THE REPUBLIC OF RWANDA

NATIONAL INSTITUTE OF STATISTICS OF RWANDA

Fourth Population and Housing Census, Rwanda, 2012

Thematic Report

Data quality assessment

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Ministry of Finance and Economic Planning
National Institute of Statistics of Rwanda

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January 2014

The Fourth Rwanda Population and Housing Census (2012 RPHC) was implemented by the National Institute of Statistics of Rwanda (NISR). Field work was conducted from August 16th to 30th, 2012. The funding for the RPHC was provided by the Government of Rwanda, World Bank (WB), the UKAID (Former DFID), European Union (EU), One UN, United Nations Population Fund (UNFPA), United Nations Development Programme (UNDP), United Nations Children's Fund (UNICEF) and UN Women.

Additional information about the 2012 RPHC may be obtained from the NISR:
P.O. Box 6139, Kigali, Rwanda; Telephone: (250) 252 571 035
E-mail: info@statistics.gov.rw; Website: http://www.statistics.gov.rw.

Recommended citation:

National Institute of Statistics of Rwanda (NISR), Ministry of Finance and Economic Planning (MINECOFIN) [Rwanda], 2012. *Rwanda Fourth Population and Housing Census.*
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List of abbreviations

DHS	Demographic and Health Survey
EA	Enumeration Area
EICV	Integrated Household Living Conditions Survey
GPS	Global Positioning System
NISR	National Institute of Statistics of Rwanda
OPM	Oxford Policy Management
PES	Post-Enumeration Survey
RPHC4	Fourth Rwanda Population and Housing Census
SMS	Short Message Service

FOREWORD

The undertaking of Population Censuses in Rwanda goes back to the year 1978 where the first ever Census was implemented. The second and third censuses were carried out in 1991 and 2002. The 2012 Census marks the Fourth in the series. It is undoubtedly that Census information, particularly if made available on a regular basis, is indispensible for planning, policy development, evaluation and for research purposes.

The final results of the 2012 Census are published in the form of statistical tables and analytical thematic reports. Generally, the results provide population counts down to the lowest administrative level, as well as demographic and socioeconomic indicators at both national and district levels. I recommend that such invaluable information contained in the census results be used as updated benchmarks for all development planning, and in monitoring and evaluation of Rwanda's development goals.

On this occasion, I would like to seize this opportunity to thank His Excellency the President of the Republic of Rwanda for his direct support to the census, the Government of Rwanda and development partners for providing the required resources for conducting the 2012 Census. Special gratitude goes to One UN, the European Union (EU), the United Nations Population Fund (UNFPA), the World Bank (WB), the United Kingdom AID (UKAID-formerly DFID), UN Women and UNICEF.

I would also like to thank all members of the National Census Commission and the Census Technical Committee for their able guidance of the entire Census operation. The National Institute of Statistics of Rwanda (NISR) deserves special appreciation for the successful implementation of this huge statistical undertaking and releasing the final results on time.

Special gratitude goes to all respondents, field staff from NISR and other government institutions and international experts for their sincere cooperation and dedication to successfully complete the mission.

Claver GATETE

Minister of Finance and Economic Planning, and
Chairperson of the National Census Commission

ACKNOWLEDGEMENTS

The National Institute of Statistics of Rwanda (NISR) is pleased to release the final results of the Fourth Population and Housing Census (PHC4). The execution of different Census phases: preparatory works, data collection, data processing, tabulation and data analysis continued for about four years -- between 2010 and 2013.

NISR has published several Census analytical reports to be of direct help to policy makers, planners, local authorities and other users. The reports have dealt with several issues from population size and distribution, education, settlement, labour, population projections to mention but a few. NISR hopes that the analytical reports would meet the demand of Census data users at central and local levels.

On this occasion, I would like to pay our sincere gratitude to the President of the Republic of Rwanda for the Presidential Decree No. 02/01 of 07/02/2011 organizing the 4th Population and Housing Census and the Minister of Finance and Economic Planning the Chairperson of the National Census Commission for the Ministerial Order No. 001/12/10/TC of 19/01/2012 determining the administrative structure and technical organization of the 2012 Population and Housing Census. These legal instruments laid a solid foundation for all activities that followed without which not much could be achieved.

I also take this opportunity to thank the National Census Commission, the Branches of the Commission at Province and District levels and the Census Technical Committee whose invaluable guidance and advice enabled carrying out Census operations in a highly professional and timely manner.

My greatest gratitude extends to the Government of Rwanda and development partners for availing logistical and technical support.

Special recognition goes to the Ministries of Defense, Local Government, Education, Internal Security, Foreign Affairs, the National Police and National Correctional Services for the direct involvement in field data collection operations.

I also wish to express my appreciation to the local government authorities and NISR staff for their excellent operational organization and to the tens of thousands of enumerators and supervisors for their painstaking efforts throughout the data collection phase.

Finally, the people of Rwanda, residents and visitors your cooperation was crucial for the success of the census. Thank you.

MURANGWA Yusuf

Director General,
National Institute of Statistics of Rwanda

Executive summary

The work presented in this report represents an independent quality review conducted in parallel with the thematic analysis of the Fourth Rwanda Population and Housing Census (RPHC4). It covers the work done prior, during, and after enumeration to maximise the data quality. The assessment confirms the strong planning and quality assurance throughout the enumeration to maximise representation of the population; but also finds potentially weaker direct quality assurance during the data processing phase. The overall conclusion of the assessment is that the RPHC4was implemented with strong quality control and gives an excellent representation of the population of Rwanda with generally good measurement of its structure both in terms of spread and demographic and socio-economic characteristics.

The claim of high quality with respect to representation is confirmed by the Post-Enumeration Survey (PES), which measured the net-coverage of the household population in the RPHC4 to be over 99% nationally with little variation across provinces and by age and sex. Gross under-coverage was around 1.5% while gross over-coverage (erroneous inclusions) was around 0.6%. The conclusion of excellent representation is also consistent with the plausible growth rate for the population over the inter-censal period implied by the national results.

Analysis of the demographic and socio-economic information contained in the final RPHC4 database and triangulation with other data sources also confirm that for most areas, the RPHC4 gives a reliable and comprehensive representation of the population. However, some issues were found with respect to measurement of population characteristics: some possible under-reporting of males (especially at young ages), some age-heaping around the digits 0 and 2 as well as particular irregularities around the ages 2 and 12. Moreover, despite careful testing of the questionnaire with explicit enumerator instructions regarding these sections, there is also evidence of under-reporting of mortality, and to a lesser extent fertility. Indirect estimation may be appropriate in these two thematic areas. However, apart from these issues the analysis of the RPHC4 database supports the assertion of good quality with respect to measurement.

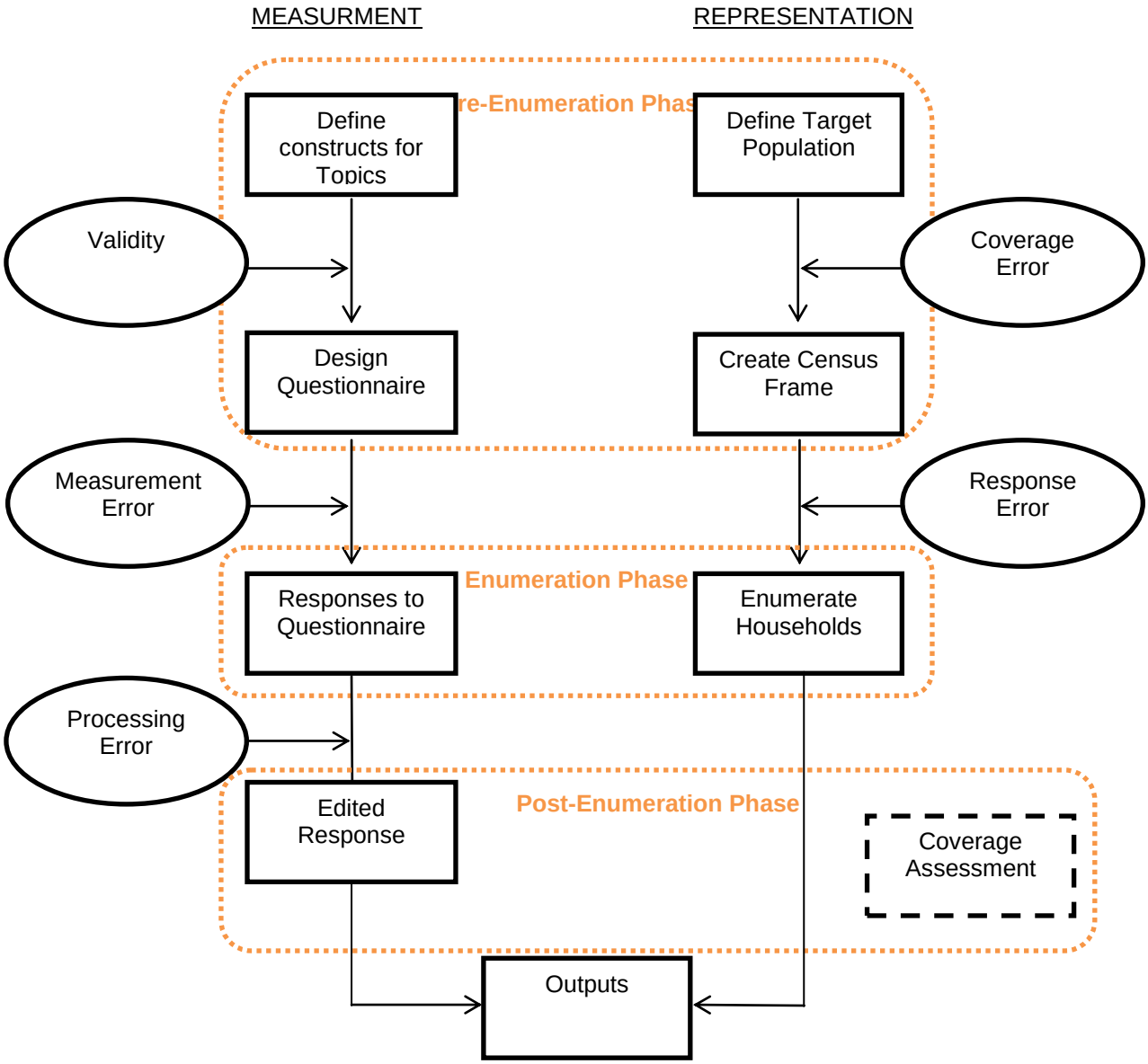
Introduction

The population and housing census of any country forms the basis of the population information for that country. Therefore, assessing the data quality of the census is crucial to ensure users and policy-makers can have confidence in the data. In this report we review the data quality of the Fourth Rwanda Population and Housing Census (RPHC4) conducted for the night 15th August 2012. We do this by first reviewing the processes and procedures behind the RPHC4; and then by directly assessing the coverage of the RPHC4 and indirectly assessing the outputs of key variables for plausibility.

Eurostat identify six aspects of data quality; relevance, accuracy, timeliness and punctuality, accessibility and clarity, comparability, coherence. In this report we will focus particularly on the accuracy aspect with reference to comparability and coherence. We will make some reference to the other aspects where appropriate, for example relevance comes in when we consider the design of the questionnaire. To aid our assessment of accuracy we will use the life-cycle from Groves *et al* (2009), simplified for a census situation. This is shown in Figure 1.

The life-cycle in Figure 1splits the process of producing final outputs into two components; measurement and representation. Within measurement there are several steps (boxes) to the creation of an output and at each step errors (ovals) can occur. For example, a well-designed question may well give valid measurement of the underlying construct but if poorly administered there will be measurement error as the resulting response is the true response with error. Within representation there are also several steps and again errors can occur at each step. For example, there may be a perfect listing of all housing units (census frame) but if the enumerator fails to get responses from all units there will be response error. With the Census, coverage assessment is a step that takes place to assess the representation but it is rare, the UK is a notable exception, for the output database to be adjusted to 'correct' for errors of representation.

Figure 1:Census life cycle from a quality perspective



Source: adapted from Figure 2.5, p. 48, Groves *et al* (2009).

The steps in Figure 1have also been split into three phases to cover the implementation of the RPHC4 Project; a pre-enumeration phase, an enumeration phase, and a post-enumeration phase. In the following sections we will use the three phases to deal with the various steps for both measurement and representation and their associated errors. In Section 5 we will then bring in information from the Post Enumeration Survey (PES) as part of the coverage assessment to assess the quality of the representation component. In Section 6 we will use various tools, particularly focusing on age and sex, to assess the overall quality of the key census outputs. Finally, we will conclude and discuss lessons for the next census.

Chapter 1: Pre-enumeration phase

Detailed planning for the RPHC4 Project started back in 2009. The National Institute of Statistics of Rwanda (NISR) were able to build on the broadly successful 2002 Census but with the goal to improve timeliness of the data and therefore also improve relevance for policy-makers by making results available closer to the timing of the data collection. The early start to detailed planning was part of a conscious decision by NISR to put the delivery of a high quality[1] output database at the centre of the RPHC4 Project. This key aim was supported further by strong political engagement at all levels from National Government down to Village Heads; as well as buy-in from society of the importance of collecting the census data.

Political support was encapsulated by the Presidential Order of 28/02/2011 that set-out the structure for the administration of the census; a National Census Commission comprising of high level Government representation supported by National Census Commission branches and the Census Technical Committee. This was then put into action by the Ministerial Order of 19/01/2012 'determining the composition, mission, structure and functioning of the National Census Commission branches and determining the administrative structure, technical organisation and activity schedules of the fourth general population and housing census'. Within NISR, as planning progressed a Director of Census was recruited, to work alongside the National Census Coordinator, and a Census Department created to take forward the plans. The work of NISR was also supported by UNFPA with Consultants providing additional input, especially at this pre-enumeration phase. Overall, the aim was to ensure planning was thorough and had sufficient time built-in for the various stages.

A management structure for the RPHC4 was developed, in line with the structures laid-down in the Presidential and Ministerial Orders, starting with National Coordinators to cover the household population as well as the army, police, and prison populations. There were then Provincial Coordinators and for each District two key Coordinators; one from NISR and one from the Education Department as enumerators were to be recruited from local primary school teachers. There was also representation from the army, police, and prisons; and the support of police was particularly important in the more remote areas as they were able to support the movement of census enumerators. Within each District, Zones were created by combining Administrative Sectors so there were Zone Supervisors and then Sector Supervisors within each District. Finally, Team-Leaders were assigned between three and six neighbouring EAs within a Sector with an enumerator assigned to each EA.

In this section we will now cover the creation and testing of the questionnaire dealing with ensuring there could be valid measurement of the desired[2] constructs. We then cover the representation stages up to the listing of housing units prior to the enumeration phase in August 2012. The recruitment and training of enumerators is also covered as that was crucial for the listing of housing units as well as the subsequent enumeration covered in Section 3.

[1] relevance, accuracy, timeliness and punctuality, accessibility and clarity, comparability, coherence
[2] It is important that the constructs should be relevant to the policy-makers.

1.1 Development and testing of the questionnaire (*validity; measurement errors*)

The first stage involved starting with the 2002 questionnaire and engaging across the Departments of National Government to assess the relevance of the topics being covered and potentially identify key topic gaps. Once there was agreement on the topics, the design and layout of the 2002 questionnaire was the starting point for developing the questions and questionnaires for 2012. As a default, questions were kept the same in 2012 as in 2002. This not only increases the comparability of the data across time but made sense given the 2002 questionnaire was based on UN recommendations for census questions and content. There were some changes to content and question structure. More household information was collected on internet access reflecting the rapid changes in terms of internet coverage. In the area of disability, there was the positive move towards utilising questions from the Washington Group that were consistent with the International Classification of Functioning, although the questionnaire did not capture all the elements. Other questions, such as those relating to birth registration and survival of parents were added or adjusted from 2002 to improve comparison with other sources such as the Demographic and Health Surveys. In the area of marriage and family, there was the addition of a direct question on age at first marriage but polygamy for females was still not fully covered. There was some loss of comparability in terms of literacy questions between 2002 and 2012, minor but potentially problematic changes to economic status categories, and a change in the definition of a 'room' when reporting the number of rooms; and looking back it is not clear what the motivation was behind these minor changes.

In terms of lay-out, there was a fundamental change to restructure the household questionnaire to be a page-per-person design. This was based on the experience of 2002 where a line-per-person lay-out going across several pages caused problems both in terms of measurement and processing errors. However, this change in the design of the questionnaire required the inclusion of a household member grid on the first page to ensure the enumerator included all members when completing the individual pages. The grid also facilitated the enumerator in identifying the usual residents present in the household on census night, the usual residents absent from the household on census night, and those visiting the household on census night.

A result of the change was to move the household questions to the end, which had previously been identified during planning for 2002 with an increase in missing data in the household questions. To mitigate this, the original form design for 2012 was such that the household[3] section was visible when the enumerator un-folded and folded the questionnaire to complete the individual questions as a reminder to complete the household section. Testing showed the design worked well but it was too costly to produce, relative to the simple booklet that was adopted for the actual census, with enumerator instructions to not forget the household section. Therefore, a conscious decision was made to change the design of the lay-out to improve the quality of the individual level data and accept a possible reduction in the quality of the household data. But it was also a known issue so that the importance of the household data could be stressed during the enumerator training to mitigate any reduction in quality, and small-scale testing supported that training could prevent a reduction in quality.

[3] It is worth noting that the mortality questions relate to the household and therefore come at the very end of the questionnaire as they are at the end of the household section.

Prior to any field-testing, the proposed questionnaire was reviewed by experts within the NISR. Small-scale tests were then undertaken to pilot the use of the questionnaire. This allowed further development of enumerator instructions where it was clear that enumerator-respondent interaction was potentially introducing measurement error with respect to the desired measurement. The result of the testing was a proposed questionnaire that could be used in the pilot census; where it's general use by enumerators, flow of questions, as well as understanding and acceptability by respondents could be assessed on a larger scale.

1.2 Creation and mapping of the enumeration areas (*coverage errors*)

The United Nations[4]define a census as 'the total process of collecting, compiling, evaluating, analysing and publishing or otherwise disseminating demographic, economic and social data pertaining, at a specified time, to all persons in a country or in a well delimited part of a country' either defined in terms of persons present on census night (*de facto*) or usual residents (*de jure*). Therefore, a census must plan to maximise the coverage of the population, in the case of the 2012 Census both in terms of usual residents and, via the inclusion of visitors in the enumeration of each household, persons present. That maximisation started with the defining and mapping of enumeration areas (EAs).

To ensure the census outputs would have the most relevance, the village was chosen as the basic definition of the EA as this is the smallest administrative unit, typically covering between 150 and 200 housing units. Early testing of the questionnaire had also confirmed that the average time taken to enumerate a household made this a realistic workload for a single enumerator given the fifteen day fieldwork period specified in the Presidential Order. The first stage of mapping was a pilot exercise in February / March 2011 that visited every EA. The first aim was to collect data to map the boundaries of each village on the ground, with the help of the Village Head, using GPS; as well as recording important local landmarks that would aid enumerators in identifying the EA during the enumeration phase. The second aim was to estimate the size of each village, with the help of the Village Head, and this identified some villages that would have resulted in EAs that were too large. In such cases a further sub-dividing was undertaken using roads to define boundaries and recording the chosen boundaries using GPS.

