations previous to the census, and with implicit stratification by commune/arrondissement.

200 spare ZDs were selected in case we encountered any problem in one of the original ZDs.

4.2 Selection of dwellings

In the second stage 12 dwellings per EA were selected for the study sample by OPM using a **Simple Random Sample (SRS)** technique, i.e. each dwelling was selected with equal probability. The master sample frame for the dwellings was based on the dwelling listing described in Section 5.2 below.

4.3 Selection of dwellings

In the third stage one household per dwelling was selected for the study sample by OPM using the SRS technique. Given the definition of the household² used in the study it is possible that there could in some cases be more than one household living in the same dwelling, given the condition that household members must *share food from a common source*.

4.4 Construction of sample weights

The following procedure was used to calculate the probability of a household being selected for the study sample.

$$P_{final} = P_{EA} * P_{dwelling} * P_{household}$$

Where,

P_{final} = total probability of household selection

P_{EA} = probability of EA selection from EA sample frame

$P_{dwelling}$ = probability of dwelling selection from dwelling sample frame

$P_{household}$ = probability of household selection in dwelling

To construct the final household sampling weight, W_{final} , the following procedure was used.

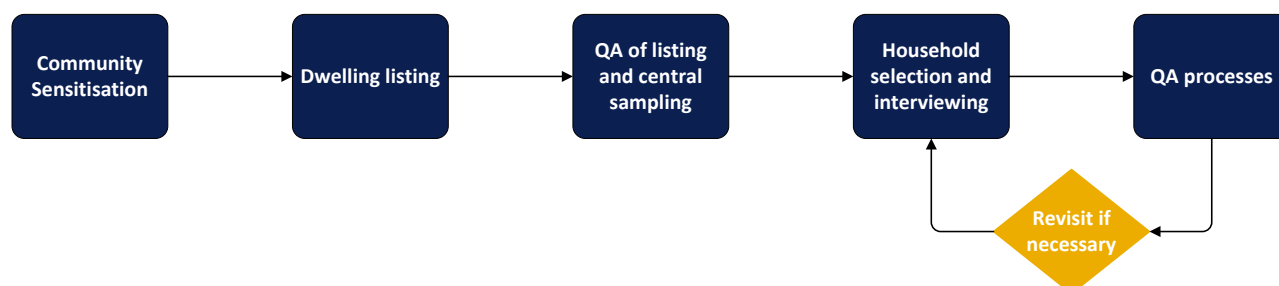
$$W_{final} = \frac{1}{P_{final}}$$

² A household consists of one or more people who live under the same roof and share meals together including family and non-family members. 'Live under the same roof' needs to be interpreted as 'live together'. However, this could be in a different building (within a compound for instance).

5 Fieldwork organisation and execution

The fieldwork implementation involved five phases that built upon one another and were implemented in parallel during the fieldwork. Details on each phase are provided in below and summarised in Figure 4.

Figure 4 Fieldwork processes



5.1 Community sensitisation

In order to ensure community acceptance of the survey and the unhindered work of fieldworkers, before any fieldwork was conducted in a given EA, the field team supervisor would introduce him/herself to the Fokontany chief (or multiple Fokontany chiefs if the EA was spread across more than one Fokontany³).

The supervisor would explain the purpose of the study and the activities that would be conducted as part of the study. Fieldwork would not begin in a particular EA until permission from the Fokontany chief had been given. Supervisors were supported in this effort with a laminated copy of a letter from the World Bank and a laminated ID identifying them as a supervisor conducting research on behalf of ATW consultants.

5.2 Dwelling listing

The listing exercise listed all dwellings inside the EA boundaries and served to establish the sample frame for the dwelling selection. The listing exercise was designed to include two processes: (1) a listing of all the structures within a sampled EA; and (2) a listing of all dwellings that exists within all structures within a sampled EA. The definitions that were adopted of each are as follows:

- A structure is a self-standing construction. This can be either a self-standing building or a compound. A compound is a structure which has a boundary wall around it. A boundary wall can be any type of fence: brick walls, tires, an iron fence, flowers, plants, bushes, etc.
- A dwelling is a room or a group of rooms that is inhabited (e.g. a single house, an apartment or a group of rooms in a house). A dwelling should have its own entrance that is reached without going through another dwelling. A dwelling should have access to a cooking facility that may or may not be shared.