Back in the office, the original plan was to impose the GPS data defining boundaries on traditional line-maps and these were used during the census pilot. However, after further discussion the line-maps were replaced by high definition aerial photographs of the whole of Rwanda supplied by the Rwandan National Land Centre (for Kigali) and purchased from Google for other areas. Some further work, including re-visiting villages, was done to ensure common boundaries of EAs were linked and followed visible features on the ground that were also identified on the maps. This was on-going work throughout 2011 and the start of 2012 to ensure the defined EAs gave 100% coverage of the geographic territory of Rwanda. A high definition map of each EA was then produced, in time for the listing exercise, with the EA boundary clearly marked on the high definition aerial photograph along with boundaries for the bordering EAs.

[4]Principles and Recommendations for Population and Housing Censuses, *Statistical Papers Series M*, **No. 67/Rev.2**, United Nations, New York, 2008, p.7.

Figure 2: Map showing EA boundaries

Source: NISR

The geographic codes identifying the EA were included on the map to aid the enumerator and multiple copies were produced for the various levels of field management. Other maps were also produced for each management level of the census fieldwork so that local managers would be able to identify their areas 'on-the-ground' and track progress of individual EAs.

1.3 Census Pilot

The Pilot Census in July / August 2011 took place in 75 EAs randomly selected from across Rwanda and was a major test of the enumeration phase 'on-the-ground' in terms of the recruitment and training of enumerators, the listing of an EA, as well as the use of the questionnaire. In other words it was concentrating on ensuring measurement errors would be minimised in the actual census collection. After further consultation across the team, testing of ideas for fieldwork management was added to consider how to ensure response error would be controlled. It was also decided that the forms would be processed to consider issues in relation to processing error.

With respect to reducing measurement error, a key decision following the Pilot was the addition of two more people to the form increasing the individual grid from 10 to 12, reducing the need for enumerators to use additional forms for a single household. There was also the subsequent change in the design of the form to a simple booklet as discussed in Section 2.1. However, in general the Pilot Census confirmed the conclusion of Section 2.1 and further confirmed that the time taken per enumeration made the standard EA a reasonable workload.

With respect to response error, several lessons were learnt. First it was clear that more flexible hours would be required for the enumeration phase, especially in urban areas. A call-back card was added to allow the household to call the enumerator to arrange a suitable time for enumeration. Second, the size of the EA had been based on the mapping exercise and in some cases this had seriously under-estimated the number of dwellings. This was especially the case in the East where there has been rapid population growth due to the Government encouraging internal migration to this more sparsely populated Province. As the comprehensive EA mapping for the whole country was already under-way, it was not possible to re-visit EA boundaries with respect to the RPHC4. However, it was possible to ensure reserve enumerators would be available in the actual census to boost enumeration capacity once EAs had been listed. To do this a live management information system was going to be required to first track the listing of each EA and then to track the progress of its enumeration. A system was developed for the actual census that was able to receive information via SMS and directly process the information to create maps and reports of progress.

There were also lessons with respect to the general organisation and management of the enumeration phase. In some cases there was a shortage of forms in EAs and this was identified as being due to form packs supplied by the printer being smaller than expected. To reduce this risk in the actual census, form and serial numbers were added and weighing of form batches was implemented to ensure each district would receive four form batches of 50 forms per EA in the district.

The data processing stage did not identify any issues with respect to the form, apart from the need to include a zero option for years of education. However, it was not possible to

undertake a detailed analysis of the processed data from the pilot that may have shown up some of the issues that have been dealt with during the editing and imputation of the real census data; and the subsequent analysis. For example, while there was a change in the education questions to aid in the data collection, sufficient information was not available to undertake more detailed analysis relating to educational reforms and school drop-out. Some of the categories and information collected on sanitation was not fully consistent with international indicators, and this is a major drawback for the calculation of internationally comparable indicators. Some of the skips in the economic activity and occupation sections were not consistent for certain population sub-groups, and while this can be hard to detect when looking at small-scale tests it will often be highlighted if analysis is done on the larger-scale pilot. While NISR did not get the full benefit of the data processing by actually attempting analysis of the data, it did benefit it terms of planning the logistics of the main data processing.This led to the securing of the warehouse to store the projected 2.4 million forms, as well as systems to track the movement of an EA's forms during coding and processing.

As a last phase, the final questionnaire was reviewed by the Census Technical Committee. It was felt that after this review, the design and testing phase, including both Section 2.1 and the Pilot Census evaluation, had resulted in a questionnaire that would be able to deliver relevant and valid information with the potential for measurement errors minimised by the design of the form, the wording and structure of the questions, and the accompanying enumerator instructions. The Pilot Census had also allowed for development of the listing and enumeration to help minimise coverage and response errors. It had also highlighted logistical issues with regard to the enumeration and data processing, but the time between the Pilot and the actual census allowed those issues to be addressed in time for the fieldwork of the RPHC4. The slight weakness was that by not analysing the pilot data, some issues in relation to categories and comparability with both the 2002 census and international indicators remained; and these have needed to be dealt with at the analysis stage.

1.4 Enumerator training *(measurement errors; coverage errors; response errors)*

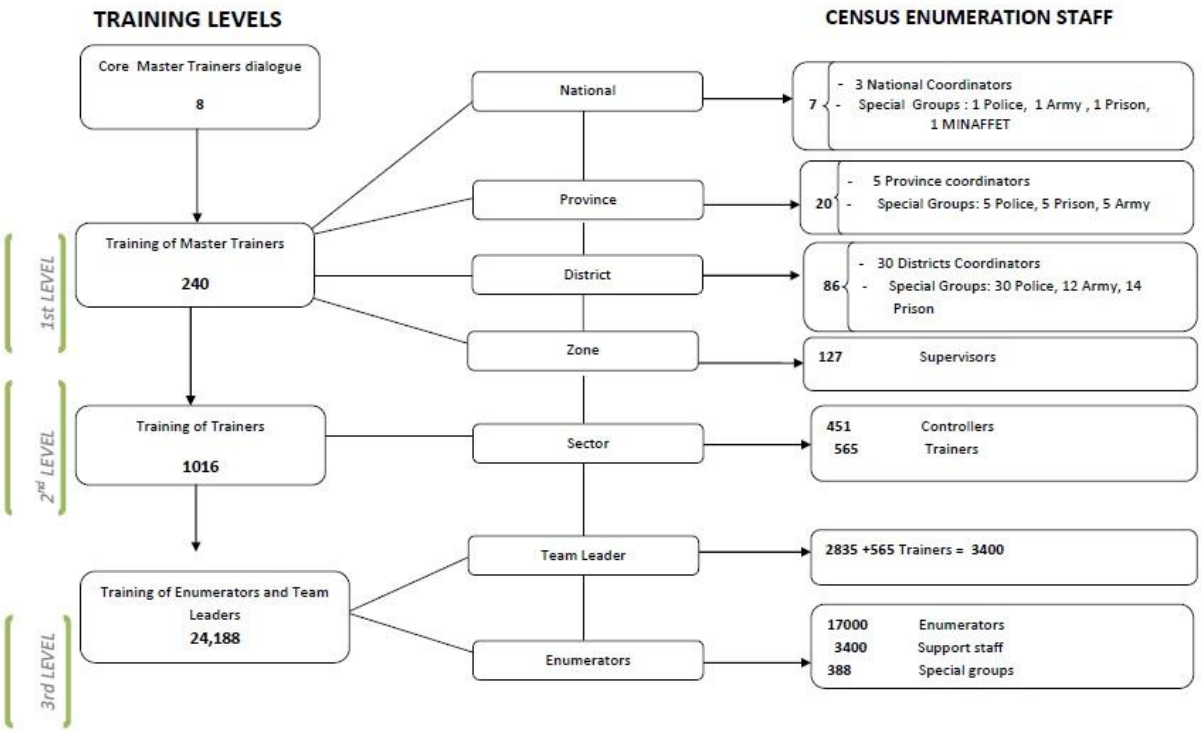
Key component of preparation for the enumeration was the recruitment of approximately 16,700 enumerators to cover each EA with a single enumerator. In addition, a reserve pool of 10% was also recruited to cover for issues such as illness or unavailability. It was also necessary to cover the expected issue of boosting enumeration capacity in EAs identified as having more than the target maximum of between 180 and 200 households. A key decision to recruit local primary teachers as enumerators was aimed at ensuring enumerators would: have a commitment to their local area, have a good level of education to allow training for the enumeration, have local knowledge to aid the listing phases, be respected members of the local village to aid cooperation during the actual enumeration. Therefore, from the beginning, and reflected in both the Presidential Order and the Ministerial Order, the Department of Education was involved with NISR in the planning of the RPHC4. This resulted in a smooth and successful recruitment of the fieldwork team needed to undertake the actual census.

Detailed training materials were prepared covering the use of the maps and the identification of an EA's boundary (*coverage error*), the listing of households within the EA (*coverage error*), and then the enumeration of the households both in terms of getting a response with the identification of all individuals to be enumerated (*response error*), as well as the correct completion of the questionnaire for the identified individuals (*measurement error*). The

materials included a CD of example interviews demonstrating how an enumeration should proceed in different scenarios.

To enable the ultimate training of more than 17,000 enumerators and their team-leaders, the hierarchical structure of census management was used to cascade the standardised training down from the National and Provincial level to the local level. Core Master Trainers from NISR developed the training materials, including the CD of enumerator dialogues, trained those involved at the Province, District and Zone as Master Trainers. This was a two week residential training programme that included at least two fieldwork tests to assess and aid learning. These Master Trainers then cascaded the training down to the Sector level by replicating the two week residential training programme at training centres across Rwanda. Finally, the Sector level Trainers trained the team-leaders and enumerators using the same two week residential model, with the fieldwork tests, at 67 training centres. As training was cascaded down, the quality was ensured by the use of standard materials including the CD as well as by direct quality assurance at the training by the eight Core Master Trainers and the more numerous Master Trainers. This structure, with the relevant numbers at each level, is shown inFigure 3.

Figure 3: Training Framework for the Fourth Rwanda Population and Housing Census



Source: NISR

Figure 3 also shows the engagement with police, army, and prisons at the various levels to ensure cooperation in the training of enumerators and then the enumeration of their institutional households. This is covered in more detail in Section 2.6 and Section 3. It also shows 3,400 ‘Support staff’ at the bottom level and this was the pool of trained reserve enumerators.

1.5 Creation of the enumeration lists within each EA (*coverage errors*)

An absolutely crucial stage in a census for maximising coverage is the identification and listing of all housing units within each EA. This was recognised by NISR at an early stage in the planning and careful consideration was given to ensuring sufficient time would be given for the listing independent of the enumeration, while keeping it as close in time as possible to the actual enumeration. The early securing of the warehouse for storage of the forms after data collection gave space for the organisation of logistics prior to data collection. This included the storage of forms for delivery to each District as well as all the additional equipment such as the thousands of pens needed by enumerators. On the ground, enumerators (and team-leaders) were provided with bicycles in flat rural EAs that often covered larger geographic areas, while motorcycles were made available to Sector Controllers. In more difficult areas, transport including boats was provided through the involvement of the Police that was ensured through their engagement at all levels of the process.

The first stage of the listing was the identification 'on the ground' of each EA boundary. Prior to the listing, enumerators were trained[5] to utilise their maps to identify the EA on the ground. The identification by each enumerator was carried-out 'on-the-ground' in consultation with their team-leader, the enumerators responsible for the neighbouring EAs and the relevant Village Heads. This ensured that all housing units close to a boundary were assigned to *one and only one* EA prior to the listing.

Listing then followed during four days at the start of August 2012. It was closely supervised by the team-leaders who checked the work of their enumerators each day and fed back listing progress in each EA to the Sector Supervisors. Listing information was then reported back daily to the NISR's command and control system via SMS so that progress of listing in relation to the expected size of each EA could be monitored centrally. Thecombined approach of local supervision with central reporting resultedin direct quality assurance of the listing of each enumerator to maximise the coverage of the final census frame of housing units, as well as identifying more difficult areas to allow additional resource to be made available from the pool of reserve enumerators during the actual listing phase. The result was a high quality[6] listing of all EAs achieved within the planned time-frame with the information fed back to the central NISR census team.

1.6 Listing institutional households (*coverage errors*)

The vast majority of the Rwandan population reside in residential households but there are an important sub-group of the population that reside within institutional households that cover army barracks, police barracks, prisons, and other institutions such as hotels. These require special treatment in the census to ensure they are enumerated. At the District level a list was created covering all army barracks, police barracks, and prisons. The enumeration of these institutional households was then managed separately with their own National Coordinators as shown inFigure 3. Other institutional households such as hotels were identified by the standard enumerators as part of their listing and entered at the end of the listing to be

[5] The delivery of enumerator training is covered in Section 2.4.
[6] The final quality of the listing can be assessed using the Post-Enumeration Survey but the planning, management, and implementation of the listing was a success getting as close as possible to 100% coverage.

enumerated by the standard enumerator during the enumeration phase. Another important sub-group not within residential households are the homeless. With the help of the Village Head, the enumerator identified the presence and location of homeless individuals in their EA during the listing stage to allow them to be enumerated as members of an ‘institutional household’ for that EA on Census Night.

Chapter 2: Enumeration phase

Careful planning by NISR ensured that everything was in-place to facilitate the actual enumeration of the population during the enumeration phase following census night, 15th August 2012. An important component of that preparation was possible because all the final listings were reported back to the NISR's command and control system via SMS giving a mapping of the listing size for each EA. Up to this point, the size of each EA had been based on the estimation during the exercise to define boundaries but now the actual listing sizes could be mapped. Where EAs were larger than expected, a particular issue in the Eastern Province, additional resource from the pool of reserve enumerators was made available to ensure the enumeration phase could be completed in the initial thirteen day fieldwork period. This was important as the testing had given an indication of the average time taken to enumerate a household, and therefore it was known that above a certain threshold of households it would not have been possible to complete the workload in thirteen days. Prior to the enumeration phase, the original enumerator helped the reserve enumerator to identify the EA and then the households in the listing were identified and shared between the enumerators to ensure households were not missed or duplicated by adding enumerators after listing.

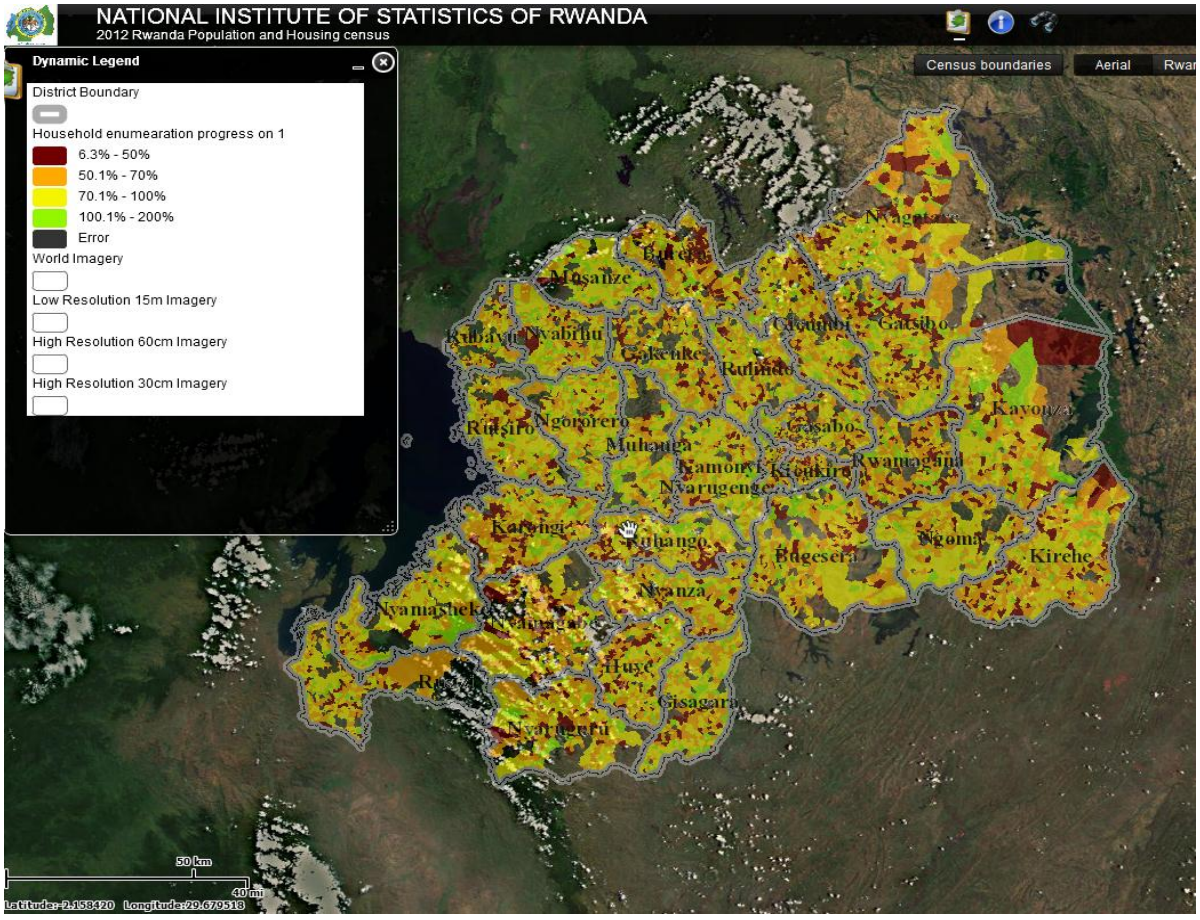
2.1 Fieldwork management *(response errors; measurement errors)*

The training of enumerators and team-leaders, as discussed in Section 2.4, had already prepared them for the enumeration phase. This training is crucial to ensure the enumerators are effective at now getting a response from the listed households with an accurate completion of the questionnaire. To quality control this crucial phase, team-leaders had daily meetings with their team of three to five enumerators. This allowed reviewing of the last day's enumeration, planning for the next day, and as the enumeration phase progressed delivery of additional batches of forms if needed. Team-leaders collected completed forms each day and checked them for completeness, as well as re-visiting some households to check the accuracy, helping to control measurement error. The process of enumeration also allowed for some fine-tuning of the listing. This is a particular issue in some rural areas where at listing stage it can be difficult to understand exactly how many households exist in a compound, while this becomes clear when the compound is enumerated and can therefore result in either the addition or removal of households.

A key component was then the daily feedback of numbers enumerated in each EA by the team-leaders using SMS, so that progress with respect to response error as measured by the listing could be monitored at all levels. For each EA, expected progress in the management information system was spread evenly across 13 days allowing for two days at the end to tidy-up where needed. Figure 4gives an example of the daily information available for every EA from early in the fieldwork period showing progress against the listing. It was also possible to track progress against a daily target that assumed response would be spread evenly across the thirteen days. Table 1gives progress at the provincial level across the initial thirteen days. By the end of this initial period, some additional resource was targeted at Kigali (and to a lesser extent the Eastern Province) in a final push towards complete enumeration. The Eastern Province had been a concern, due to the large EAs identified at listing, but the mobilisation of the reserve enumerators had ensured progress more-or-less kept pace with the other Provinces to the end of the main fieldwork. At the end of day fifteen enumeration stopped, even if there were some minor gaps in response against

the listings in some EAs, with all Provinces over 99%. This was actually a conscious and sensible decision to control both measurement and response quality. It is possible that some residual non-response was actually related to listing issues so pursuing a response is an unnecessary use of resource. In addition, a 100% response against the listing can give a false impression and getting the estimate of the final estimate of coverage is the role of the Post-Enumeration Survey (PES). Also, the US experience shows that a long follow-up often just results in more measurement error with enumerators getting poor quality proxy information and an in-complete form; or even 'curb-stoning' where they create an erroneous return for the household to simply complete the process.