The overall purpose of the listing process was to deliver a comprehensive list of all dwellings within the 200 sampled EAs. The listing instrument collected information on structure type, the inhabitation status, number of floors, and a list of all dwellings inside the structure for each

³ A Fokontany is one of the five administrative divisions in Madagascar, and represents the smallest administrative division.

inhabited structure inside the EA boundary. In addition the GPS coordinates of every structure were recorded twice using the GPS capability of *Survey Solutions* and the tablet's Android location triangulation that uses GPS and mobile phone network mast location.

For each EA, supervisors were provided with a print-out of the EA, with the boundaries clearly marked, created in Google Maps. Examples of the EA maps used for this purpose are given in Annex A. Supervisors could also access a map of the EA with clearly defined boundaries using the Google My Maps app on their smartphones. This allowed the supervisor not only to identify the exact location of the EA but also her own location within the EA boundaries.

Enumerators would systematically work their way through an EA, recording details for every structure and dwelling. The hardcopy map of the EA allowed the team to check for completeness. The listing was set up to largely record visual information that the fieldworkers could access by walking down the street, though wherever possible this was verified by asking information from residents, staff or flat/resident registries.

The listing team consisted of 20 enumerators and 4 supervisors, who worked in four teams. The listing began on the 10 October 2016 and was completed on the 6 December 2016. The listing exercise was quality assured by OPM, and managed in the field by Andrianina Rakotoarimanana from ATW consultants. The listing exercise consisted of a total of 56,890 dwellings in 25,055 structures in the 200 EAs located throughout Antananarivo.

5.3 Quality assurance of listing and central sampling

In order to check the quality of the listing data, the ATW Consultants team conducted extensive in-field observations of the teams and re-visits to cross check individual buildings in EAs. He was supported in this by Katharina Keck from OPM who remained in Antananarivo to provide support during the first week of the listing exercise.

A set of data checks were programmed in Stata and used to check the internal consistency of the listing data, missing information, compliance with naming conventions and the location of GPS coordinates. Listing forms with errors were either returned to the field for correction, cleaned in Stata if the information was easily accessible, or deleted and re-issued to the teams for listing.

EAs marked as complete and correct went into the dwelling sampling process, in which the dwellings for the household interviewing were selected. The sampling was done centrally by the OPM survey expert, Andreas Kutka, in regular intervals using a custom written Stata do-file.

From within each EA, 12 dwellings were randomly selected and given a unique identifier. Reference data was created for the *Survey Solutions* household questionnaire, along with a tracking sheet and a map to use for re-location. Additional replacement dwellings were randomly selected and captured on a replacement management sheet in a specified order.

5.4 Household selection and interviewing

Following the listing and sampling of dwellings, EAs were assigned to the fieldwork team for household location and interviewing. A total of 2,735 households were visited and interviewed between October and December 2016, by a team of 48 interviewers and 6 supervisors (see section 6.2 on changes in team size).

5.4.1 Processes

After sampling was completed, EAs were assigned to teams of fieldworkers led by a supervisor. Supervisors were provided with a map of the selected dwellings, as well as a printed completion form (an example is provided in Annex B). The completion form provided all relevant information about the sampled dwellings and allowed the supervisors to keep track of progress within an EA and ensure completeness.

Fieldworkers relocated selected dwellings using the address/description provided during the listing, supported by the provided EA maps. If a dwelling could not be found, fieldworkers immediately informed their supervisor who would then contact ATW consultant headquarters. Addresses and descriptions of neighbouring dwellings were then provided to support the relocation of the sampled dwelling.

Fieldworkers recorded GPS coordinates for the dwelling using *Survey Solutions* and filled a short observation questionnaire about the dwelling. As part of this observation questionnaire, fieldworkers identified and listed all households residing inside the dwelling. If only one household resided at the dwelling, the household was automatically treated as the selected household. If more than one household was identified in one dwelling, an automatic random selection process was initiated within *Survey Solutions* to select one of the households for enumeration.