Figure 4:Example of the daily information available, showing progress against the listing



Source: NISR

Table 1: Progress at the provincial level across selected days of the fieldwork

	Day Five	Day Nine	Day Thirteen
Northern Province	40.5%	82.8%	99.5%
Southern Province	38.4%	81.7%	99.6%
Eastern Province	40.0%	81.6%	*98.7%*
Western Province	39.1%	82.9%	99.4%
Kigali	*32.7%*	*71.4%*	*95.4%*

Source: NISR

2.2 Enumerating institutional households (*response errors; measurement errors*)

The questionnaire for institutional households was simpler than the main household questionnaire and did not include the fertility section for women or the household section where mortality is measured. It was administered on an individual-by-individual basis to the members of the institution. As already discussed, the large institutional households including prisons and army barracks were enumerated by staff recruited from the relevant organisations to aid cooperation 'on the ground'. For hotels, these were dealt with by the standard enumerators towards the end of the enumeration phase; while the homeless individuals identified within an EA during the listing phase were dealt with at the very start to ensure those actually present in the EA on Census Night were enumerated.

Chapter 3: Post phase

All the available evidence outlined in Section 2 and 3 points to a well-planned and managed enumeration phase that maximised the coverage of the Rwandan population as on Census Night, as well as working to minimise errors on the measurement side. Forms were returned to Kigali and stored in the warehouse that had already been secured for the purpose. Racking was organised so that each stack of forms would be an EA and the EAs were grouped on the racks as per their geography – making it easy to find the forms for any given EA. A computer system was also installed to ensure that the forms for each EA could be tracked so it would be known when and where they were at any time once they had been returned from the field and receipted into the warehouse.

The role of the post phase is to get the millions of data items collected on approximately 2.5 million paper forms stored in the warehouse into an output dataset that can be used to produce the census tabulations. This is a key task as it maximises the future utility of the data to policy-makers summarising the information and making it accessible. It is also possible to correct for inconsistencies in the data created by residual measurement errors not spotted and corrected during the enumeration phase as part of the form checking done in the field. However, if not carefully managed, it can also introduce error into the data. This may just be a residual random noise in the final outputs but it can end-up creating artificial consistencies that then appear to need correcting. Both reduce the quality of the final outputs produced from the data.

3.1 Data coding *(processing error)*

A small number of the census questions, such as occupation, are free-form answers that need to be coded prior to data entry. Coders worked in teams of 10 with a supervisor. An EA's forms were brought from the warehouse for coding. The coders worked through the forms with the supervisor checking and quality assuring the work of the coders in their team. This structure was similar to that used in the enumeration where Team-Leaders had provided direct quality assurance of the work of the enumerators. Once an EA's forms had been coded and checked they were returned to the warehouse ready for the data entry phase.

3.2 Data entry

Data entry, or the capturing of the forms into a database, was structured similarly to the data coding. The data entry clerks worked in teams of 10 with a supervisor per team. There were multiple teams per shift and multiple shifts per day. The aim was to complete data entry in four months and in the end additional resource was needed to achieve this. Traditional manual data entry is resource intensive but when there is double independent data entry with reconciliation it can achieve a very high quality. However, the push for increased timeliness meant there was not the resource available to achieve double entry and the decision was taken that any random noise from the data entry would be too small to warrant the required resource. This is likely to be the case, but unlike with data coding, the team supervisors did not have a quality assurance role. Therefore, while the assertion that variable errors during data entry would have minimal impact on the final quality seems sensible there is no direct evidence to support this.

Data entry usually involves consistency checks that can either highlight issues with the completed data on the form, or indicate a gross error by the data entry clerk. This is especially true when there is just single data-entry. Simple checks will spot issues such as a male having fertility data or five-year-old having a full-time job; and often involve following the skip structure of the questionnaire. Again, it was felt that the most important issue was to get the data entered with minimal delays so in fact very few checks were in operation during the data entry. The decision was that gross inconsistencies could be dealt with more efficiently at the subsequent editing and imputation stage; and that attempting to deal with them during data entry would have led to ad-hoc and inconsistent decisions by individual data entry clerks and their supervisors. For example, if a male did have fertility data recorded on their form an ad-hoc decision would have been made to either change the gender of the individual or not enter the fertility data. However, while it is indeed a sensible decision to not have those doing the data entry making ad-hoc decisions on how to fix genuine inconsistencies recorded on the original forms, having no checks removed all quality controlwith respect to random errors introduced by data entry. The result was that editing and imputation be required to fix all gross inconsistencies, both genuine and created by data entry; and of course not all data entry errors result in an inconsistency but all add error to the final data.

The conclusion has to be that while this streamlined approach to data entry is unlikely to have damaged the final utility of the data, it is the weak point in the production of the final database. At all earlier stages, direct quality assurance was built-in to the processes to minimise the impact of errors, while with data processing it was felt that errors could be corrected post data entry with editing and imputation. This is the correct and consistent approach for handling genuine data inconsistencies recorded on the forms as a result of the data collection. However, it is generally better to handle any additional errors created during the actual data entry process at the point they occur; rather than trying to ‘fix’ the errors created by data entry later or assuming they will have a negligible impact on the final database. This direct quality control did not happen during the data entry of the RPHC4. Inevitably, however good the control during data collection and data processing there will still be data errors and inconsistencies that will need to be corrected but the aim of quality control is to minimise their occurrence.

3.3 Data editing and imputation for item non-response

As is standard with a census, it is necessary to apply edit rules to identify internal inconsistencies in the data, and then to make a minimum change to the data so that a record can pass the edit rules. For example, if a 30 year-old individual is male, married to the male head-of-household aged 33, and reporting a full current fertility history; this record is inconsistent. The minimum change is to change the gender to female. In this case the edit rules that only females have children and only a female can be married to a male not only highlight the inconsistency but define the imputation required to correct the inconsistency. A full list of the edit rules was created by NISR and is recorded inAnnex A of this report.

After editing, the data contains item non-response, either because the respondent failed to provide a required answer or as a result of the edit process. The NISR have used standard (hot-deck and cold-deck) donor-based methods to impute for the item non-response on a variable-by-variable basis. Such an approach preserves the marginal distribution of a variable, conditional on the variables used to identify the donor, but it can damage multivariate relationships as different donors can provide imputations for the item non-response of related questions within a single individual. However, this is likely to be a

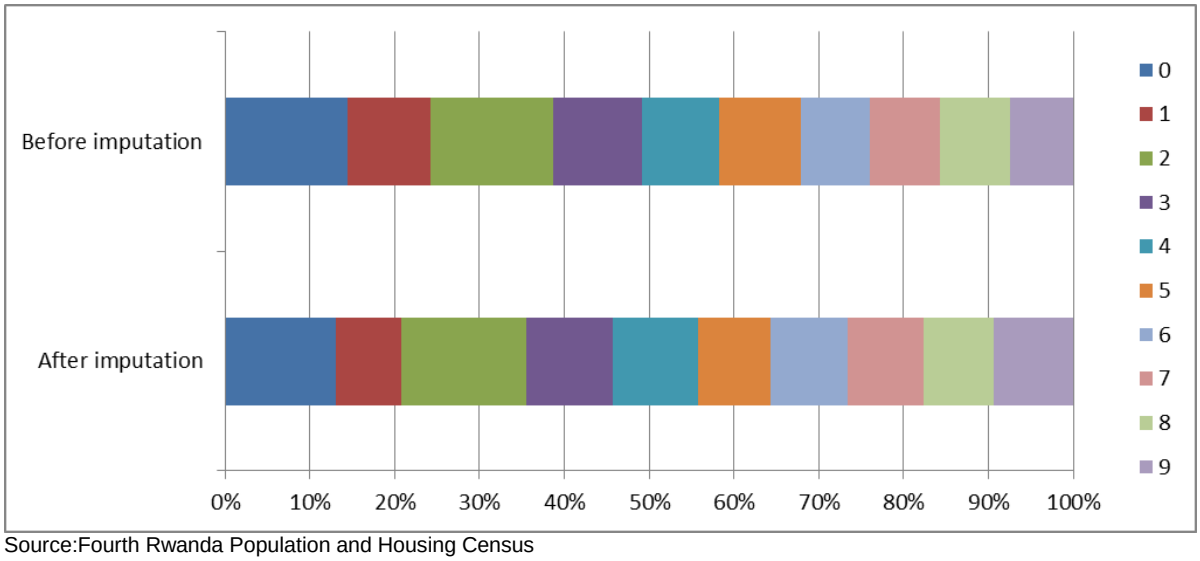
minimal issue here as edit and imputation rates for individual questions are in general a fraction of one per cent. In the small number of cases where the full household information was missing, a single donor was chosen from the neighbouring households rather than an individual-by-individual variable approach as in such cases there is no household level information apart from location to inform the choice of the donor record. Full details of the imputation rates can be found inAnnex B of this report.

The edit and imputation phase did highlight one issue from data entry. Around 20,000 individuals appeared in the data with a completely imputed record. This was independently checked and involved reviewing a sample of the individual household forms. It was discovered that at data entry the clerk had sometimes mistakenly pressed enter to start a new individual before realising that all the individuals had been entered. Therefore, the 20,000 records could be removed from the database as they were ghosts created by data entry. Countries that use scanning of forms can have a similar issue where any accidental mark on a page of a form can be interpreted as the existence of an individual. In this case, the approach of allowing editing and imputation to detect errors rather than having more detailed checks at data entry worked and the issue was resolved. There was the secondary advantage that while checking for these ghost individuals, other aspects of the data entry could also be quality assured. For example, there was no evidence that the mortality data had been poorly keyed or even missed during data entry based on these checks. There were additional ghosts within the actual mortality data where a death was recorded with no details. Again, a sample of forms was checked revealing the same issue as with the ghost individuals and these were removed from the final database.

While the level of edit inconsistencies and item non-response was generally very low with the earlier work to minimise measurement errors being effective, there was one key exception. Age was measured twice, both in terms of completed years and date-of-birth. There was a third measurement using an events calendar to identify age when the respondent was unable to provide either an age or date-of-birth. In more than 99.9% of cases, an age was provided by one of three approaches that were consistent with the rest of the data provided. However, for 2.5% of individuals there was an inconsistency between age in completed years and date-of-birth. In such cases the UN recommendation[7]is to go with age based on date-of-birth as this is less likely to be subject to age heaping. However, it is possible that individuals were actually heaping the year-of-birth with for example 2000 resulting in a spike of 12 year-olds. To explore this, Figure 5 shows the distribution of end digits of age for this 2.5% of individuals. As expected, there is a small reduction in 0 and 5 digits when using date-of-birth over reported age, which is consistent with traditional age-heaping for reported age. There is also a small increase in 2 and 7, and in the case of 2 a noticeable reduction in 1 and to a lesser extent 3, consistent with minor heaping on year-of-birth. However, Figure 5 does not support going against the UN guidelines and the spike of 12 year-olds results from individuals with a consistent age and date-of-birth.

[7] UN Handbook on Population and Housing Census editing, revision 1, page 65

Figure 5: Distribution of end digits for age in completed years and age calculated from date-of-birth for the 2.5% of records which had inconsistent data across the two questions



Source:Fourth Rwanda Population and Housing Census

3.4 Concluding remarks on the post phase

Looking across the whole process from the initial planning through the enumeration phase to this final phase, it is clear that data entry is a potential weak point in terms of the final quality of the outputs. Subsequent to the data entry, NISR has put considerable resource into editing and imputation, including reviewingsamples of forms where entire blank records had been created, and there is no evidence to suggest that data-entry has resulted in a quality issue. However, it is worth remembering for a future census, that it is always best to eliminate an error at its source if possible rather than assuming it can be corrected for later. In the UK, for example, the output database is fully adjusted for census under-coverage but it is recognised that while such a correction improves the quality of the data it can never be as good as getting the real response. In this case, NISR have successfully used edit and imputation to fix any gross inconsistencies introduced at data entry but in future it is worth considering whether more direct quality control may have removed many of those errors without the need for a subsequent fix.

Provisional estimates of the population were provided by NISR based on the census fieldwork management sheets. These gave the total resident population as 10,537,222 individuals split as 5,074,942 males and 5,462,280 females. At the end of data processing, the final resident population count was 10,515,973 individuals split as 5,064,868 males and 5,451,105 females. The final count is approximately 0.2% lower than the provisional count and this minor difference would be consistent with small errors in the completion of the fieldwork management sheets and their subsequent processing. For example, visitors on the household forms occasionally being incorrectly counted as residents on the fieldwork management returns. However, given the presence of the fieldwork management counts, this information could have been used as an additional quality control check during the actual processing of each EA's forms so that a precise reconciliation would have been possible.

Chapter 4: Evaluation of representation

Given that a census should give 100% coverage of its defined population, an independent evaluation of the representation is crucial. The UN recommends the use of an independent Post-Enumeration Survey (PES) to allow this evaluation[8] with the use of dual-system estimation (Sekar and Deming, 1949) as per the approach taken by the US Census Bureau (Hogan, 1993). The NISR has implemented this recommended approach as a check on coverage and response errors, which based on Sections 2 and 3 are expected to be small.

4.1 Design and conduct of the PES

The PES took place in 120 randomly selected EAs shortly after the census enumeration phase. The EAs included were unknown to anyone involved in the Census, so there could be no manipulation of response in those EAs, and no staff worked on both the Census and the PES to maximise the operational independence of the PES. The 120 EAs were a stratified sample based on urban-rural by province, with some over-sampling to ensure good representation of all strata. The selections were made using systematic random sampling with geographic ordering and this additional implicit stratification also ensured all districts were represented by at least one EA in the final sample.

As is common in most countries, the PES only covers the household population and not those individuals resident in institutional households. In the field, the PES enumerators went through a process similar to the census enumerators to identify their EA 'on-the-ground' using the EA map, and then carried-out a comprehensive listing of the whole EA completely independently of the listing done by the Census. The PES enumerator then attempted to get a response from all listed households. They first collected the basic demographic characteristics of all the usual residents of all households as per the stated PES day around one month after Census Night. They then established who amongst those individuals were also usual residents (present or absent) on Census Night so that in-movers to the household since the census could be excluded. Second, they collected the same data on all individuals that were usual residents (present or absent) on Census Night that were no longer usual residents to ensure that out-movers were included. The very short time between Census and PES helped minimise issues with collecting data on out-movers and if necessary the Village Head was consulted to provide basic information on out-movers. This essentially defines the P-sample of individuals, a sample of individuals from the population that should have been counted by the Census.

After an intensive clerical matching exercise to reconcile the PES household forms with the Census household forms, this identifies individuals reported on the Census and missed by the PES. A second fieldwork exercise (referred to as the E-sample by the US Census Bureau) checked whether the individuals were correctly or erroneously enumerated in the Census and this information was added to the PES data. With the RPHC4, this final check was not as difficult as it often is in the US context as the E-sample checking was done very close to the original Census Night and Village Heads could be used to help confirm an individual's enumeration status if this could not be resolved directly with the household.

[8] Post Enumeration Surveys - Operational guidelines, New York, April 2010, UNSD.

4.2 Approach to estimation of coverage

As mentioned in the introduction to Section 5, the UN approach to estimating coverage follows the implementation of dual-system estimation as done by the US Census Bureau. Within a sub-group of the population based on post-stratification defined by age-sex group a crossed with geographic area h to ensure homogeneity of response, let Z_{aih} be the count from the PES for sampled EA i corrected for both in-movers and out-movers,X_{aih} be the census count excluding members of institutional households as they are not covered by the PES, M_{aih} be the matched-count, and E_{aih} be the erroneous count in the census identified after the follow-up to the PES. At the level of the post-stratum, an estimate of the true total population Y_{ah}based on dual-system estimation is given by

$$\hat{Y}_{ah} = \frac{\sum_{i \in PES} w_i Z_{aih} \times (\sum_{i \in PES} w_i X_{aih} - \sum_{i \in PES} w_i E_{aih})}{\sum_{i \in PES} w_i M_{aih}}$$

where w_i is the PES sampling weight associated with sampled EA i. This estimator is based solely on the data associated with the PES but using classic ratio estimation arguments it can be enhanced using the full census database to give

$$\hat{Y}_{ah} = \frac{\sum_{i \in PES} w_i Z_{aih} \times (X_{ah} - \sum_{i \in PES} w_i E_{aih})}{\sum_{i \in PES} w_i M_{aih}}$$

where X_{ah} is known census total from the finalised census database.

With this approach, the creation of the post-strata is key, and a balance needs to be made between fine level stratification to maximise the likelihood of homogenous response, and stable estimates based on reasonable sample sizes. The post-strata used by NISR firstly reflect the geographic stratification of the PES, defined by 'h' in the above equations, and evidence from the census fieldwork supports differing coverage between provinces and by urban-rural within provinces. Secondly, they reflect broad age-sex groups, defined by 'a' in the above equations, as it is well established that census coverage will vary by age and sex. It is also important to present coverage by age-sex groups as the age-sex structure of the population is a key output from any census.

In the context of estimating coverage for UK censuses, dual-system estimation has been implemented slightly differently (see Brown *et al*, 1999; Brown, Abbott and Diamond, 2006). The approach applies dual-system estimation directly at the level of the PES, so that local geographic area defined by the EA enhances the homogeneity assumption, and then applies ratio estimation leading to an alternative estimator given by

$$\hat{Y}_{ah} = \frac{\sum_{i \in PES} w_i \left[\frac{Z_{aih} \times (X_{aih} - E_{aih})}{M_{aih}}\right]}{\sum_{i \in PES} w_i X_{aih}} X_{ah}.$$

In the UK context, the Chapman correction is applied to the dual-system estimator component to correct for the small sample bias, but in the context of the PES for the RPHC4 this is probably unnecessary as the PES re-enumerated whole EAs and the required age-sex groups for estimation are quite broad.

An advantage of this alternative approach is that it not only applies the dual-system estimator at a level where the homogeneity assumption is more likely to be well approximated, it removes the need to estimate the level of erroneous enumerations as this is directly observed within an EA sampled for the PES. A disadvantage is that it does not directly

estimate the gross errors of under-coverage and erroneous inclusions, but directly estimates the net coverage error. In the US context this would be an issue as the gross error from erroneous inclusions is the same order of magnitude as the gross error from under-coverage. However, in the Rwandan contextwe would expect the impact of erroneous inclusions to be small relative to under-coverage so the net coverage error is the main focus of interest.

4.3 Summary results of coverage assessment

Based on the efforts put in during both the pre-enumeration and the enumeration phases, a high level of coverage is to be expected. The PES measured the net coverage of the RPHC4 to be over 99%. A high value is to be expected given the comprehensive efforts put into the planning and enumeration phases. Table 2 shows that this net coverage is primarily under-coverage of the household resident population with only around one third of the gross coverage error coming from erroneous inclusions in the census. The under-coverage detected by the PES was mainly associated with absent residents that had not been included in the census enumeration, while it found very few completely missed households consistent with the efforts to maximise coverage in the main census. The very high match-rates (not reported here) also confirm that the PES itself had a high response rate. In general, coverage errors are very similar between urban and rural and slightly higher errors with a lower net coverage for males compared to females. Table 3 then shows net coverage cross-classified by sex and residence type.There is little variation with the exception of the very small not stated group for sex, where in the rural areas this is generally associated with erroneous inclusions in the census enumeration.

Table 2: Type of Census Coverage Errors (%) by main population sub-groups

	Population Group				
Census Coverage	Rwanda	Urban	Rural	Male	Female
Under-coverage	1.33	1.34	1.33	1.45	1.22
Over-coverage	0.58	0.55	0.59	0.60	0.56
Gross coverage error	1.92	1.89	1.93	2.07	1.79
Net census coverage	**99.25**	**99.20**	**99.26**	**99.14**	**99.34**

Source: Figures extracted from the PES Report Executive Summary and coverage rate tables.