Dwellings were replaced in the following cases:

- If the dwelling was uninhabited, if the respondent refused to be interviewed, or if the dwelling appeared inhabited but no one was available to be interviewed.
- If a dwelling could not be found after repeated efforts by the interviewer and supervisor (1 case).
- If the same dwelling appeared twice on the list of sampled dwellings. There were 4 cases and these were treated as listing errors and replacements were made.
- If the interviewer refused part-way through the interview, the dwelling was replaced in cases where only a small section of the interview had been completed.

In these cases, the next dwelling on the sample list was assigned to the fieldworker.

The fieldworker conducted the interview with a number of members of the selected household. The household interview had three components asked to potentially different respondents, depending on the household composition:

1. Main respondent: questions on household composition, basic information on members, assets, remittances, grants, housing, properties, exposure to shocks and flooding, and consumption. The main respondent was a knowledgeable household member that was present;
2. Household head: questions on residential history and satisfaction, and questions on employment were asked to the household head. When the household head was present, the head and main respondent could be the same person; and
3. Random respondent: questions on employment were also asked to a randomly selected household member of age 15 or above who was not the head. The main and random respondent could be the same person.

Typically several visits were required to complete all components, especially when more than one respondent was needed to complete the interview process. Enumerators had to do two credible revisits after the initial visit before a component could be marked as unavailable. Credible revisits were defined as a visit at a time when the respondent could reasonably be expected to be at home. For example, if a household head was found to work during the week, the fieldworker was expected to revisit during the weekend. Survey management enforced this rule through supervision and spot checks.

5.4.2 Interview outcome

The survey aimed to interview 12 households per sampled EA and a total of 2,400 households across 200 EAs. Table 3 summarises the interview outcome for each component.

Table 3 Household interview outcome

Outcome	Main respondent	
	#	%
Completed	2271	83
Partially complete (refused after interview start)	19	0.7
Permission refused	216	7.9
Long term unavailable	36	1.3
Dwelling not inhabited	36	1.3
Dwelling not found	1	0.04
Listing error	4	0.1
Lost during synchronisation process (completed)	129	4.7
Lost during synchronisation process (non-response)	23	0.8
TOTAL	2735	100

Dwellings were marked as “*Long term unavailable*” if the selected dwelling looked inhabited, but the respondent was unavailable and as “*Dwelling not inhabited*” if the dwelling seemed to not be inhabited. In some instances, the distinction was not clear for the field workers. Dwellings were marked as “*Dwelling not found*” if the dwelling could not be located, even with additional information provided, and as “*Listing error*” in cases where the same dwelling was listed and sampled twice. Cases that were lost during the synchronisation process (see section 7.1) were marked as “*Lost during synchronisation process*”.

The overall refusal rate was 8.4% including only the refusals which were synchronised as a proportion of synchronised interviews. The overall non-response rate (including refusals, not being available, the dwelling being uninhabited) by the same measure was 11.9%. These rates of non-response are lower than in Dar-es-Salaam (18.4%) and in Durban (41%).

Table 4 Household head component outcome

Outcome	Household head	
	#	%
Completed	2167	79.2
Household head not present	112	4.1
Household level non-response	304	11.1
Household level lost during synchronisation process	152	5.6
TOTAL	2735	100

In addition to the non-response at the household level, an additional 112 household heads were not present to be interviewed.

Table 5 Random respondent component outcome

Outcome	Random respondent	
	#	%
Completed	1995	72.9
Random respondent not present	41	1.5
Random respondent not mentally or physically able to respond	30	1.1
No eligible random respondent in the household	191	7
Household level non-response	307	11.2
Household level lost during synchronisation process	152	5.6
Error during assignment or random respondent	19	0.7
TOTAL	2735	100

For the component to be completed by the random respondent, 136 households did not have an eligible random respondent because the household only consisted of 1 member. An additional 41 randomly selected respondents were not present, while 30 were not mentally or physical able to respond.

The survey also aimed to conduct one community questionnaire in each of the 200 EAs. Community questionnaires were conducted with the chief of the Fokontany. Where one EA covered more than one Fokontany, the Fokontany that covered the largest area of the EA was selected. In 3 cases (EA 13, 349, 371), two community questionnaires were conducted because the EA was equally split across two different Fokontany.