Table 3: Net Coverage Rate (%) by sex and residence type

	Residence type		
Sex	Urban	Rural	Total
Male	99.09	99.15	99.14
Female	99.32	99.35	99.34
Not stated	98.66	102.97	102.23
Total	99.20	99.26	99.25

Source: Figures extracted from the PES Report Executive Summary and coverage rate tables (2.2.1).

These results show slightly worse coverage for males, as would be expected, but little difference between urban and rural. Table 4 breaks down the urban rural coverage by broad age groups. Again the urban rural split has little or no impact, while the 5 to 14 age group have the lowest net coverage. There is no real evidence of poorer coverage amongst the babies, an age group that often experiences lower coverage than the general population, or young adults. The small group with not stated age also have relatively poorer coverage.

Table 4: Net Coverage Rate (%) by age group and residence type

	Residence Type		
Age Group	**Urban**	**Rural**	**Total**
0-4	99.10	99.49	99.44

Age Group	Residence Type		
	Urban	Rural	Total
5-14	98.64	98.66	98.65
15-29	99.17	99.13	99.13
30-44	99.73	99.80	99.78
45-59	99.90	99.79	99.80
60+	100.02	100.02	100.02
Not stated	98.66	98.66	98.66
Total	99.20	99.26	99.25

Source: Figures extracted from the PES Report Executive Summary and coverage rate tables (2.2.2).

Table 5 breaks down the sex coverage by age groups. Here we do see that males generally have lower coverage across the age groups and this is most noticeable for young adults. Poorer coverage of young men relative to young women, and other age groups, is an issue across nations in censuses and is generally associated with this sub-group of the population being highly mobile and less connected with society.

Table 5: Net Coverage Rate (%) by age group and sex

Age Group	Male	Female	Not stated	Total
0-4	99.39	99.49	98.66	99.44
5-14	98.63	98.67	98.66	98.65
15-29	98.95	99.30	159.44	99.13
30-44	99.68	99.88	--	99.78
45-59	99.69	99.88	--	99.80
60+	100.14	99.94	--	100.02
Not stated	--	--	98.66	98.66
Total	99.14	99.34	102.23	99.25

Source: Figures extracted from the PES Report Executive Summary and coverage rate tables (2.2.3).

The general picture of coverage from the PES confirms the expected high coverage of the RPHC4 based on the careful planning and enumeration phases. There is little evidence of variation in coverage by area while the age-sex results are generally as expected; lower coverage for males especially in the young adult ages. However, the PES does not suggest a problem with coverage of babies. These results from the PES are of course subject to sampling error but estimates of these have not been made available for this report. However, it is likely that with such high coverage the sampling error would swamp any implied bias in the census counts so attempting any adjustment of the census database based on the PES would not be desirable.

Chapter 5: Evaluation of measurement and representation

The preparation for the RPHC4 outlined in Section 2, the enumeration phase outlined in Section 3, the post-enumeration phase outlined in Section 4, and the independent coverage check in Section 5 all point to a final census database with both good representation and good coverage. However, the final check on quality has to be whether the numbers are plausible and consistent with the patterns and information available from other sources; and whether there are any internal inconsistencies in the numbers such as obvious age heaping or peculiar sex ratios. In this section we first consider the basic structure of the population and then look at the basic data collected on fertility, mortality, and economic activity.

5.1 Population size and structure

The overall coverage of the RPHC4, as measured in Section 5 is high so we expect the total population figures to be of high quality. This is supported by the total population figures in Table 6 showing sensible levels of growth between 2002 and 2012 for the total population and populations by sex and urban rural split, after the instability of the previous inter-censal period that covered the genocide against the Tutsi. The overall growth rate of 2.6% per annum is consistent with a population that has declining mortality positively contributing to growth, while the impact of fertility decline is being offset by a young age structure. Allowing for the overall census coverage of 99.25% in 2012, would increase that growth rate to around 2.7%, but that would be assuming the 2002 Census had perfect coverage, which it did not.

Table 6: Evolution of the size of the population between 1978 and 2012

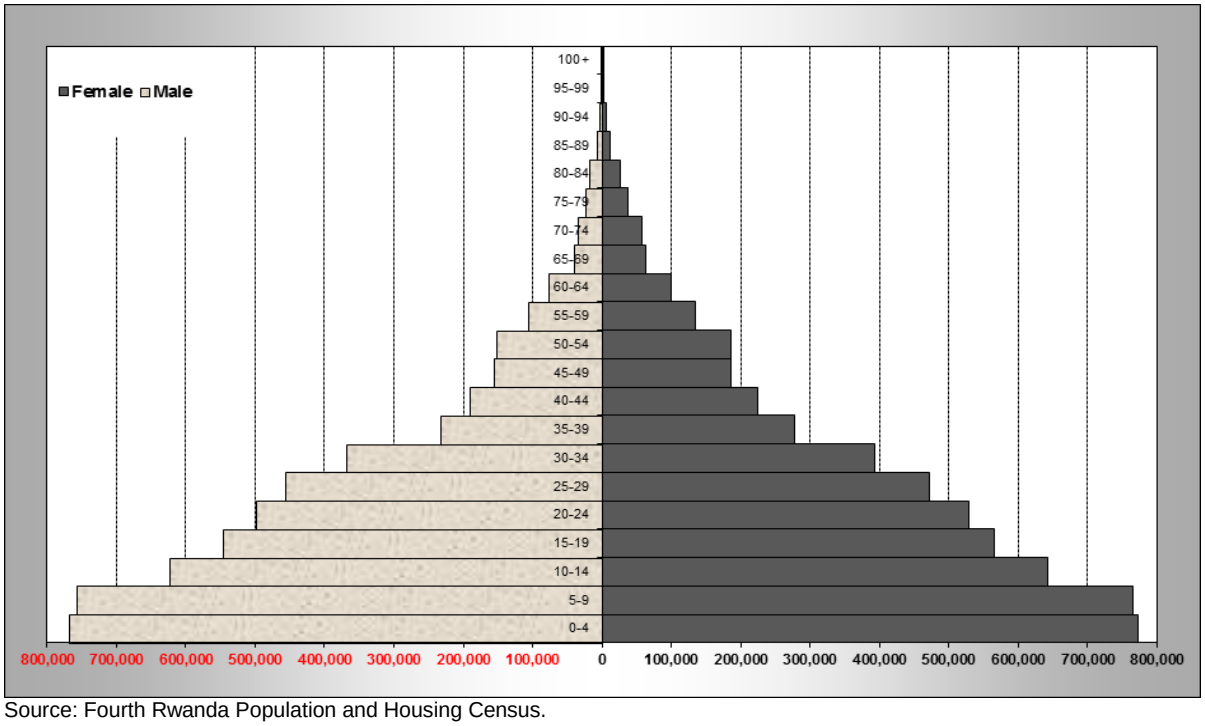
Year of census and Intercensal growth rate	Rwanda			Urban			Rural		
	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
Year of census									
1978	2,363,177	2,468,350	4,831,527	122,784	99,943	222,727	2,240,393	2,368,407	4,608,800
1991	3,488,612	3,668,939	7,157,551	207,490	183,704	391,194	3,281,122	3,485,235	6,766,357
2002	3,879,448	4,249,105	8,128,553	727,172	645,432	1,372,604	3,152,276	3,603,673	6,755,949
2012	5,064,868	5,451,105	10,515,973	891,806	845,878	1,737,684	4,173,062	4,605,227	8,778,289
Intercensal growth rate									
1978-1991	3.0	3.1	3,07	4,12	4,79	4,43	3,02	3,00	3,00
1991-2002	1.0	1.3	1.2	12,08	12,10	12,09	-0,36	0,30	-0,01
2002-2012	2.7	2.5	2.6	2,1	2,7	2,4	2,8	2,5	2,7
1978-2012	2.3	2.4	2.3	6,0	6,5	6,2	1,8	2,0	1,9

Source: Rwanda Population and Housing Census 1978, 1991, 2002, 2012.

The coverage by age and sex is also high so we expect the basic age-sex structure of the population to be of high quality. This is confirmed by the population pyramid in Figure 6 representing the overall population in standard five-year age-groups. It displays the overall shape we would expect. However, the flattening of the sides of the pyramid at the two youngest age-groups, in the context of an expected decline in infant and child mortality combined with a growing population in peak childbearing ages, implies sizeable reductions in fertility. The alternative and more plausible explanation would be under-coverage of young children, a perennial problem for population censuses, which is not fully reflected by the PES results showing lower coverage for the youngest ages. This overall structure is broken down further by urban rural in Table 7 showing that the rural population still dominates and as expected, due to the excess mortality of males with the additional impact of the recent history, females are over 50% of the population. The sex imbalance is less obvious in the

urban areas where, as would be expected due to economic migration, there is an excess of males to females in the 20 to 24 and 25 to 29 age groups.

Figure 6: Population pyramid for grouped age (count)



Source: Fourth Rwanda Population and Housing Census.

Table 7: Five-year age-sex structure of the resident population

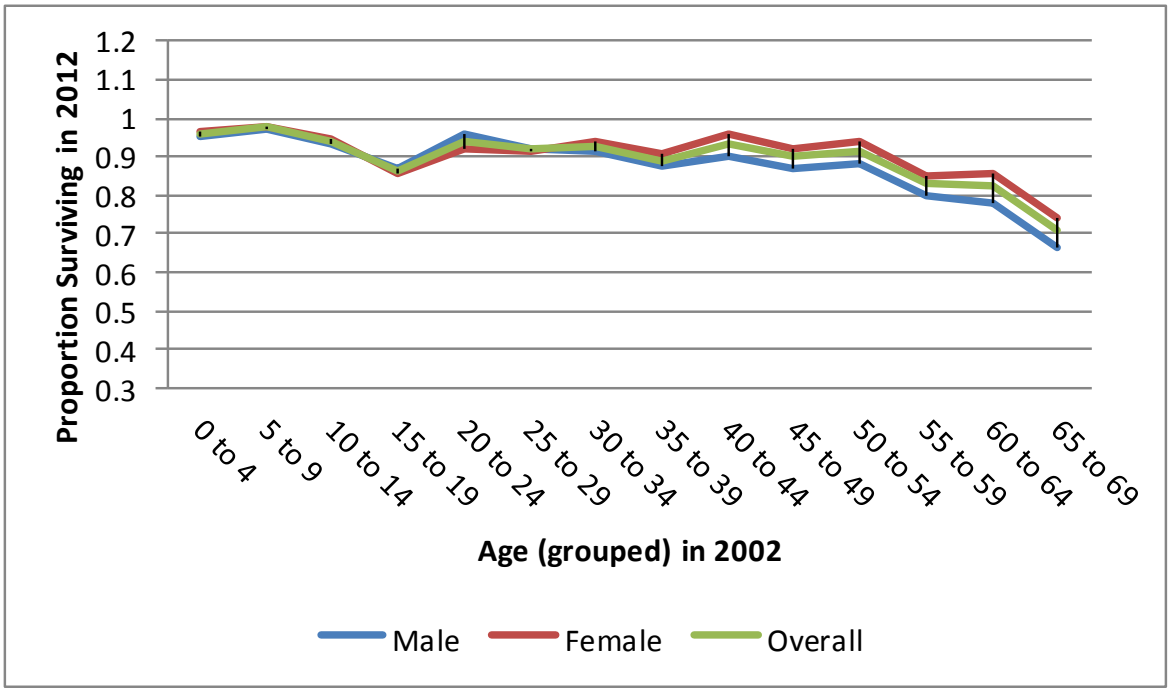
5-year age-group (Years)	Rwanda			Urban			Rural		
	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
0-4	768,049	771,978	1,540,027	113,812	113,492	227,304	654,237	658,486	1,312,723
5-9	757,421	765,565	1,522,986	101,037	100,832	201,869	656,384	664,733	1,321,117
10-14	623,440	641,630	1,265,070	86,792	90,623	177,415	536,648	551,007	1,087,655
15-19	546,863	566,212	1,113,075	89,080	102,203	191,283	457,783	464,009	921,792
20-24	499,416	528,969	1,028,385	116,135	110,268	226,403	383,281	418,701	801,982
25-29	456,642	471,452	928,094	115,731	95,248	210,979	340,911	376,204	717,115
30-34	367,917	392,967	760,884	88,917	71,037	159,954	279,000	321,930	600,930
35-39	232,822	276,844	509,666	53,503	45,826	99,329	179,319	231,018	410,337
40-44	190,876	224,684	415,560	39,627	32,063	71,690	151,249	192,621	343,870
45-49	155,557	185,299	340,856	27,836	22,608	50,444	127,721	162,691	290,412
50-54	151,797	186,512	338,309	22,327	19,084	41,411	129,470	167,428	296,898
55-59	106,829	134,494	241,323	13,997	12,807	26,804	92,832	121,687	214,519
60-64	76,489	99,860	176,349	9,343	9,305	18,648	67,146	90,555	157,701
65-69	40,176	62,367	102,543	4,664	6,141	10,805	35,512	56,226	91,738
70-74	35,351	56,934	92,285	3,723	5,414	9,137	31,628	51,520	83,148
75-79	23,470	36,758	60,228	2,417	3,717	6,134	21,053	33,041	54,094
80-84	18,167	26,847	45,014	1,626	2,723	4,349	16,541	24,124	40,665
85+	13,586	21,733	35,319	1,239	2,487	3,726	12,347	19,246	31,593
Total	5,064,868	5,451,105	10,515,973	891,806	845,878	1,737,684	4,173,062	4,605,227	8,778,289
	48.2%	51.8%	100.00%	8.5%	8.0%	16.5%	39.7%	43.8%	83.5%

Source: Fourth Rwanda Population and Housing Census.

The overall growth rate reported in Table 6 for the inter-censal period looks credible, but we can also consider the progression of the population from 2002 to 2012. Figure 7shows the proportion of an age-group in 2002 that is surviving in 2012. So for example, it is the ratio of 10 to 14 year-olds in 2012 to 0 to 4 year-olds in 2002. The general pattern is sensible with

male survivorship declining more than female for the older age-groups. There appear to be anomalies with the survivorship for those aged 15 to 19 in 2002 being low and those aged 20 to 24 being high, especially for males. The 10 year progression of the younger group would see them move from school into the workplace and higher education; and the patterns could, to some extent, reflect international migration flows for studying and working abroad. The progression for the older group would then reflect some returning from overseas study and employment.Survivorship being relatively high for males (and to a lesser extent females) for those progressing from early twenties to early thirties would also be consistent with other forms of international in-migration such as those coming from neighbouring countries to seek work. Similar patterns are certainly evident in the internal migration data between the urban and rural areas of Rwanda. There is also further evidence of some temporary international migration in that the count of those actually present on census night (residents and visitors) is less than the total count of residents (present and absent).

Figure 7: Survivorship from 2002 to 2012 (grouped age)



Source: Rwanda Population and Housing Census, 2002 and 2012.

Looking at the sex ratios more generally, Table 8 gives the sex ratio by age-group for Rwanda as a whole as well as by urban rural. Looking at the Rwanda sex ratios, it is clear that the ratio looks too low from the earliest ages given an expected range at birth of 103 to 107. In general, the pattern of decline down the column is sensible but it starts low and remains lower than would be expected. Of course, the sex ratio is very sensitive to the international issue of excess male under-coverage in censuses but this is usually in the young adult ages. Under-coverage of children is more usually either non-differential with respect to sex or more prevalent for female children. The impact of the recent history of Rwanda is evident in the sudden drop for the population in their late 30s and early 40s, who would have been late teens and early 20s at the beginning of the 1990s. Comparing urban with rural, we see the expected impact of male economic migration increasing the sex ratio in urban areas during the main years of economic activity, with a corresponding drop for the rural areas.

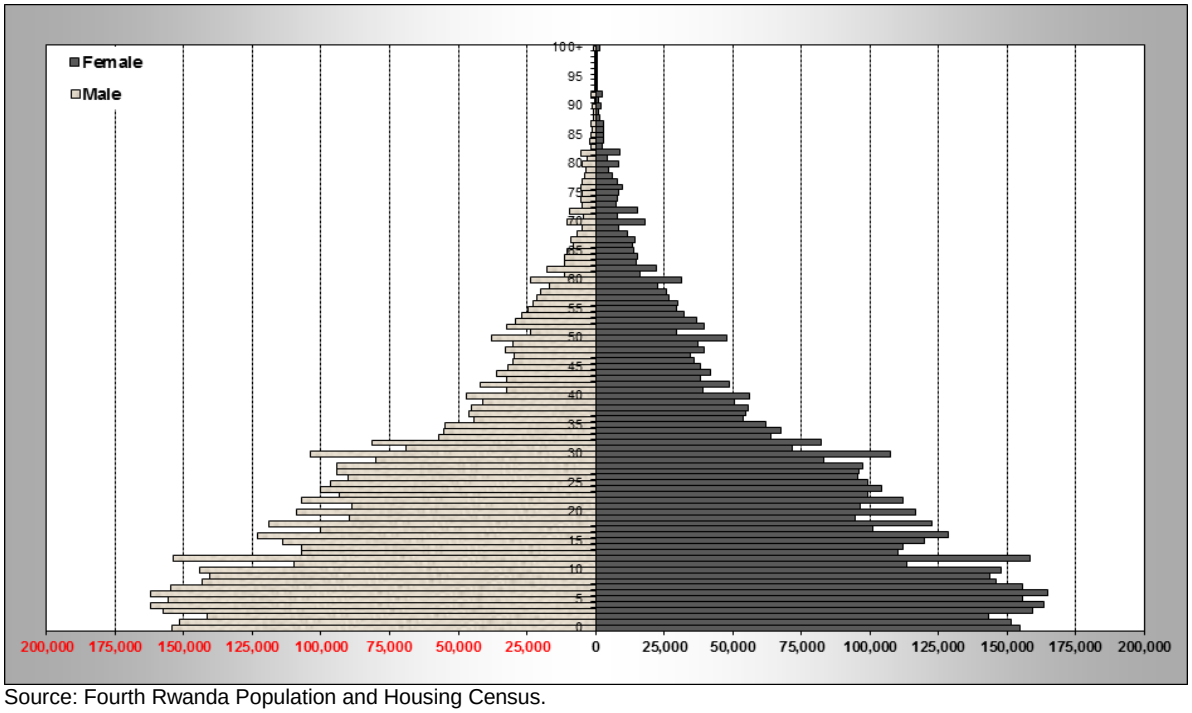
Table 8: Sex ratios by 5-year age-group

5-year age-group (Years)	Area of residence		
	Rwanda	Urban	Rural
0-4	99.5	100.3	99.4
5-9	98.9	100.2	98.7
10-14	97.2	95.8	97.4
15-19	96.6	87.2	98.7
20-24	94.4	105.3	91.5
25-29	96.9	121.5	90.6
30-34	93.6	125.2	86.7
35-39	84.1	116.8	77.6
40-44	85.0	123.6	78.5
45-49	83.9	123.1	78.5
50-54	81.4	117.0	77.3
55-59	79.4	109.3	76.3
60-64	76.6	100.4	74.1
65-69	64.4	75.9	63.2
70-74	62.1	68.8	61.4
75-79	63.9	65.0	63.7
80-84	67.7	59.7	68.6
85+	62.5	49.8	64.2
Total	92.9	105.4	90.6

Source: Fourth Rwanda Population and Housing Census. Notes: (1) Sex ratio defined as men per 100 women.