Table 6 Community questionnaire outcome

Outcome	#	%
Completed	173	85.2
Second community questionnaire	3	1.5
Refused	2	0.9
Lost during synchronisation process	25	12.3
TOTAL	203	100

5.5 Quality control checking

OPM, supported by ATW consultants, put extensive effort into assuring the accuracy and quality of the collected household data. These efforts were implemented at various levels and stages and are described below. Please note that all data quality control efforts were centralised in a data management team led by OPM to provide consistent feedback to fieldworkers and ensure the same level of effort across the sample. Supervisors managed field work logistics and fieldwork monitoring staff conducted back check interviews. The data quality feedback was provided directly to the enumerators by the data management team. This direct feedback approach was facilitated by maintaining a constant Skype group between OPM and ATW consultants. ATW consultant's fieldwork manager, Arinay Rajaona, would then communicate feedback to fieldworkers.

5.5.1 Fieldworker selection and team size

Special attention was paid to the ability and attitudes of fieldworkers during the training, piloting and initial phases of the fieldwork. The final team was selected at the end of the training based on: active participation during the training; ability to follow fieldwork procedures and administer interviews during the field practice days; ability to use CAPI; availability throughout the fieldwork; and other positive personality traits such as good overall attitude, diligence and willingness to learn and follow procedures. Some fieldworkers had to be sent home during the training or piloting due to poor performance or poor attitude, whilst others quit due to the difficulty of the questionnaire.

5.5.2 In interview feedback from CAPI

OPM built routing and checking syntax directly into the *Survey Solutions* CAPI questionnaire that provided interviewers with guidance during the interview. Automatic routing syntax helped fieldworkers ensure that only relevant questions were asked and that no questions or modules were missing. Automatic checks alerted fieldworkers to mistakes and inconsistencies in given answers, so that these could be addressed while the fieldworker was still with the respondent. Fieldworkers were trained to check quality and completeness before submitting an interview. A full listing of routing and consistency checks in the CAPI questionnaire can be taken from the end of the pdf questionnaire that were submitted together with the data.

5.5.3 Aggregate checks

Completed interviews were submitted on a daily basis by interviewers and exported into Stata. The central data management team reviewed every submitted case using *Survey Solutions* supervisor application to identify common mistakes, need for feedback and retraining and to inform the list of data quality checks. Individual cases were later reviewed on a spot check basis. A comprehensive list of data quality checks was run in Stata on the exported data of all cases on a daily basis by the data manager.

The checks comprised checks regarding duplicates, ID consistency between the modules, inconsistency checks not built into CAPI (either due to complexity or in order to obtain a better picture of fieldworker performance by not revealing the checks during an interview) and outliers.

The total list of checks has been provided in a do-file format together with the data. A list of all inconsistencies was provided by OPM to ATW consultants on a daily basis, who rejected cases with inconsistencies using the *Survey Solutions* supervisor functionality and provided feedback to the fieldworker so that inconsistencies could be addressed. ATW consultants checked all cases without inconsistencies for completeness and other interviewer comments and approved them if everything was found to be correct. All cases underwent the same procedure until approved by OPM and ATW consultants.

5.5.4 Debriefs and additional interviewer training

Apart from identifying problems within individual interviews, the aggregate checks also provided insights into which questions interviewers were struggling with or where common errors were occurring. ATW consultants held debriefs with all interviewers and supervisors twice a week, or more frequently when necessary. During these debriefs, any issues with the CAPI software were resolved, questions were clarified where necessary and interviewers were re-trained on common issues flagged up during the aggregate checks.

5.5.5 Interviewer performance and completion monitoring

The aggregate data export⁴ was furthermore used to build fieldworker and EA level summaries of response rates, completion status and weekly progress. The data was used by survey and data management to ensure completion of the survey, to monitor interviewer performance and the use of on-response codes over time. Feedback was subsequently provided to fieldworkers.

5.5.6 Indicator balance

OPM tracked weekly summaries of key indicators in aggregate, by team, and by fieldworker. The selected key indicators were aimed at identifying fieldworkers who had spotted shortcuts over time by under-reporting in particular modules of the questionnaire. The key indicators included those at the household and individual level such as average household size, number of consumption items, number of shocks recorded, etc. OPM, supported by ATW consultants, investigated suspicious trends and followed up with individual fieldworkers if necessary.