The general age-sex structure of the population is sensible, although there is some suggestion of under-coverage of those aged 0 to 4 and an apparent systematic under-reporting of males. This second issue is also confirmed by the PES, which estimates the coverage of males to be slightly lower than females, although not by enough to fully explain the sex ratio effects seen here. However, looking at the data by age-groups can hide other data quality issues such as heaping of ages on single digits. Therefore, single year pyramid is presented in Figure 8.

Figure 8: Population pyramid for age in single years (count)



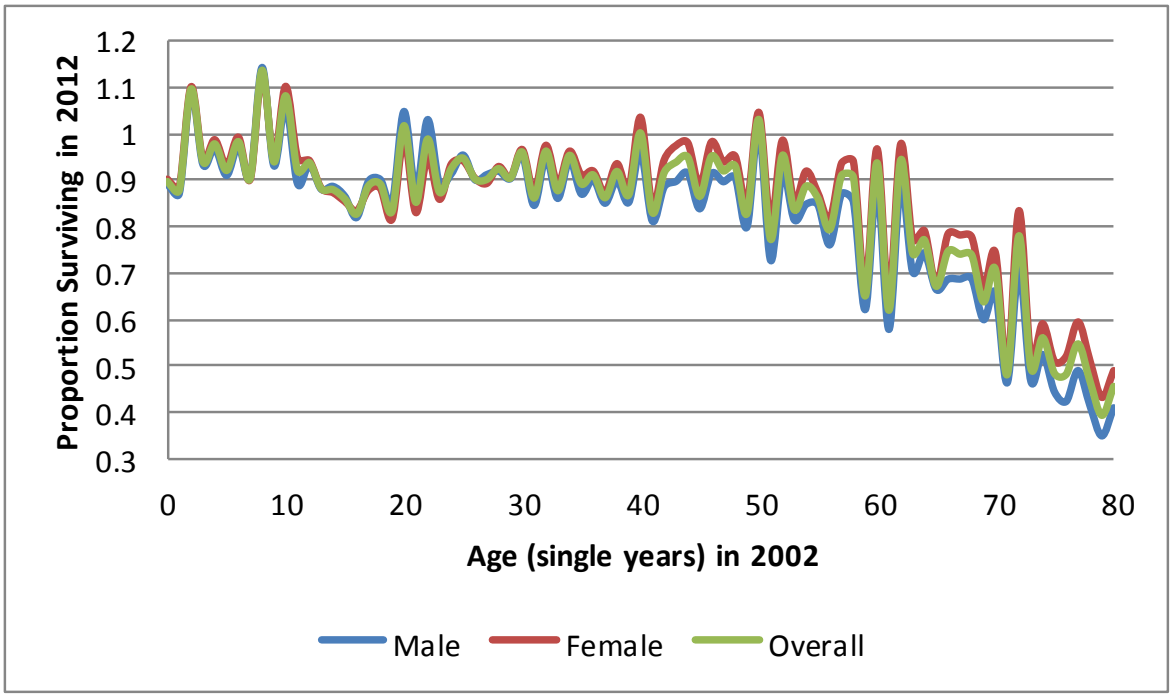
Source: Fourth Rwanda Population and Housing Census.

Pictorially, the single year population pyramid in Figure 8does suggest some age heaping both on the traditional values of 0 and 5, but also on the digit 2. Heaping on the digit 2 for age would be consistent with heaping on the year-of-birth at 0 and the census being in a year

ending 2. There is an obvious spike at 12, relating to births in 2000, and less obvious spikes at the older ages (22, 32, etc.). The issue of heaping on year of birth (rather than age) was considered during data processing (see Figure 5 in Section 4.3) where year of birth was taken in preference to reported age when they were inconsistent. It was concluded that the inconsistent records did not markedly increase any heaping and that the spikes on digit 2 are generally associated with a consistent report of age and year-of-birth. Interestingly, there is a drop of two-year-olds in the RPHC4, with that age being around 10% lower than the average of those aged one and three and again this is not due to inconsistent reporting of age and date-of-birth. However, it is difficult to conceptualise how either a data processing error or data collection error might have led to a systematic under-reporting of two-year-olds in the data and a counter-balancing over-reporting of 12-year-olds.

We can also look at the 10 year survivorship from 2002 to 2012 by single year-of-age. Figure 9 demonstrates considerable noise but as age increases we start to see declines in survivorship with males below females. At the younger ages we can see that there are 10% more 12-year-olds in 2012 than two-year-olds in 2002, even with a spike at age two in 2002 consistent with a mini baby-boom in 2000; with further irregularities for those aged around 10 and around 20 in 2002. This additional excess of 12-year-olds in 2012 relative to 2002 adds further weight to there being an issue with that particular age.

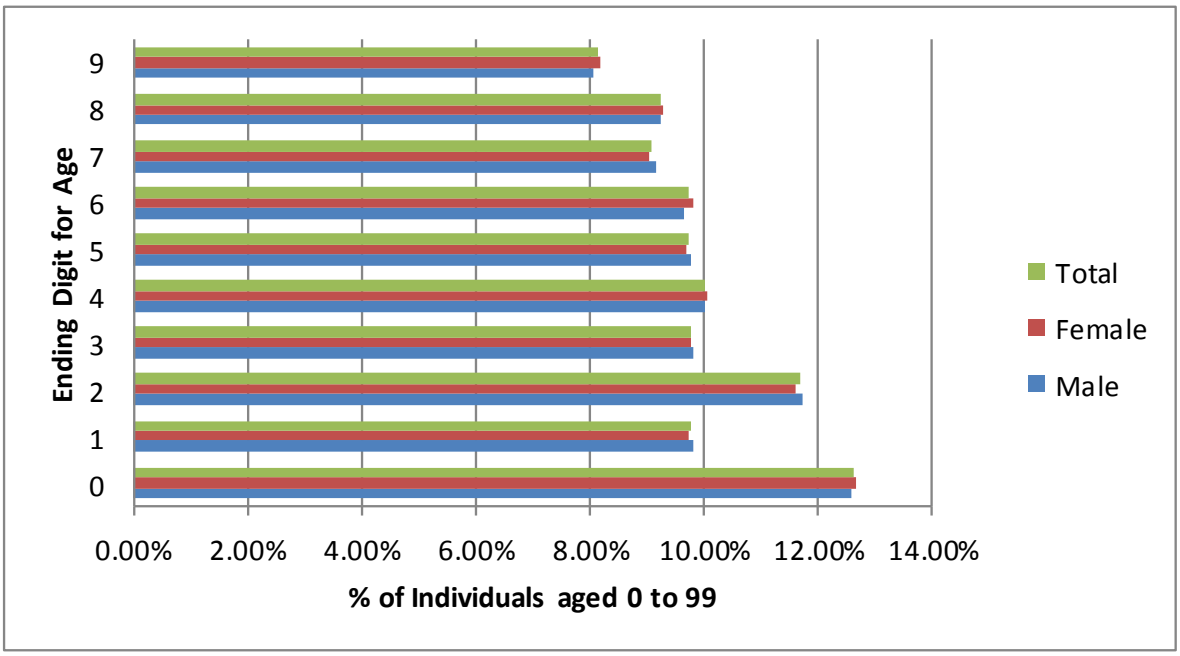
Figure 9: Survivorship from 2002 to 2012 (single years)



Source: Rwanda Population and Housing Census, 2002 and 2012.

Putting this together with the population pyramid suggests that there were some irregularities in age reporting in 2012; and that these are not entirely consistent with any patterns or irregularities seen in 2002. However, while it has been identified that quality control of data processing is a potential weak-point with respect to data quality, it is difficult to conceive of the processing errors that would result in say systematically recording age as 12 rather than 2. Therefore, we must conclude that these anomalies must 'on-the-whole' reflect the data as reported by the responding households in 2012.

Figure 10: Percentage of individuals with an age ending in the specified digit

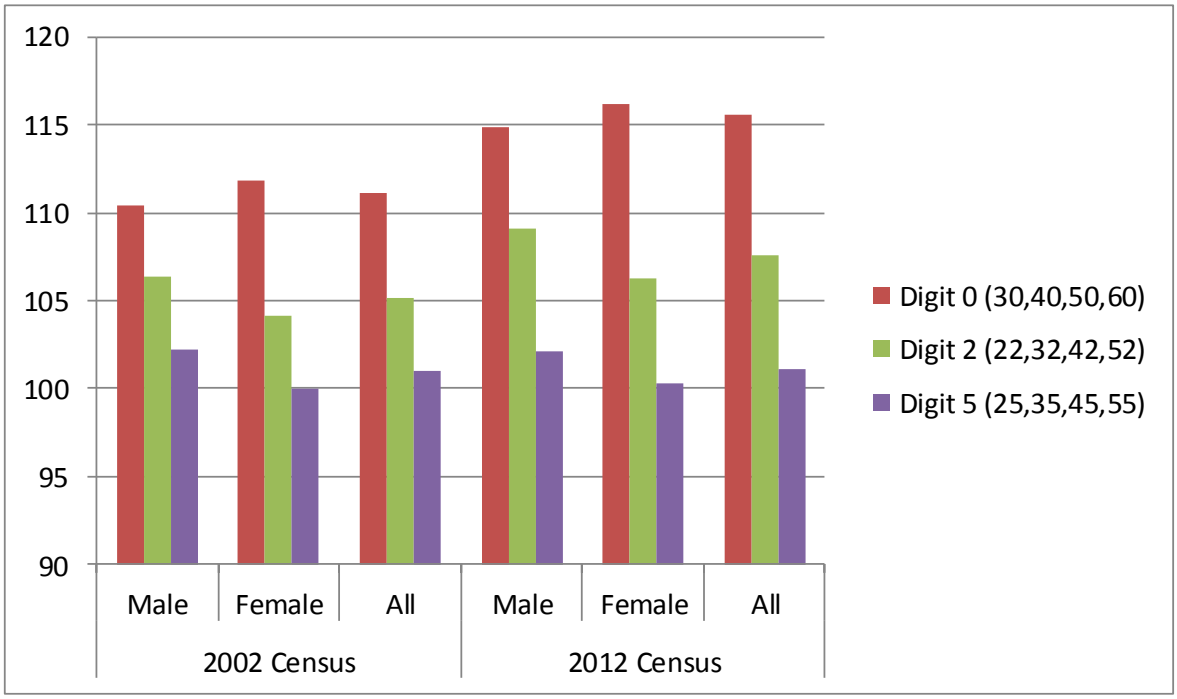


Source: Fourth Rwanda Population and Housing Census.

While looking at patterns in terms of single years, we can overly concentrate on a single problem age, and neglect the overall pattern. For this, more summary measures can be useful. Figure 10 shows the distribution of end digits from zero to nine (for those with reported age from 0 to 99) and pictorially shows some preference for 0 when reporting age either in completed years (0 in the figure) or by year-of-birth (2 in the figure). Figure 11 uses the Whipple index to explore the extent of age heaping in the data with respect to 0, 2, and 5 for ages 20 to 62[9]. It also compares 2012 with 2002. This shows that there has been an increase in age-heaping on 0 and 2 in the RPHC4 when compared to 2002, but consistent with Figure 10 heaping on 5 is not an issue. Comparing to the UN recommendations reported in Table 9 we can conclude that the age reporting has some, but not excessive, issues with heaping; consistent with the earlier analysis.

[9]The UN standard is 23 to 62, allowing the exploration of digit preference with respect to 25, 35, 45, and 55; or 30, 40, 50 and 60. We extend this range to start from 20 to allow the exploration on 22, 32, 42, 52. Note that when exploring a single digit we use the five single years that span the digit in the denominator, and not the full 10 year period.

Figure 11:Whipple index by sex



Source: Rwanda Population and Housing Census, 2002 and 2012.

Table 9: UN recommendations for interpreting Whipple's index

WI < 105	Highly accurate
105 ≤ WI ≤ 109.	Fairly accurate
110 ≤ WI ≤ 124.9	Approximately accurate
125 ≤ WI ≤ 174.9	Roughly accurate
WI ≥ 175	Very Roughly accurate

The Whipple index focuses on specific digits, while both the Myers Index and the UN age-sex accuracy index look for general evidence of age-heaping (and sex mis-reporting in the case of the UN) across all the digits. The values for the Myers Index in Table 10 are encouraging with zero representing no age heaping but the UN measures are in the mid-20s; where less than 20 is desirable forevidence of accurate recording of age and sex and over 40 is considered highly inaccurate.

Table 10:Myers index by sex and United Nations age-sex accuracy index

Age	Sex		
	Both Sexes	Male	Female
Myers Index	7.94	7.95	7.84
United Nations age-sex accuracy gross index (UN joint score)	25.18		
United Nations age-sex accuracy net index (UN joint score)	26.68		

Source: Fourth Rwanda Population and Housing Census.

The UN measures is Table 10 imply that the age-sex reporting is not as internally consistent as it could be, but at least some of that will be caused by the recent history of Rwanda and the resulting excess male mortality. Therefore, another way to consider the issue is to try and assess whether the inconsistencies come from the real population structure or at least the

populations perception of it; or whether the inconsistencies are related to the measurement process within the census enumeration or subsequent processing of the data. This is possible to some extent by looking at the variability in answers give for age and sex, for those individuals covered by both the RPHC4 enumeration and the PES enumeration. This is standard analysis as recommended by the UN[10] and in the case of sex in Rwanda showed very high consistency with the aggregate measure of inconsistency being around 1.5%. Using 14 age-groups the aggregate consistency measure for age was still well under 10%, which confirms generally consistent reporting but does highlight that age is something that is not always consistently reported[11]. However, these results tend to confirm that the structure we see in the census database is coming from the population rather than being an artefact of the measurement and processing by the RPHC4.

Pulling together the information in this section there is some evidence of general under-reporting of males, and an overall higher under-coverage of males is indicated by the PES. The under-reporting is especially true for children but as we move into adult ages it could also be partly related to a work migration pattern and PES coverage of young adult males is lower than other groups, and for older adults the recent history of Rwanda will also be a factor. There is apparent evidence of under-reporting of very young children in the population pyramid but this has to be weighed against a population that is experiencing both fertility and mortality decline, and the fact that the PES did not highlight children as having poorer coverage. There is evidence of some age-heaping by individuals with 0 and 2 being the issues rather than 0 and 5. This appears to be slightly worse in 2012 than in 2002, and that may be related to increasing use of ID cards and the need to impute a date-of-birth when it is unknown with either a rounded age (0 digit) or a rounded year (2 digit) being the common choices. In the 2002 Census the enumerator would have used the calendar method to elicit an age when it was unknown. However, it is plausible to assume that in 2012 if the individual has an ID card that date-of-birth or age will be used, even if it was just imputed for the purposes of issuing the ID. The heaping on 0 and 2 does potentially create a problem with both digits appearing in the same five-year age-group but the issue is not enough to create problems with the grouped age structure as shown in Figure 6. Overall, the age-sex structure is sufficiently well-reported to be used, especially when grouped, and the high level of net coverage by the PES fits with the results. There is no proposal to adjust the age-sex structure based on either the PES results or the demographic analysis presented here.

5.2 Fertility data

In this section we now focus on the basic data reported in the fertility section of the household questionnaire. As a simple check on completeness, Table 11 compares the number of births reported in the last 12 months with the size of the resident population aged 0 on Census Night. This immediately shows that the reported fertility is likely too low as after accounting for the impact of infant mortality we would expect more births relative to the size of the population aged 0, unless there has been significant international in-migration of babies. (In this case about 10% of the residents aged 0 measured in the census would have to be born outside of Rwanda once the mortality recorded in the fertility section is accounted for.)This also has to be put into the earlier context of an apparent under-reporting of the youngest ages within the resident population. However, Table 12 shows that in terms of life-time reporting of fertility the data looks better, although we can see that the issue of under-

[10] Post Enumeration Surveys - Operational guidelines, New York, April 2010, UNSD.
[11] More details are available in the full PES report but the authors of this report have only seen the summary information.

reporting of male births is particularly pronounced for the younger ages.Their life-time reports of fertility will be mostly associated with the most recent fertility, where we have already commented on the apparent under-reporting of male babies as evidenced by the lower sex ratios.

Table 11: Number of births in the past 12 months, and number of 0-year olds in the population

	Male children	Female children	Total
Number of births reported in past 12months	149,663	149,657	299,320
Number of 0-year olds in the population	154,732	154,825	309,557

Source: Fourth Rwanda Population and Housing Census.

Table 12: Children ever born by mother's age

Mother's age at reference date	Males ever born	Females ever born	Total	Average	Sex Ratio
12-14 years	991	1,065	2,056	0.01	93.1
15-19 years	13,051	13,248	26,299	0.05	98.5
20-24 years	140,383	137,336	277,719	0.53	102.2
25-29 years	373,836	367,233	741,069	1.57	101.8
30-34 years	576,526	568,820	1,145,346	2.91	101.4
35-39 years	581,702	576,359	1,158,061	4.18	100.9
40-44 years	560,985	556,770	1,117,755	4.97	100.8
45-49 years	520,433	516,857	1,037,290	5.60	100.7
50-54 years	571,845	572,646	1,144,491	6.14	99.9
55+ years	1,549,441	1,568,388	3,117,829	7.10	98.8
Total	4,889,193	4,878,722	9,767,915		100.2

Source: Fourth Rwanda Population and Housing Census.

Using the reported fertility we can estimate of the crude birth rate and general fertility rate. Technically, the denominator should be adjusted back from the Census Day to six months earlier[12] but this has not been done here as the impact is minimal and the aim is to judge the likely quality of the fertility data, not present the final fertility analysis of the thematic report. Similarly, as the aim is to study the trend in the indicators over a short time interval the indicators are not standardised for age. Table 13 presents both rates and for comparison figures from the 2002 Census and the sequence of Demographic and Health Surveys (DHSs) are included.

Table 13: Evolution between 1992 and 2012 of basic fertility measures

Year (source)	Crude Birth Rate ‰	General Fertility Rate ‰	Mean Parity at end of childbearing
1992 (DHS)	41.0	197	7.7
2000 (DHS)	39.2	180	6.8
2002 (census)	**41.2**	**162**	**7.06**
2005 (DHS)	43.2	190	6.6
2007-08 (DHS)	39.2	179	6.0
2010 (DHS)	34.4	151	5.9
2012 (census)	**28.5**	**113**	**5.60**

Source: ICF International, 2012, MEASURE DHS STATcompiler - http://www.statcompiler.com –accessed October 18 2013 for the DHS results.2002 Census results as published in National Census Service (2005).Fourth Rwanda Population and Housing Census. Notes: (1) Rates from the DHS based on averaging the three years prior to the survey date recorded in the table, while mean parity at end of childbearing based on ages 40 to 49 rather than 45 to 49 for the two censuses.

From Table 13 we can see that fertility has been declining both in terms of the crude birth rate and the general fertility rate since the early 2000s. The RPHC4 rates continue this decline but as with the results in Table 11, the decline to the RPHC4 would suggest some under-reporting of current fertility. However, in terms of mean parity at the end of childbearing, the results look very consistent with the declining trend and from Table 12 we can see that the average of 6.14 for those aged 50 to 54 is also consistent with the earlier

[12]This can be done by either using the inter-censal growth rates to interpolate backwards or by using the births and deaths data with an assumption of a uniform distribution over 12 months. This would assume that half the births and half the deaths reported for the 12 month period would have occurred at six months prior to the census.

figures reported in Table 13. Therefore we can conclude that there is evidence of some under-reporting of current fertility, which would suggest indirect approaches to estimation to allow for some adjustment, while the life-time fertility data looks to be of high quality.