5.5.7 Direct observations

During the beginning of the fieldwork members from OPM and ATW consultant management observed interviews of all fieldworkers to ensure adherence to and understanding of protocols, as well as to identify idiosyncrasies. Feedback was provided to individual fieldworkers immediately after the interviews. Particular emphasis was placed on fieldworkers that showed weaknesses in certain sections of the questionnaire.

5.5.8 Back check interviews

A total of 480 back check interviews were conducted, i.e. a total of 20% of the sample. Households were randomly sampled from the pool of completed and approved interviews at the time of sampling without replacement so that the same household would not be re-visited twice for back checking.

Back check interviews were conducted by 4 fieldwork monitoring staff from ATW consultants. The fieldwork monitors conducted most back check interviews in person and some over the phone if circumstances did not allow revisits, and to speed up the back checking process as the survey completion date was shortly before Christmas.

The back check interviews were conducted in Survey Solutions, using a small sample of questions administered in the main interview. The interviewer's etiquette and whether they followed the consent procedure were also verified during the back check. The back check forms were designed as a double blind data entry to remove scope for collusion between back checkers and fieldworkers, but also to provide space for reconciling inconsistencies between both sources of information. For example, the back checking form asked for the number of household members without displaying the number recorded during the interview. The full list of questions can be taken from the QA questionnaire report that was submitted together with the data. The back check interviews were conducted in Survey Solutions. Once the back check interview was submitted by the fieldwork monitor, the data management team compared the information from the back check interview to that collected during the main interview. Substantial differences were flagged for further follow-up.

⁴ Exported to a google docs survey monitoring sheet

6 Fieldwork challenges

Data collection exercises in busy and large cities are very challenging and require a high level of planning and field work management. Because of traffic and work commitments, it is difficult to find respondents at home and/or convince them to devote their time to respond to detailed questionnaires. Furthermore, respondents are often not keen to share private “sensitive” information on assets, incomes and access to basic services.

The following chapter highlights the main challenges faced by the survey teams.

6.1 Unavailability of respondents and required number of revisits

The unavailability of respondents was one of the biggest challenges encountered on this project. This is not unusual as unavailability is usually a major challenge when conducting urban surveys. Respondents are normally busier than in rural areas and have a larger geographical spread of activities (whether it's working commitments, church, visiting people, shopping). Also, because of the traffic and long distances travelled, they are less likely to be found in their homes during the day, i.e. the work hours of field teams. Tracking respondents was very challenging. Especially respondents who are employed and work over weekends. OPM recommended the use of different strategies to minimise the issue, which included making appointments with respondents, contacting respondents by phone, and working during the weekends.

Appointments were made on specific days and/or time as per respondents' request but often not kept by respondents. Some respondents would stop picking up calls from enumerators when new attempts of contacting them were made. At times the enumerators felt that some respondents would set up appointments as a way of getting rid of them instead of refusing to do the interview. In upper class neighbourhoods, it was particularly difficult to find respondents at home and appointments had to be scheduled well in advance.

OPM asked enumerators to use all described strategies to find respondents and they had high incentives to keep a good performance as the non-response rate was part of OPM's constant monitoring indicator, as well as an important criteria for the definition of the final overall performance.

6.2 Team size and field work duration

OPM and ATW consultants had anticipated that each enumerator could complete two interviews per day. During the first two weeks of fieldwork only just over 1 interview a day, and this rate did not change between the first and second week. The reasons that the interview completion rate was lower than expected included:

- The length of the questionnaire
- Difficulties getting access to certain areas: In military or police areas, it was often difficult to get access (military and police barracks were excluded from the listing exercise, but it was difficult to gain access even to the households surrounding the barracks where the families of military or police officers live). Even after gaining access, many households in these areas refused the interview, resulting in a lot of replacements being made.
- The unavailability of respondents, as described above, which required numerous revisits or having to schedule appointments, which were usually only held early in the mornings, late

in the evenings or on the weekend, reducing the number of hours in a day during which interviews could be conducted.

In order to be able to complete the fieldwork before the Christmas period, the decision was taken to train additional fieldworkers. During a second training period, 35 interviewers and 5 supervisors were trained, of which 28 interviewers and 2 supervisors were hired. All interviewers were experienced in administering household interviews and had used CAPI software before. With the increased team size, the fieldwork was completed within the planned timeframe, although this still required substantial effort on the part of the enumerators who worked long hours under pressure.

6.3 Accuracy of GPS coordinates

During the first days of the listing exercise, the accuracy of the GPS coordinates was lower than expected (e.g. 17m in EA1, 13.66m in EA5). We ensured that all devices were set to high accuracy that resorts to GPS signals, WiFi networks and mobile phone tower triangulation. All devices were always equipped with mobile data to be able to use mobile phone tower signals during the GPS recording. We also analysed each device's GPS accuracy and, where possible, switched devices that were consistently producing inaccurate GPS readings. The average accuracy during the listing exercise was 9.51 metres (SD 4.86). Particularly because of variability of GPS accuracy in the different EAs, this accuracy was still not considered accurate enough to be able to easily relocate the sampled dwellings. Therefore, after the first two days of listing fieldwork, a question was added to the listing instrument that assigned a unique number to each structure listed per EA. On the EA map printout provided, the team supervisor identified the location of each structure using the same number. Both the GPS readings and the structure plan were then used to relocate the sampled dwellings.

During the household interviews, the average GPS accuracy was much higher at 23.54 (SD 12.75), despite the devices having acceptable GPS accuracy during initial testing. The recorded coordinates are of worse accuracy than in the LSMS Dar-es-Salaam survey (mean accuracy 5.1m), but of better average accuracy than those recorded in the Durban survey (mean accuracy 28.9m). The urban setting with tall or very congested buildings made it difficult to obtain precise GPS recordings. Enumerators at times had to make several attempts before they were able to obtain any GPS recording at all. GPS recordings in the household interviews were replaced with those from the listing in cases where the GPS recorded during the listing was more accurate.

6.4 Household roster

Enumerators encountered difficulties in determining who was a household member. The definition of a household member given to enumerators was as follows:

I would like to start by asking you who the members of this household are. By that I mean all people, including children, who: 1) lived under this "roof" or within the same house for at least 3 months in the past year, and 2) when they are together, they share food from a common source, and 3) contribute to and/or share in a common resource pool.

Particularly in the beginning of the survey, some enumerators did not fully adhere to the criterion of the individual having to have spent at least 3 months during the past year in the household to be considered a household member. When the enumerator then arrived at the question "For how many months during the past 12 months has [this person] been away from this household?", the enumerator realised that there was a household member who had been away for more than 9 months of the year and should not have been counted as a household member. They returned to the household roster and deleted this person from the roster. In other cases, the main respondent

was sometimes adamant that a person be counted as part of the household, despite having been away for more than 9 months during the past year.

The deletion of household members from the roster introduced inconsistencies in the numbering of household members on the roster. For example, when the second person on the roster is deleted, the remaining household members continue to be assigned Id 1, 3, 4, 5 etc. This also resulted in three households where the Id numbers of the main respondent and household head are larger than the total number of household members. For ease of merging the household Id numbers across the various datasets, we have not changed the numbering of household members in cases where a member was deleted from the roster.

Enumerators were re-trained on this issue immediately after it was flagged during the data checking process. They were re-trained on the exact definition of a household member, and on how to explain to the main respondent that this is the definition to be adhered for the purpose of the survey, even if the main respondent considers someone to be part of the household despite having been away for more than 9 months in the previous year. For each interview where this issue was observed, the data manager spoke with the enumerator individually and clarified any outstanding confusion.

6.5 Problems synchronising ATW64 and ATW70

Due to a mistake made during the set-up of the tablets for accounts ATW64 and ATW70, the data from these two tablets could not be synchronised successfully. This was only noticed after the start of fieldwork, when several interviews had already been started and/or completed on these devices. The information from the interviews was accessible on the device but could not be synchronised. The ATW team transferred the information from all completed interviews to another tablet and synchronised this tablet. GPS coordinates and visit dates for these interviews were captured on an Excel sheet and subsequently merged into the dataset. For interviews that were started but not yet completed, the data was transferred to a new tablet and the interview was continued on that tablet.