5.3 Mortality data

A key role of the population census, in the absence of high quality vital registration data, is to measure the mortality of the population. However, there is always a concern that mortality will be under-reported, and as discussed earlier the questions come at the very end of the questionnaire raising further issues regarding whether enumerators always completed them. The details from the imputation presented in Annex B do show that 0.5% of households needed their entire household data imputed while single variables in the household component had generally higher rates of imputation than person variables, although the percentagesare still low. This would be indicative of slightly lower data quality in this last section of the questionnaire, with the mortality data coming at the very end. Table 14 presents the summary data from the mortality section and as with the fertility rates the denominators have not been adjusted here, they are just the resident populations as of Census Day. The crude death rates from the 2002 Census are also included for comparison.

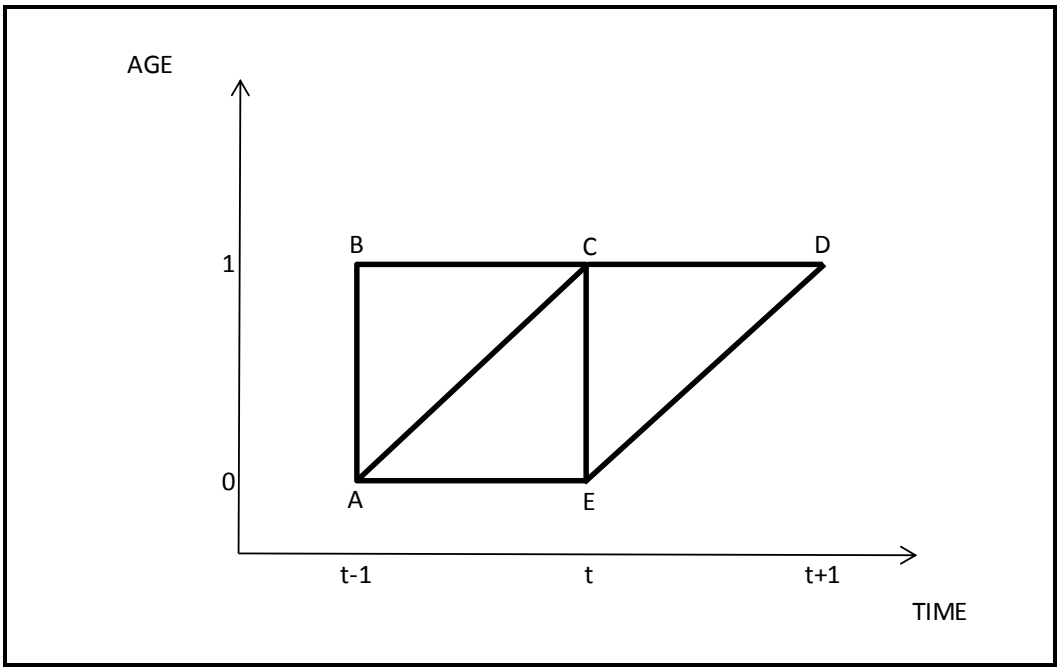
Table 14: Summary data relating to mortality

	Male	Female	Total
Number of Deaths (2012 Census)	16,714	11,203	27,917
Population	5,064,868	5,451,105	10,515,973
Crude Death Rate ‰ (2012 Census)	3.3	2.1	2.7
Crude Death Rate ‰ (2002 Census)	16.2	14.0	15.4

Source: Rwanda Population and Housing Census 2002 and 2012. Notes: (1) 2002 Census results as published in National Census Service (2005) are constructed from indirect methods.

Based on Table 14 it is clear there has been under-reporting of mortality by comparing the 2002 results with 2012. The crude death rate is of course sensitive to the age-sex structure, and decline in mortality is to be expected but the total number of deaths reported is very low.Interestingly though, the difference between the crude birth rate and the crude death rate is about 26, which is consistent with a growth rate of around 2.6%. However, if the difference between the reported crude rates is sensible with respect to population growth, it implies that relatively small under-reporting of births, around 10% would be consistent with the size of the resident population aged 0, translates into under-reporting of overall mortality by around 50%.Given the apparent high under-reporting of deaths, Table 15 focuses on the specific indicator of infant mortality. Generally speaking, the infant mortality rate (IMR) compares deaths to those under one in a year with the births for that year. However, the DHS typically estimate ${}_1q_0$, the probability that a baby will survive one year. The Lexis Diagram in Figure 12 highlights this point. The traditional measure of infant mortality for the year t-1 to t has all the deaths in ABCE in Figure 12 as the numerator, and divides by all the births in that year given by AE. The alternative ${}_1q_0$ is a cohort measure so has all the deaths in ACDE in Figure 12 as the numerator, and divides by all the births in that year given by AE.

Figure 12:Lexis Diagram highlighting the two measures of infant mortality



With the census data, we can calculate the traditional infant mortality rate directly using the deaths to children under one reported in the mortality data to capture the deaths occurring in ABCE, and births reported in the fertility data as the denominator. This can be compared to the q-rates from the DHS, which will be similar to the traditional infant mortality rate unless there has been either a dramatic change in fertility or mortality over a single year period. With the census data, we can also approximate the infant mortality rate by using the deaths reported in the fertility data. These relate to the triangle ACE in Figure 12 so should give a lower number of deaths than those reported in the actual mortality section. The results are presented in Table 15 along with the published rates from the DHS and the 2002 Census.

Table 15:Evolution between 1992 and 2012 of the Infant Mortality Rate by sex

	Infant Mortality Rate ‰		
	Male	Female	Both sexes
1992 (DHS)	98	82	90 (85)
2000 (DHS)	123	112	117 (107)
2002 (census)	**145**	**133**	**139**
2005 (DHS)	106	99	103 (86)
2007-08 (DHS)	83	71	77 (62)
2010 (DHS)	67	55	61 (50)
2012 (census)	**35.8**	**23.8**	**29.8**
2012 (census – fertility)	**77.1**	**70.7**	**73.9**

Source: ICF International, 2012, MEASURE DHS STATcompiler - http://www.statcompiler.com –accessed October 18 2013 for the DHS results.2002 Census results as published in National Census Service (2005).Fourth Rwanda Population and Housing Census. Notes: (1) Rates from the DHS based on averaging the ten years prior to the survey date recorded in the table. The overall rates can also be estimated using just the preceding five years and these are given in () to highlight the strength of the overall decline in the most recent years. (2) 2002 Census results as published in National Census Service (2005) are constructed from indirect methods.

The results in Table 15 show clear evidence of a decline in infant mortality prior to the RPHC4. However, they also clearly demonstrate that the 2002 Census estimate, calculated from indirect methods, of 139 is considerably higher (over 60%) than the comparable five-year figure for the 2005 DHS of 86, and also higher than the 2000 DHS figure of 107. The DHS is of course a survey and subject to both under-reporting as well as sampling error so while it shows strong evidence of decline the results for the 2002 Census would indicate that it also under-reports mortality. Therefore, such a low figure of 29.8 for the infant mortality rate

based on direct measurement from the RPHC4is not credible when compared a DHS figure of 50 in 2010 and points to severe under-reporting of mortality in the mortality section of the census.

Using the decline from the 2000 DHS to 2010, a projected figure (approximately linear on the log-scale) for the DHS in 2015 would be between 33 and 34. Using the relationship between 2002 census and 2005 DHS would imply we might expect to see a 2012 census based rate around 55. Using the relationship between 2002 census and 2000 DHS would imply we might expect to see a 2012 census based rate around 65. Table 15 also presents the infant mortality rate for the RPHC4 calculated using just the fertility data. This suggests a rate of 73.9, which while slightly higher than those projected figures is not implausible. When we account also for the suggested under-reporting of births by around 10% the rate comes down to the mid-60s.These alternative estimatesprovide strong evidence of under-reporting in the main mortality data.

Table 16: Mismatches between mortality section and fertility section regarding the reporting of infant mortality in past 12 months

Reporting of infant deaths in past 12 months	
Household reports no infant death in past 12 months	99.0
Household reports infant death both in mortality and fertility sections	0.1
Household reports infant death in fertility section only	0.7
Household reports infant death in mortality section only	0.2
Total	100.0
Count	2,406,176

Source: Fourth Rwanda Population and Housing Census.

Table 16 presents further evidence of under-reporting of mortality in the mortality section. Of all households reporting a death to a child under one anywhere on the form, 70% reported the death only in the fertility section of the questionnaire, which should not happen. However, the 10% that only appear in the household mortality is sensible due to the differing coverage of deaths as pointed-out with Figure 12. Bringing the information together there is strong evidence of severe under-reporting of mortality at total population level and for infants in the mortality data. Levels of 50% under-reporting would be consistent with other sources available to compare to, and even allowing for this would still represent considerable improvements in mortality. Based on this conclusion, it will be necessary to explore the use of indirect methods to estimate mortality as was done with the 2002 Census but this is left to the analysis within the thematic report on mortality.

5.4 Economic indicators (and other variables)

As we move on to other variables, there are less comparisons to be made. Marital status is a key demographic characteristic that is measured by the census and Table 17 gives the overall distribution as well as the distribution by sex. With the young age structure of the population it is credible that high numbers are never married, but with younger age at first marriage for females it is to be expected that fewer females aged 12 and above are never married when compared to males. In a society where there is still some polygamy, it is also sensible that more females than males report being currently married. Excess male mortality is evident in higher levels of female widowhood, and it is also likely to contribute to higher levels of divorce and separation for females as males will find it easier to re-partner or will have died since the divorce or separation. The PES confirms that reporting of marital status is consistent with an aggregate measure of 6.29%. However, this is dominated by extremely consistent reporting of the main categories while there is somewhat more variation in

reporting the small categories of divorce and separation. Overall, the reporting of marital status is consistent and gives a credible pattern at the population level.

Table 17: Distribution (%) of the resident population aged 12 years and above by Current marital status by Sex

Marital status	Male		Female		Both Sexes	
	Count	%	Count	%	Count	%
Never married	1,655,398	50.4	1,499,069	41.0	3,154,467	45.5
Currently married	1,557,403	47.4	1,641,203	44.9	3,198,606	46.1
Separated	6,916	0.2	28,625	0.8	35,541	0.5
Widowed	41,028	1.2	399,117	10.9	440,145	6.3
Divorced	23,326	0.7	82,142	2.2	105,468	1.5
Not stated	866	0.0	2,585	0.1	3,451	0.0
Total	3,284,937	100.0	3,652,741	100.0	6,937,678	100.0

Source: Fourth Rwanda Population and Housing Census.

Levels and patterns of migration as measured by the census are also of key interest and information on recent migrants is presented in Table 18. This shows strong migration flows out of the South and West, with strong flows into Kigali City and the East. Growth in the East is consistent with both Government policy and the experience during enumeration of the size of EAs in that Province. The numbers can also be compared to those published by EICV3[13] on migration in the five years prior to the survey. The main indicators report estimates around one million migrants in total for the same age group with around 380,000 in Kigali City and around 480,000 in the Eastern Province; and correspondingly smaller numbers for the South, followed by West, and then North. In other words, both the levels and pattern of in-flows are consistent between EICV3 and the RPHC4 giving us high confidence in the basic migration data.

Table 18: Distribution (Count) of the recent migrant population by Current Province of residence and Previous Province of residence

Current Province of residence	Previous Province of residence							
	Kigali City	South	West	North	East	Abroad	Not Stated	Total
Kigali City	78,116	84,902	54,029	31,356	38,177	19,250	23,204	329,034
South	19,820	67,528	24,806	3,609	6,201	9,003	4,214	135,181
West	6,663	5,807	39,004	4,900	2,156	9,146	2,695	70,371
North	8,304	3,768	8,869	12,186	4,339	2,948	1,194	41,608
East	50,025	48,463	57,959	97,294	79,378	25,416	5,864	364,399
Total	162,928	210,468	184,667	149,345	130,251	65,763	37,171	940,593

Source: Fourth Rwanda Population and Housing Census. Notes: (1) A recent migrant is defined as an individual that lives in a different district than the district where he/shelived five years ago. The above table presents information at the provincial level, please note that recent migrants that have moved to another district may still be residing in the same province.

The final area is the basic measurement of economic activity. Tables 19 and 20 give counts and associated rates for economic status amongst those aged 16 years and above. The pattern shows higher participation by males with higher employment rates as well. Across urban rural, male participation is similar, while for females participation is lower in the urban areas with higher unemployment. Across the provinces both participation and employment are generally lower in Kigali relative to other Provinces with correspondingly higher unemployment. These patterns are sensible in a situation where the rural economy is still dominated by subsistence farming, while the urban economy of Kigali is becoming more industrialized.

[13] The EICV3 main indicators report can be downloaded from http://www.statistics.gov.rw/publications/third-integrated-household-living-conditions-survey-eicv-3-main-indicators-report.

Table 19: Distribution (count) of the population aged 16 years and above by Economic activity status by Sex, Province, Area of residence

Province and Area of residence	Active			Inactive			Not Stated			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Rwanda												
Urban	399,428	311,982	711,410	132,038	200,623	332,661	42,409	8,670	51,079	573,875	521,275	1,095,150
Rural	1,655,681	1,933,467	3,589,148	529,541	683,506	1,213,047	42,700	14,043	56,743	2,227,922	2,631,016	4,858,938
Total	2,055,109	2,245,449	4,300,558	661,579	884,129	1,545,708	85,109	22,713	107,822	2,801,797	3,152,291	5,954,088
Kigali City												
Urban	229,184	154,971	384,155	66,779	105,681	172,460	14,030	1,500	15,530	309,993	262,152	572,145
Rural	55,476	48,903	104,379	19,599	31,271	50,870	1,608	122	1,730	76,683	80,296	156,979
Total	284,660	203,874	488,534	86,378	136,952	223,330	15,638	1,622	17,260	386,676	342,448	729,124
South												
Urban	46,470	43,258	89,728	15,735	23,152	38,887	16,139	2,382	18,521	78,344	68,792	147,136
Rural	430,094	509,433	939,527	157,668	212,572	370,240	11,786	4,234	16,020	599,548	726,239	1,325,787
Total	476,564	552,691	1,029,255	173,403	235,724	409,127	27,925	6,616	34,541	677,892	795,031	1,472,923
West												
Urban	53,834	48,086	101,920	25,687	37,830	63,517	5,560	609	6,169	85,081	86,525	171,606
Rural	390,140	484,138	874,278	128,225	162,670	290,895	12,094	5,646	17,740	530,459	652,454	1,182,913
Total	443,974	532,224	976,198	153,912	200,500	354,412	17,654	6,255	23,909	615,540	738,979	1,354,519
North												
Urban	30,224	31,341	61,565	10,238	14,161	24,399	3,607	3,766	7,373	44,069	49,268	93,337
Rural	315,672	373,554	689,226	83,577	103,081	186,658	3,791	428	4,219	403,040	477,063	880,103
Total	345,896	404,895	750,791	93,815	117,242	211,057	7,398	4,194	11,592	447,109	526,331	973,440
East												
Urban	39,716	34,326	74,042	13,599	19,799	33,398	3,073	413	3,486	56,388	54,538	110,926
Rural	464,299	517,439	981,738	140,472	173,912	314,384	13,421	3,613	17,034	618,192	694,964	1,313,156
Total	504,015	551,765	1,055,780	154,071	193,711	347,782	16,494	4,026	20,520	674,580	749,502	1,424,082

Source: Fourth Rwanda Population and Housing Census.

As with migration, some comparison can be made to EICV3[14] but we should be aware that the survey covers a whole year so averages out seasonality, while the census does not. The survey estimated participation at around 83%, so somewhat higher than the RPHC4, with around 4.7 million employed. Correspondingly, unemployment is slightly lower in the survey at 2.4%. However, given that the two sources are not directly comparable the survey results tend to support the census results. In addition, the participation rate and unemployment rate by Province in the survey tend to mirror the pattern in Table 20, with Kigali City having lower participation and higher unemployment. However, it is noticeable that the census has more variation across provinces, which would be consistent with seasonality impacting on employment in a single week rather than an average across the year.

[14] The EICV3 main indicators report can be downloaded from http://www.statistics.gov.rw/publications/third-integrated-household-living-conditions-survey-eicv-3-main-indicators-report and the EICV3 thematic report on economic activity can be downloaded from http://statistics.gov.rw/publications/eicv-3-thematic-report-economic-activity

Table 20: Labour force participation rate, Employment rate, and Unemployment rate by Province, Area of residence and Sex (16 years and above)

Province and Area of residence	Labour force participation rate			Employment to population ratio			Employment rate			Unemployment rate		
	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes
Rwanda												
Urban	75.2	60.9	68.1	71.3	54.1	62.9	94.9	88.9	92.3	5.1	11.1	7.7
Rural	75.8	73.9	74.7	74.1	71.7	72.8	97.8	97.1	97.4	2.2	2.9	2.6
Total	75.6	71.7	73.6	73.5	68.8	71.0	97.2	96.0	96.6	2.8	4.0	3.4
Kigali City												
Urban	77.4	59.5	69.0	72.4	49.6	61.7	93.5	83.4	89.5	6.5	16.6	10.5
Rural	73.9	61.0	67.2	71.1	56.7	63.7	96.2	92.9	94.7	3.8	7.1	5.3
Total	76.7	59.8	68.6	72.2	51.3	62.2	94.1	85.7	90.6	5.9	14.3	9.4
South												
Urban	74.7	65.1	69.8	72.1	60.8	66.3	96.5	93.4	95.0	3.5	6.6	5.0
Rural	73.2	70.6	71.7	71.2	68.1	69.5	97.3	96.5	96.9	2.7	3.5	3.1
Total	73.3	70.1	71.6	71.3	67.5	69.2	97.3	96.3	96.7	2.7	3.7	3.3
West												
Urban	67.7	56.0	61.6	64.9	52.0	58.2	95.9	92.9	94.5	4.1	7.1	5.5
Rural	75.3	74.9	75.0	73.6	72.9	73.2	97.8	97.3	97.6	2.2	2.7	2.4
Total	74.3	72.6	73.4	72.5	70.4	71.3	97.6	96.9	97.2	2.4	3.1	2.8
North												
Urban	74.7	68.9	71.6	73.0	66.4	69.5	97.8	96.4	97.1	2.2	3.6	2.9
Rural	79.1	78.4	78.7	77.8	76.9	77.3	98.3	98.1	98.2	1.7	1.9	1.8
Total	78.7	77.5	78.1	77.3	76.0	76.6	98.3	98.0	98.1	1.7	2.0	1.9
East												
Urban	74.5	63.4	68.9	72.6	60.3	66.4	97.4	95.1	96.3	2.6	4.9	3.7
Rural	76.8	74.8	75.7	75.2	72.7	73.9	98.0	97.1	97.5	2.0	2.9	2.5
Total	76.6	74.0	75.2	75.0	71.8	73.3	97.9	97.0	97.4	2.1	3.0	2.6

Source: Fourth Rwanda Population and Housing Census.

Conclusions and lessons learnt for the next census

The pre-enumeration and enumeration phases of the RPHC4 were extensively planned and carefully managed by NISR to maximise the data quality both with respect to the measurement of the population's attributes and its representation within the final database. The Pilot Census was also used effectively to test training and fieldwork management processes that were then used in the full enumeration. During the post phase, less direct quality control was in-place for the data processing, and this required considerable effort at the editing and imputation phase. While there is no strong evidence to support the data processing causing quality issues with the final data, it is clear that not having strong quality control on such an important process does put at risk the overall quality of the final database.

Ensure that the very high standards put in place in the early stages are continued throughout the entire census process.

Planning of the questionnaire was well-coordinated with other Government Ministries to ensure the overall relevance of the information. Where possible, UN standard questions were used and there were several stages to ensure questions were developed appropriately for use in Rwanda. However, during the analysis of the data it was evident that in a few cases the questionnaire structure, or the categories given for individuals to answer, did not fully support all of the thematic analysis that was desired. This was a specific problem for sanitation and disability where it was not possible to construct fully the accepted international indicators. While the Pilot Census was used as an opportunity to test the questionnaire in the field and the data was entered into the computer, it was not fully processed and no analysis of the data was undertaken. Undertaking these further stages would have been an opportunity to both test and tune the edit and imputation procedures, as well as ensuring any proposed analysis could be supported by the data as collected by the questionnaire.

Ensure that the analysis is more directly connected to questionnaire design from the start and attempt to complete all processes on the Pilot Census to ensure the questionnaire can be fully processed efficiently and deliver the data needed for thematic analysis.

The UN standard approach has been taken with respect to the planning, conduct, and analysis of the PES. This is broadly based on the model developed for the PES by the US Census Bureau. It confirms the RPHC4 has a very high net coverage of over 99% and the gross coverage error is around 1.5%. However, the PES estimates that coverage of those aged 0 to 4 is very high, which is less supported by subsequent analysis. It also finds little evidence of differential under-coverage of malesand subsequent analysis would also challenge this to some extent. Therefore, while the overall pattern of high coverage as measured by the PES is credible, the coverage may not be quite as high as estimated for some specific sub-groups. However, given the very high estimated net coverage and the sampling errors associated with the PES, it is not recommended that any adjustment to the census database be contemplated based on the PES results.

Consider exploring alternative post-stratification approaches to ensure the estimates of net coverage are stable with respect to these choices.

Using standard tools as recommended by the UN, it is clear that there are some quality issues with respect to the reporting of age, and that this appears to be worsening relative to the 2002 Census. Overall, the age heaping is not sufficient to impact when analysing

grouped age, but it does create some obvious patterns in the population pyramid based on single years. Age was collected using date-of-birth, or age in years, or using a calendar approach when no value could be given. The increase in heaping on both 0 and 2 would be consistent with more people directly reporting an age or date-of-birth but this being an imputed value, say for their ID card. In other words, the enumerator is getting the information via the ID card rather than as a direct response from the individual. If this is the case then going forward we would expect this impact to weaken as birth registration increases and ID cards are increasingly issued to those with registered births and therefore in the next census we would expect a reduction in heaping.

Enhance the enumerator training with respect to age to discourage the taking of information directly from ID cards. If the individual cannot respond unaided with respect to their date-of-birth or age the calendar method should be used to confirm the suitability of the value on the ID card.

There is some evidence of minor under-reporting of fertility in the year prior to the census but the overall level reported is credible when compared to other sources.The reported life-time fertility looks to be of high quality with respect to level, with higher reporting of male births than in the recent fertility. Some minor under-reporting of total births is to be expected as the death of the mother in the past year would result in the fertility not being recorded, whether or not the child survived. Nevertheless, given the evidence of minor under-reporting of recent fertility, indirect approaches might be appropriate during the analysis. The infant mortality rate as measured using the reported deaths in the fertility section is also credible, demonstrating that collecting recent mortality data using the census is possible.

Continue to emphasise the importance of the fertility data during enumerator training to ensure that its coverage of recent births does not decline in future censuses.

There is strong evidence of severe under-reporting of all age mortality in the year prior to the census. This also happened in 2002, resulting in indirect estimation of mortality, but not as severely as the under-reporting appears to be in 2012. The placement of the mortality section at the very end of the questionnaire is always going to make it more vulnerable to poor completion at the end of the enumeration interview. It is also difficult for a team-leader to realise the mortality data is missing as for many households it will legitimately be blank. There is also information within the questionnaires such as the reported deaths in the fertility section that can provide a consistency check but it is clear this did not happen in the field as around 70% of the households that reported mortality in the fertility section did not have that infant mortality recorded in the mortality section.

Strengthen the checking of the mortality data within the field by the team-leaders to ensure that the yes/no question has been completed, and that if recent deaths are recorded in the fertility section these are also reflected in the mortality section. If there is a move to electronic devices to capture the data in-the-field, this will allow such a check to be built-in, and for us to know at processing if the initial response on mortality was inconsistent with the data provided in the fertility section.

Consider using the local leaders as another quality check as they will likely have some knowledge of deaths that have occurred during the previous year.

Consider a specific follow-up survey, in addition to the PES, to just target the measurement of mortality. This could either be an independent check, as with the

PES, or more dependent in nature with a sample of household being drawn from those enumerated by the census.

NISR are to be commended for under-taking the RPHC4 rigorously and to a high quality. The overall impression is that the data quality both with respect to the measurement of the population's attributes and its representation within the final database are good. This is further supported by additional triangulation and inspection of other key attributes in this report, as well as comprehensive analysis in the full set of thematic reports. Under-reporting of fertility is minor, age-heaping is evident but not excessive, and the only significant weakness in the final database is with respect to the direct measurement of mortality.

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Annex A Census questionnaire

This annex provides the key pages of the Census questionnaires. The full questionnaires including all cover sheets can be obtained from the NISR.

As mentioned above, two different types of questionnaires were administered, one for private households and one for institutional households. The questionnaire for private households contained a person record, a household record and a mortality record. The questionnaire for institutional households contained only a person record.

A.1 Private households: person record

FORM: 001 S/N: 0000000

REPUBLIC OF RWANDA

MINISTRY OF FINANCE AND ECONOMIC PLANNING

NATIONAL CENSUS COMMISSION

NATIONAL INSTITUTE OF STATISTICS OF RWANDA
P.O. Box 6139 Kigali. Tel.: (+250)252571035
Fax: (+250)252570705 *E-mail :info@statistics.gov.rw*

GENERAL POPULATION AND HOUSING CENSUS
16 – 30 AUGUST 2012

***Legal Basis**: Presidential decree No, 02/01 of 28/02/2011*

CENSUS QUESTIONNAIRE *(PRIVATE HOUSEHOLD)*

I. SECTION L - LOCALIZATION AND IDENTIFICATION OF HOUSEHOLD

L01. PROVINCE / KIGALI CITY: ..... |__|
L02. DISTRICT: ..... |__|
L03. SECTOR: ..... |__|__|
L04. CELL: ..... |__|__|
L05. VILLAGE: ..... |__|__|
L06. ENUMERATION AREA (N° EA): ..... |__|__|
L07. AREA OF RESIDENCE: (Urban = 1, Rural = 2): ..... |__|
L08. BUILDING NUMBER: ..... |__|__|__|
L09. HOUSEHOLD NUMBER: ..... |__|__|__|
L10. TYPE OF HOUSEHOLD: ..... |1|0|0|

L11. NUMBER OF QUESTIONNAIRES FILLED IN THIS HOUSEHOLD: |__|/|__|

II. SECTION S - HOUSEHOLD SUMMARY TABLE TO BE FILLED IN AFTER

	MALE	FEMALE	TOTAL
PRESENT RESIDENTS (PR)			
ABSENT RESIDENTS (AR)			
TOTAL RESIDENTS (PR + AR)			
VISITORS (VIS)			
TOTAL ENUMERATED			
RESIDENTS ABOVE 18 YEARS OLD			

CONTROL SHEET

ENUMERATOR	TEAM SUPERVISOR
Enumeration Date:	Date of Verification: .....
Observations:	Observations:
Name of Enumerator: ..... Signature:	Name of Team Supervisor: ..... Signature:

CODER	VERIFIER	DATA ENTRY CLERK
Name :..... Date: ..... Signature:	Name :..... Date: ..... Signature:	Name:..... Date: ..... Signature: Code: |__|__|

N°	Name and First Name (P01)	Relationship to the Head of Household (P02)	Sex (P03)	Age at last birthday (P05)
	1. Resident household members Write the names of all resident members who were present or absent during the census night: (15-16/08/2012) according to the following order : - The Head of the Household ; - Unmarried resident children of the head of the household whose mothers /fathers are not resident in the same household beginning with the eldest ; -The first Spouse, followed by her unmarried children resident in the household beginning with the eldest ; -The second, third, … .Spouses, followed by their unmarried children resident in the household beginning with the eldest; - Married resident children of the head of the household followed by their resident spouses and children; - Children unrelated to the head being brought up within the household; - Other resident persons who are related either to the head of the household or to his spouse or spouses; - Other resident persons who are unrelated either to the head of the household or to his spouse or spouses; - Names of all other residents who did not spend the census night within the household; **2. Visitors** Record the names of all visitors who spent the census night within the household (if any).	**What is [NAME]'s Relationship to the head of the household?** *Circle the code corresponding to the response options found at the bottom of the page, depending on the declaration of the respondent.*	**What is [NAME]'s Sex?** *Circle the number which matches the response given.*	**How old was [NAME] at his/her Last Birthday?** *If respondent do not know the exact age; Use the historical calendar provided to estimate his/her age.*
1		1. HH 3. SD 5. FM 7. GC 9. NR 2. SP 4. UC 6. BS 8. OR	1. Male 2. Female	|__|__|__|
2		1. HH 3. SD 5. FM 7. GC 9. NR 2. SP 4. UC 6. BS 8. OR	1. Male 2. Female	|__|__|__|
3		1. HH 3. SD 5. FM 7. GC 9. NR 2. SP 4. UC 6. BS 8. OR	1. Male 2. Female	|__|__|__|
4		1. HH 3. SD 5. FM 7. GC 9. NR 2. SP 4. UC 6. BS 8. OR	1. Male 2. Female	|__|__|__|
5		1. HH 3. SD 5. FM 7. GC 9. NR 2. SP 4. UC 6. BS 8. OR	1. Male 2. Female	|__|__|__|
6		1. HH 3. SD 5. FM 7. GC 9. NR 2. SP 4. UC 6. BS 8. OR	1. Male 2. Female	|__|__|__|
7		1. HH 3. SD 5. FM 7. GC 9. NR 2. SP 4. UC 6. BS 8. OR	1. Male 2. Female	|__|__|__|
8		1. HH 3. SD 5. FM 7. GC 9. NR 2. SP 4. UC 6. BS 8. OR	1. Male 2. Female	|__|__|__|
9		1. HH 3. SD 5. FM 7. GC 9. NR 2. SP 4. UC 6. BS 8. OR	1. Male 2. Female	|__|__|__|
10		1. HH 3. SD 5. FM 7. GC 9. NR 2. SP 4. UC 6. BS 8. OR	1. Male 2. Female	|__|__|__|
11		1. HH 3. SD 5. FM 7. GC 9. NR 2. SP 4. UC 6. BS 8. OR	1. Male 2. Female	|__|__|__|
12		1. HH 3. SD 5. FM 7. GC 9. NR 2. SP 4. UC 6. BS 8. OR	1. Male 2. Female	|__|__|__|

Relationship to the head

1. HH: Head of Household
2. SP: Spouse
3. SD: Son/Daughter
4. UC: Unrelated child
5. FM: Father/ Mother
6. BS: Brother/ Sister
7. GC: Grand child
8. OR: Non Relative
9. NR: Other relative

SECTION P – CHARACTERISTICS OF POPULATION

FOR ALL MEMBERS OF HOUSEHOLD

P01 – Serial Number of the person ☐☐

NAME: _____

P02 – What is [NAME]'s relationship to the Head of Household?

1. Head of Household

P03 – Is [NAME] male or female?

1. Male 2. Female

P04 – In what month and year was [NAME] born?

Month:_____ ☐☐ Year: ☐☐☐☐

P05 – How old was [NAME] at his/her last birthday?

Record age in completed years ☐☐☐

P06 – What is residence status of [NAME]?

1. Present Resident – PR
2. Absent Resident - AR
3. Visitor – VIS

FOR USUAL RESIDENTS

P07 – Where [NAME] was born?

Province: _____

District: _____

Foreign Country: _____ ☐☐☐

P08 – What is [NAME]'s Nationality?

1st Nationality: _____

2nd Nationality: _____

Foreigner:_____

(Record the name of the country) ☐☐☐

P09 – Where was [NAME] residing previously?

Province: _____

District: _____

Foreign Country: _____ ☐☐☐

P10 – How long has [NAME] been living continuously in this District?

Record 000 if less than 1 year;
Record 999 if the residence has not changed since birth ☐☐☐

P11 – What is [NAME]'s Religion?

1. Catholic 4. Muslim 7. No Religion
2. Protestant 5. Jehovah Witness 8. Other……..…..
3. Adventist 6. Tradit/Animist

P12 – Does [NAME] have any difficulty or problem as listed below? If yes, what were the causes?

Type of disability (D)	Causes (C)
1. Seeing	1. Congenital
2. Hearing	2. Disease/Illness
3. Speaking	3. Injury/Accident
4. Walking/Climbing	4. War/Mines
5. Learning/Concentrating	5. Genocide
6. Other……	6. Not Known
	7. Other……

If None *(Write 0 in first D* → *Go to P13)*

D	C	D	C	D	C	D	C	D	C	D	C
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

P13 – What is [NAME]'s Medical insurance?

1. Mutuelle 2. RAMA 3. MMI 4. FARG
5. Insurance Cie 6. School 7. NGO 8. Employer
9. None 10. Other……..…..…..…..

FOR RESIDENTS LESS THAN 18 YEARS OLD

P14 – Parental survivorship and residence

P14a - Is [NAME]'s natural mother alive?	1. Yes 2. No 3. Don't know
P14b - If yes, does [NAME]'s natural mother live in this household?	1. Yes 2. No
P14c - Is [NAME]'s natural father alive?	1. Yes 2. No 3. Don't know
P14d - If yes, does [NAME]'s natural father live in this household?	1. Yes 2. No

P15 – Was [NAME]'s birth registered?

1. Yes 2. No 3. Don't know

FOR RESIDENTS AGED 3 YEARS or OLDER

P16 – Can [NAME] read and write with understanding in the following languages?

Kinyarwanda	1	Record the SUM of the codes circled
French	2	
English	4	
Other	8	☐☐
None	0	

P17 – Has [NAME] ever attended school?

1. Has never attended → *Go to P20*
2. Has ever attended
3. Is currently attending school

P18a – What is the highest level of education [NAME] attended?

	Level		Level
Preschool	0	Secondary	3
Primary	1	University	4
Post Primary	2		

P18b – How many years of school did [NAME] complete successfully at that level?

Level	Years Completed
Preschool	0 1 2 3
Primary	0 1 2 3 4 5 6
Post primary	0 1 2 3
Secondary	0 1 2 3 4 5 6 7
University	0 1 2 3 4 5 6 7+

P19 – What is the highest certificate/degree [NAME] obtained?

0. None
1. CE/FM
2. EMA/ENTA
3. A3/D4/D5
4. A2/D6/D7
5. A1: Bacc/Diploma
6. A0: Bachelor
7. MA: Master
8. PhD: Doctorate

FOR RESIDENTS AGED 5 YEARS or OLDER

P20 – Aside from his/her own housework, did [NAME] work at least 1 hour during the last 7 days preceding the census night (8-14/08/2012)?

1. Yes → *Go to P25*
2. No

P21 – Why [NAME] did not work during the last 7 days (8-14/8/12)?

0. Home worker
1. Non-worker (Never worked)
2. Non-worker (Ever worked)
3. On leave, but has job → *Go to P25*
4. Retired
5. Old age
6. Student
7. Other: ……..

4–6 → *Go to P23*

P22 – Did [NAME] do one of the following activities during the last 7 days (8-14/08/2012)?

1. Farming/Rearing animals/Fishing
2. Production
3. Services/Selling
4. House worker at someone's house
5. Home worker at own house
6. None

1–5 → *Go to P25*

P23 – Is [NAME] available to work?

1. Yes 2. No → *Go to P29*

P24 – Has [NAME] been seeking for work during the last 7 days (08-14/08/2012)?

0. No
1. Yes, 1st job
2. Yes, new job

0–1 → *Go to P29*

FOR RESIDENTS WHO ARE CURRENTLY WORKING or HAVE EVER WORKED

P25 – What was [NAME]'s main occupation (type of work) during the last 7 days preceding the census night or during the last time he/she worked?

_____ ☐☐☐☐

P26 – What is [NAME]'s status in employment?

1. Employee
2. Employer
3. Self-employed
4. Contributing family worker
5. Producers' cooperative member
6. Other

P27 – What is the main product, service or activity of [NAME]'s place of work?

_____ ☐☐☐☐

P28 – What is [NAME]'s institutional sector of employment?

1. Public 3. Non-profit institution
2. Private 4. Household

FOR RESIDENTS AGED 12 YEARS or OLDER

P29 – What is [NAME]'s marital status?

1. Never married 3. Separated 5. Divorced
2. Married 4. Widowed

If never married and FEMALE → *P33*

If Widowed or Divorced → *P32*

If never married and MALE → *Next Person*

P30 – How many spouses [NAME] have? *(For men only)*

Current number of spouses: ☐

P31 – What is the rank of [NAME] to the spouse? *(For women only)*

Current rank as spouse: ☐

P32 – How old was [NAME] when he/she first got married or lived together with partner?

Age at first marriage : ☐☐

FOR RESIDENT WOMEN AGED 12 YEARS or OLDER

P33 – How many live births [NAME] has ever had?

If none, write 00 for each sex and proceed to the next person

Male ☐☐ Female ☐☐

P34 – Among those children, how many are still alive?

Male ☐☐ Female ☐☐

P35 – How many live births has [NAME] had during the last 12 months (from 15/08/2011 to 15/08/2012)?

Male ☐ Female ☐

P36 – Among those children, how many are still alive?

Male ☐ Female ☐

SECTION P – CHARACTERISTICS OF POPULATION

FOR ALL MEMBERS OF HOUSEHOLD

P01 – Serial Number of the person ☐☐

NAME: _____

P02 – What is [NAME]'s relationship to the Head of Household?

2. Spouse
3. Son/Daughter
4. Unrelated Child
5. Father/Mother
6. Brother/Sister
7. Grandchild
8. Other Relative
9. Non Relative

P03 – Is [NAME] male or female?

1. Male 2. Female

P04 – In what month and year was [NAME] born?

Month:_____ ☐☐ Year: ☐☐☐☐

P05 – How old was [NAME] at his/her last birthday?

Record age in completed years ☐☐☐

P06 – What is residence status of [NAME]?

1. Present Resident – PR
2. Absent Resident - AR
3. Visitor – VIS

FOR USUAL RESIDENTS

P07 – Where [NAME] was born?

Province: _____
District: _____
Foreign Country: _____ ☐☐☐

P08 – What is [NAME]'s Nationality?

1st Nationality: _____
2nd Nationality: _____
Foreigner:_____
(Record the name of the country) ☐☐☐

P09 – Where was [NAME] residing previously?

Province: _____
District: _____
Foreign Country: _____ ☐☐☐

P10 – How long has [NAME] been living continuously in this District?

Record 000 if less than 1 year;
Record 999 if the residence has not changed since birth ☐☐☐

P11 – What is [NAME]'s Religion?

1. Catholic
2. Protestant
3. Adventist
4. Muslim
5. Jehovah Witness
6. Tradit/Animist
7. No Religion
8. Other……

P12 – Does [NAME] have any difficulty or problem as listed below? If yes, what were the causes?

Type of disability (D)	Causes (C)
1. Seeing	1. Congenital
2. Hearing	2. Disease/Illness
3. Speaking	3. Injury/Accident
4. Walking/Climbing	4. War/Mines
5. Learning/Concentrating	5. Genocide
6. Other……	6. Not Known
	7. Other……

If None *(Write 0 in first D → P13)*

D	C	D	C	D	C	D	C	D	C	D	C

P13 – What is [NAME]'s Medical insurance?