7 Known Issues

7.1 Synchronised interviews failing to show up on the server

During the last week of fieldwork, fieldworkers conducted a total of 152 household interviews, of which 23 were non-response, and 25 community interviews. The fieldworkers subsequently synchronised their tablets, received a notification that the synchronisation had been successful and the interviews were no longer accessible on the devices. These interviews, however, failed to show up on the server. The fieldwork manager and data manager in Antananarivo verified with the supervisors of each team that each of these interviews had been completed, and re-synchronised every tablet, but the interviews could not be recovered. The list of dwelling ID numbers and EA ID numbers for the missing interviews are listed in the excel sheet that was submitted together with the data.

7.2 Residential history

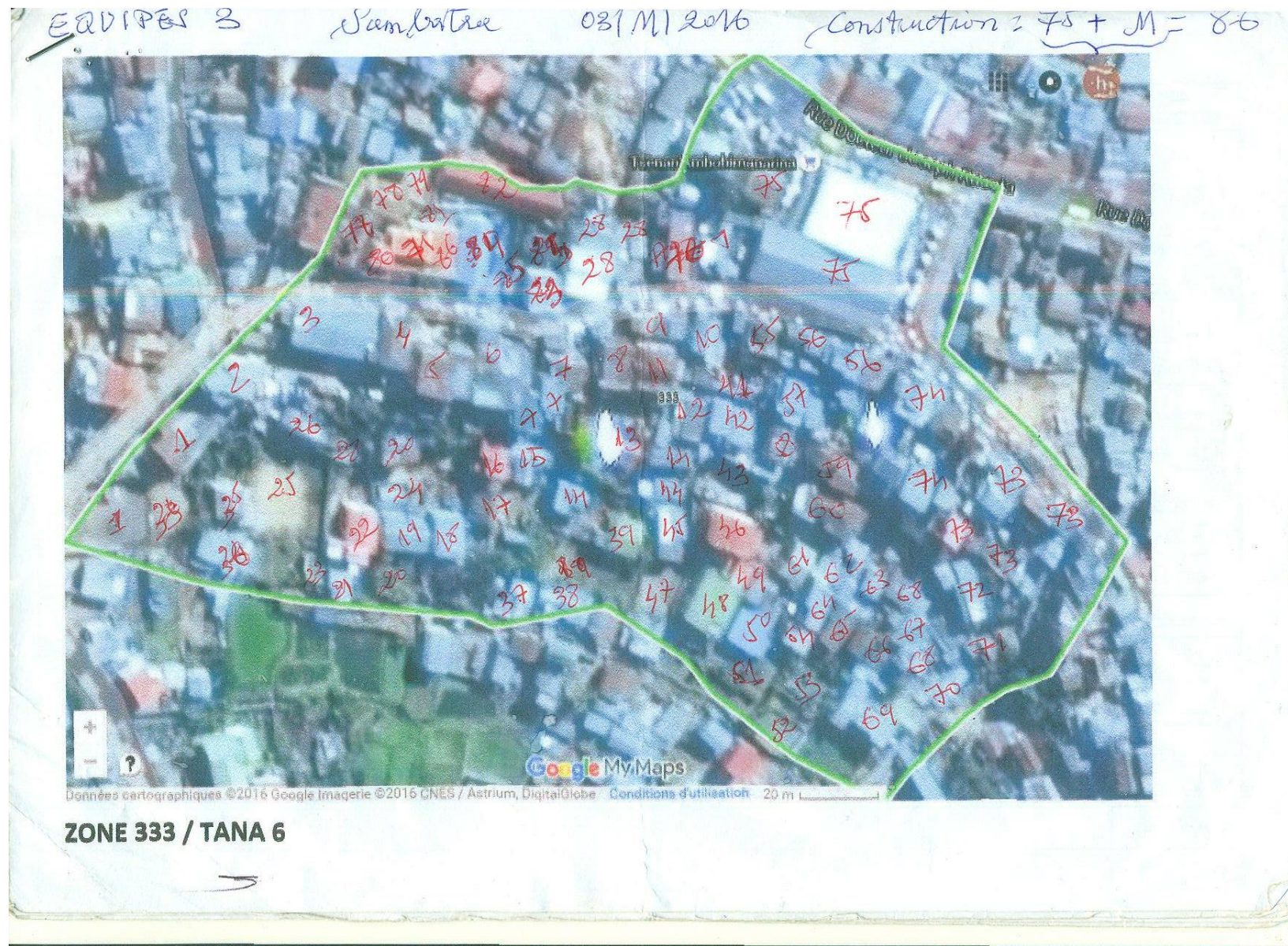
Some enumerators had difficulty administering the question on “*For how many years has your household lived in the current dwelling?*” (s8_hsgtme). Instead of entering the number of years, some enumerators entered the *year* in which the household moved to the current dwelling (e.g. 2014 instead of 2). The residential history section was programmed to be administered if the age of the household head minus the number of years lived in the current dwelling was greater than 9. As a result of this enumerator error, there are 143 cases where the residential history question should have been administered but was not.

7.3 Other known issues

OPM has not been able to address some of the issues found in the data. Known issues are listed in the sheet *KnownIssues* of the excel sheet that was submitted together with the data. The sheet contains identifying variables, an issue description, and variables providing more information.

Annex A Examples of EA maps





Annex B Examples of completion sheet

25/10/16

N° EA	N° DE L'HABITATION	Adresse ou description de la construction	Construction dans la carte	Usage de la construction	Nombre d'etages dans la	Habitation selectionnee	Commentaires	Date de listing	Liste par
13	1301	trno vao atao ,porte managa	21	Hipetrana irery ihany	1	menage 1 a gauche	tafo mena vao atao, porte manga	12/10/2016	EXTRA_8
13	1302	IIC72e ter manjakaray	10	Hipetrana irery ihany	2	1er etage menage1 porte a droite	akaikiny pompe, lavarangana hazo	12/10/2016	EXTRA_8
13	1303	IIC18GA MANJAKARAY	52	Hipetrana irery ihany	2	trano ambany rihana varavarana gris grillage misy tole	trano ciment tsy miloko varavarakely fotsy	12/10/2016	ATW4
13	1304	IIC18f manjakaray	2	Hipetrana irery ihany	2	1er etage a gauche	vavahady hazo mainty trano fotsy	12/10/2016	EXTRA_8
13	1305	IIC47bis manjakaray	56	Supermarché / Commercial	2	1er etage a gauche varavarana tsy miloko	misy alika masika	12/10/2016	ATW8
13	1306	IIC18FAbis manjakaray	14	Hipetrana irery ihany	1	trano2 trano hazo misy bararata	misy tranon omby eo an tokotany	12/10/2016	ATW8
13	1307	presIIC18AM manjakaray	20	Hipetrana irery ihany	1	trano2 trano hazo varavarana fotsy	misy trano sase eo an tokotany	12/10/2016	ATW8
13	1308	IIC 72EA TER Manjakaray	11	Hipetrana irery ihany	2	trano 1 ere etage varavarana mena tsy misy varavarankely	trano tafo kapila misy lavarangana mavokely	12/10/2016	ATW4
13	1309	IIC24BIS manjkaray	43	Hipetrana irery ihany	4	2em etage varavarana fotsy	fefy hazo trano fotsy misy tsena kely eo akaikiny	12/10/2016	ATW18
13	1310	IIC18A manjakaray	25	Hipetrana irery ihany	2	2e etage menage1	misy hasina ao anatin'ny	12/10/2016	EXTRA_8
13	1311	IIC25 manjakaray	47	Hipetrana irery ihany	2	trano mena porte droite menage1	manga rehetra, misy vavahady kel vy	12/10/2016	EXTRA_8
13	1312	IICM18F bis manjakaray	8	Hipetrana irery ihany	1	menage1 porte hazo a droite	trano hazo misy fary sy tao mangahazo	12/10/2016	EXTRA_8

+ 1313 IIC17 Manjakaray 41 - 1 - 2. 2^{eme} etage menage1 misy fahintsy mainty vavahady hazo fait 30/10/16