1. Mutuelle
2. RAMA
3. MMI
4. FARG
5. Insurance Cie
6. School
7. NGO
8. Employer
9. None
10. Other……

FOR RESIDENTS LESS THAN 18 YEARS OLD

P14 – Parental survivorship and residence

P14a - Is [NAME]'s natural mother alive?	1. Yes 2. No 3. Don't know
P14b - If yes, does [NAME]'s natural mother live in this household?	1. Yes 2. No
P14c - Is [NAME]'s natural father alive?	1. Yes 2. No 3. Don't know
P14d - If yes, does [NAME]'s natural father live in this household?	1. Yes 2. No

P15 – Was [NAME]'s birth registered?

1. Yes 2. No 3. Don't know

FOR RESIDENTS AGED 3 YEARS or OLDER

P16 – Can [NAME] read and write with understanding in the following languages?

Kinyarwanda	1	Record the SUM of the codes circled
French	2	
English	4	
Other	8	☐☐
None	0	

P17 – Has [NAME] ever attended school?

1. Has never attended → *Go to P20*
2. Has ever attended
3. Is currently attending school

P18a – What is the highest level of education [NAME] attended?

	Level		Level
Preschool	0	Secondary	3
Primary	1	University	4
Post Primary	2		

P18b – How many years of school did [NAME] complete at that level?

Level	Years Completed
Preschool	0 1 2 3
Primary	0 1 2 3 4 5 6
Post primary	0 1 2 3
Secondary	0 1 2 3 4 5 6 7
University	0 1 2 3 4 5 6 7+

P19 – What is the highest certificate/degree [NAME] obtained?

0. None
1. CE/FM
2. EMA/ENTA
3. A3/D4/D5
4. A2/D6/D7
5. A1: Bacc/Diploma
6. A0: Bachelor
7. MA: Master
8. PhD: Doctorate

FOR RESIDENTS AGED 5 YEARS or OLDER

P20 – Aside from his/her own housework, did [NAME] work at least 1 hour during the last 7 days preceding the census night (8-14/08/2012)?

1. Yes → *Go to P25*
2. No

P21 – Why [NAME] did not work during the last 7 days (8-14/08/2012)?

0. Home worker
1. Non-worker (Never worked)
2. Non-worker (Ever worked)
3. On leave, but has job → *P25*
4. Retired
5. Oldness
6. Student
7. Other: ……

Go to P23

P22 – Did [NAME] do one of the following activities during the last 7 days (8-14/08/2012)?

1. Farming/Rearing animals/Fishing
2. Production
3. Services/Selling
4. House worker at someone's house
5. Home worker at own house
6. None

Go to P25

P23 – Is [NAME] available to work?

1. Yes 2. No → *Go to P29*

P24 – Has [NAME] been seeking for work during the last 7 days (8-14/08/2012)?

0. No
1. Yes, 1st job
2. Yes, new job

Go to P29

FOR RESIDENTS WHO ARE CURRENTLY WORKING or HAVE EVER WORKED

P25 – What was [NAME]'s main occupation (type of work) during the last 7 days preceding the census night or during the last time he/she worked?

_____
_____ ☐☐☐☐

P26 – What is [NAME]'s status in employment?

1. Employee
2. Employer
3. Self-employed
4. Contributing family worker
5. Producers' cooperative member
6. Other

P27 – What is the main product, service or activity of [NAME]'s place of work?

_____
_____ ☐☐☐☐

P28 – What is [NAME]'s institutional sector of employment?

1. Public
2. Private
3. Non-profit institution
4. Household

FOR RESIDENTS AGED 12 YEARS or OLDER

P29 – What is [NAME]'s marital status?

1. Never married
2. Married
3. Separated
4. Widowed
5. Divorced

If never married and FEMALE → *P33*

If Widowed or Divorced → *P32*

If never married and MALE → *Next Person*

P30 – How many spouses [NAME] have? *(For men only)*

Current number of spouses: ☐

P31 – What is the rank of [NAME] to the spouse? *(For women only)*

Current rank as spouse: ☐

P32 – How old was [NAME] when he/she first got married or lived together with partner?

Age at first marriage : ☐☐

FOR RESIDENT WOMEN AGED 12 YEARS or OLDER

P33 – How many live births [NAME] has ever had?

If none, write 00 for each sex and proceed to the next person

Male	Female
☐☐	☐☐

P34 – Among those children, how many are still alive?

Male	Female
☐☐	☐☐

P35 – How many live births has [NAME] had during the last 12 months (from 15 August 2011 to 15 August 2012)?

Male	Female
☐	☐

P36 – Among those children, how many are still alive?

Male	Female
☐	☐

A.2 Private households: household record and mortality record

SECTION H: HOUSING UNITS CHARACTERISTICS

H01 – TYPE OF HABITAT

1. Umudugudu (clustered rural settlement)
2. Old settlement
3. Dispersed/Isolated housing
4. Planned urban housing
5. Spontaneous/Squatter housing
6. Other type of housing

H02 – TYPE OF BUILDING

1. House occupied by one household
2. House occupied by several households
3. Storey building occupied by one or more households
4. Several buildings in a compound occupied by several households
5. Other type of building

H03 – TENURE OF THE HOUSING UNIT

1. Owner
2. Tenant
3. Hire purchase
4. Free lodging
5. Staff housing
6. Refuge/Temporary camp settlement
7. Other.....

H04 – MAIN MATERIAL OF THE ROOF

What is the main material used for the roof?
(In case of a storey building, consider the roof of the last floor)

1. Iron Sheets
2. Local Tiles
3. Industrial Tiles
4. Asbestos
5. Concrete
6. Cartoons/Sheathing
7. Grass
8. Other material

H05 – MAIN MATERIAL OF THE WALLS

What is the main material used for the walls?

1. Wood/Mud
2. Wood/Cemented mud
3. Sundried bricks
4. Plastic Sheathing/Cardboard
5. Cement blocks/Concrete
6. Stone
7. Timber
8. Burnt bricks
9. Other

H06 – MAIN MATERIAL OF THE FLOOR

What is the main material used for the floor?

1. Earth/Sand
2. Concrete
3. Stone
4. Burn bricks
5. Timber
6. Other

H07 – NUMBER OF ROOMS

How many rooms do the housing units have, including bathrooms, toilets, kitchen, store rooms?

H08 – NUMBER OF BED ROOMS

How many of these rooms are used for sleeping?

H09 – NUMBER OF OCCUPANTS

How many persons usually sleep in the housing unit?

H10 – MAIN SOURCE OF WATER

What is the main source of water supply for members of the household?

1. Internal pipe-born water
2. Pipe-born water in the compound
3. Public tap out of the compound
4. Protected Spring/Well
5. Unprotected Spring/Well
6. Rain water
7. River
8. Lake/Stream/Pond/Surface water
9. Other

H11 – TYPE OF TOILET FACILITY

What is the main type of toilet facility used by the members of the household?

1. Flush toilet/Water Closet (WC) system
2. Private pit latrine
3. Public pit latrine
4. Bush
5. Other

H12 – MAIN SOURCE OF ENERGY FOR LIGHTING

What is the main source of energy the household uses for lighting?

1. Electricity by EWSA
2. Hydro-electric or other private source
3. Solar power
4. Generator
5. Kerosene lamp
6. Paraffin
7. Biogas
8. Candle
9. Firewood
10. Other

H13 – MAIN SOURCE OF ENERGY FOR COOKING

What is the main source of energy the household uses for cooking?

1. Electricity
2. Gas
3. Biogas
4. Kerosene
5. Firewood
6. Charcoal
7. Grass/Leaves
8. Other

H14 – ENERGY SAVING STOVE

Do you have an energy saving stove in this house?

1. Yes, and it is used
2. Yes, but it is not used
3. No

H15 – MODE OF WASTE DISPOSAL

What is the main mode of household waste disposal used?

1. Compost dumping
2. Private dust bins
3. Public refuse dumps
4. In the bush
5. On the farms
6. In a River/Stream/Drain/Gutter
7. Other

H16 – MODE OF SEWAGE DISPOSAL

What is the main mode of sewage disposal used by the household?

1. Sump
2. In the courtyard
3. Rivulet/Trench/Channels
4. In the street
5. Main sewer
6. Cesspool
7. Bush
8. Other

H17- H25 – HOUSEHOLD ASSETS

How many does the household have of the following assets in functioning condition?

H17 – Radio	
H18 – Television	
H19 – Telephone (fixed line)	
H20 – Cell phone	
H21 – Refrigerator/ Freezer	
H22 – Computer	
H23 – Vehicles	
H24 – Motorcycles	
H25 – Bicycles	

H26 – INTERNET ACCESS: Does any member of this household have access to Internet?

1. Yes 2. No → *Go to H28-H34*

H27 – Where do you access Internet?

From Home	1	Record the SUM of the codes circled
From Office / School	2	
From Cyber Cafe	4	
Other	8	

H28-H34 – How many cattle, goats, sheep, pigs, poultry/fowl and rabbits do you have in this household?

H28a – Local breed cow	
H28b – Cross breed cow	
H28c – Exotic breed cow	
H29 – Goats	
H30 – Sheep	
H31 – Pigs	
H32 – Rabbits	
H33 – Poultry	
H34 – Other poultry	

H35 – During the last 12 months (15/08/2011 – 15/08/2012), has any member of this household done agriculture activity or rented his land?

1. Yes, in his own land
2. Yes, in land he rented
3. No, he/she has rented it out
4. No, he/she has not rented it
5. No, without land

SECTION M: MORTALITY

Please record information on deaths that occurred in the household during the last 12 months.
Do not forget the children.

M1 – Is there any member of the household who died during the last 12 months (15/08/2011-15/08/2012)?

1. Yes 2. No → End of the interview

M2 – Specify the sex, age and cause of death.

Death No.	Sex (1. Male 2. Female)	Age at death (Record 000 if less than 1 year)	Cause (1. Accident 2. Murder 3. Violence 4. Suicide 5. Injury 6. Illness)	If death of Woman aged 12-49, ... Did the death occur while pregnant?	Did the death occur during childbirth?	Did the death occur during the 6 weeks period following the termination of pregnancy, irrespective of the way the pregnancy was terminated?
			If 1-5 and → *Next Person*	1. Yes 2. No	1. Yes 2. No	1. Yes 2. No

A.3 Institutional households: person record

FORM: 002 S/N: 0000000

REPUBLIC OF RWANDA

MINISTRY OF FINANCE AND ECONOMIC PLANNING

NATIONAL CENSUS COMMISSION

NATIONAL INSTITUTE OF STATISTICS OF RWANDA
P.O. Box 6139 Kigali. Tel.: (+250)252571035
Fax: (+250)252570705 *E-mail :info@statistics.gov.rw*

GENERAL POPULATION AND HOUSING CENSUS
16 – 30 AUGUST 2012

***Legal Basis**: Presidential decree No, 02/01 of 28/02/2011*

CENSUS QUESTIONNAIRE *(INSTITUTIONAL HOUSEHOLD)*

I. SECTION L - LOCALIZATION AND IDENTIFICATION OF HOUSEHOLD

L01. PROVINCE / KIGALI CITY: .....|__|
L02. DISTRICT: .....|__|
L03. SECTOR: .....|__|__|
L04. CELL: .....|__|__|
L05. VILLAGE: .....|__|__|
L06. ENUMERATION AREA (N° EA): .....|__|__|
L07. AREA OF RESIDENCE: (Urban = 1, Rural = 2): .....|__|
L08. BUILDING NUMBER: .....|__|__|__|
L09. HOUSEHOLD NUMBER: .....|__|__|__|
L10.TYPE OF HOUSEHOLD:.....|2|__|__|

L11. NUMBER OF QUESTIONNAIRES FILLED IN THIS HOUSEHOLD: |__|/|__|

II. SECTION S - HOUSEHOLD SUMMARY TABLE TO BE FILLED IN AFTER

	MALE	FEMALE	TOTAL
PRESENT RESIDENTS (PR)			
ABSENT RESIDENTS (AR)			
TOTAL RESIDENTS (PR + AR)			
VISITORS (VIS)			
TOTAL ENUMERATED			
RESIDENTS ABOVE 18 YEARS OLD			

CONTROL SHEET

ENUMERATOR	TEAM SUPERVISOR
Enumeration Date:	Date of Verification: .....
Observations:	Observations:
Name of Enumerator: ..... Signature:	Name of Team Supervisor: ..... Signature:

CODER	VERIFIER	DATA ENTRY CLERK
Name :..... Date: ..... Signature:	Name :..... Date: ..... Signature:	Name:..... Date: ..... Signature: Code: |__|__|

N°	SECTION P - CHARACTERISTICS OF POPULATION						
	Name and First Name	Is [NAME] male or female?	In what month and year was [NAME] born?	How old was [NAME] at his/her last birthday?	What is residence status of [NAME]?	Where [NAME] was born? (Province and District or Country)	What is [NAME]'s Nationality?
	P01	P03	P04	P05	P06	P07	P08
1		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
2		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
3		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
4		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
5		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
6		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
7		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
8		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
9		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
10		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
11		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
12		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
13		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
14		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___
15		1. Male 2. Female	____/ ____	___	1. Present Resident 2. Absent Resident 3. Visitor	.... ___	.... ___

SECTION P - CHARACTERISTICS OF POPULATION (cont'd)

	QUESTIONS ADDRESSED TO ALL HOUSEHOLD MEMBERS		FOR MEMBERS AGED 3 YEARS or ABOVE			MEMBERS AGED 12 YEARS or ABOVE
	Where was [NAME] Residing previously? (District and Province or Country)	Does [NAME] have any disability? If yes, what were the causes? If None *(Write 0 in D and Go to P17)*	Has [NAME] ever attended preschool, school or literacy program? *If P17 = 1 Go to P29*	What is highest level of school or literacy program [NAME] attended ?	How many years of school did [NAME] complete at that level?	What is [NAME]'s marital status?
	P09	P12	P17	P18a	P18b	P29
1	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
2	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
3	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
4	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
5	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
6	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
7	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
8	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
9	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
10	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
11	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
12	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
13	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
14	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has ever attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced
15	.... ___ ___ ___	D C D C D C D C D C	1. Has never attended 2. Has never attended 3. Is currently attended	___	___	1. Never married 2. Married 3. Separated 4. Widowed 5. Divorced

P12: Type of disability (D)

1. Seeing
2. Hearing
3. Speaking
4. Walking/Climbing
5. Learning/Concentrating
6. Other

Causes (C)

1. Congenital
2. Disease/Illness
3. Injury/Accidents
4. War/Mines
5. Genocide
6. Not known
7. Other

P18a: Level

0. Preschool
1. Primary
2. Post-primary
3. Secondary
4. University

P18b Year completed

0 1 2 3
0 1 2 3 4 5 6
0 1 2 3
0 1 2 3 4 5 6 7
0 1 2 3 4 5 6 7+

Annex B RPHC4 edit specifications (version August 2013)

General procedure:

1. Identifier must be unique
2. There must be at least one person in the household
3. There must be one household record for every household
4. Institutional household should not have Housing Record and death record
5. Range checks on all variables in all records
6. Universe checks on all variables in all records
7. Consistency checks pop
8. Consistency checks death
9. Consistency checks housing

Variable	Specification (detect error)	Message	Method of correction of error	Denominator
QUESTIONNAIRE LEVEL				
Various	There must be a valid information on each variable from P01 to P36F	QUEST-01: Empty Person record found. Deleted person record	Delete Person	
Various	There must be a valid information on each death record from D01 to D07	QUEST-02: Invalid death record. deleted	Delete Death Record	
Various	There must be one household record for every household	QUEST-03: More than 1 Housing record. First kept	First Kept, others Deleted	Total HHs
Various	Identifier L01 to L09 must be unique	QUEST –06: Wrong L09,impute 999 QUEST–07 : Wrong L09,impute 998	Adjust L09 for duplicates	Total HHs
Various	There No empty person.	QUEST-01: Empty Person record found. Deleted person rec		
Various	Every member must have valid information on residence status	POPREC-01: Visitor or invalid has resident information. imputed P06=2	if p07 to p36F have any information imputed P06=2;	Total persons
		POPREC-02: P06 incorrect. imputed 3	IF not (p06 in 1:3) impute 3	
Various	Every member must have valid information on age	POPREC-03: Age imputed by DoB.	Age imputed by DoB if abs(P05(k) - VP05)	Total persons

Various	Every member must have valid information on age	POPREC-04: Age invalide. imputed with hotdeck using P18A for P17=3.	Impute Age using hotdeck if currently at school and highest level of education attended	Total persons
Various	Every member must have valid information on age	POPREC-05: Age invalid. Imputed with hotdeck using P21 for P21 in 4-5.	Impute Age using hotdeck if he has worked during last 7 days	Total persons
Various	Every member must have valid information on age	POPREC-06: Age invalide. imputed with hotdeck using P14A.	Impute Age using Hotdeck using parental survivorship and residence variable	Total persons
Various	Every member must have valid information on age	POPREC-07: Age invalid. imputed with hotdeck using P02 and P03.	Impute Age using Relationship to head and sex	Total persons
Various	Every member must have valid information on age	POPREC-08: Age invalid. imputed by previous person.	Impute Age using the age of previous person	Total persons
Various	Every member must have valid information on relationship to the head	POPREC-09: Invalid relationship. Imputed P02=9	If not P02 in 1:8 then impute 9	Total persons
	There must be only one Head	POPREC-10: No head	Oldest member made head	Total HHs
		POPREC-11: More than one head	First head kept.	
		POPREC-12: Head is less than 12. Imputed oldest person P02=1	Change head to oldest person.	
		POPREC-13: Visitor head. Imputed oldest resident P02=1.	If resident exists in this hh, change head to oldest resident.	
L07	Urban/Rural must correspond to EA	L07-01: Wrong U/R.	Imputed by U/R in lookup	Total EAs
L07	EA code must be valid	L07-02: Wrong EA.	Not corrected in editing program, invalid EAs were corrected manually in the raw data file after checking with paper questionnaires.	Total EAs
L08	Structure number must be valid	L08-01:Wrong structure number. Imputed 999	Imputed 999	Total HHs
L09	HH number must be valid	L09-01:Wrong HH number. Imputed 999	Imputed 999	Total HHs
L10	HH Type number must be valid	L10-01 to 05: Type of HH wrong,imputed 100 or 215	IF L10 <100 then impute 100. IF L10 in 101: 199 then impute 100. IF L10 =200 or L10>215 then impute 215 IF L10 =notappl and sum(P02>0)then	Total HHs

			impute 100 IF L10 =notappl and sum(P02=0) or sum(P02)=default then impute 215.	
POPULATION RECORD				
P01	Person ID must be Sequential number			Total persons
P03	Sex must be compatible with P30	P03-01: Sex incompatible with P30. Imputed P03=1	If P03<>notappl and $<> 1 then impute($,1)	Total persons
		P03-02: Sex incompatible with P31. Imputed P03=2	If P31<>notappl and !($<> 2) then impute($,2)	
		P03-03:Sex invalid; fertility exist impute 2	If P33M <>notappl or P33F<>notappl or P34M <>notappl or P34F<>notappl then impute($,2)	
		P03-04:invalid sex of Head ,imputed from spouse's sex	IF P02=1 and !($ in 1:2) then impute (P03,3-sexspouse)	
		P03-05:sex invalid, imputed P03 randomly	If not ($ in 1:2) then impute ($,random(1,2))	
		P03-06: sex incompatible. Spouses imputed opposites	If P02=2 then if sexhh=P03 then Impute P03(Spouse) <> P03(HH)	
P05	HH must be older than 12	P05-01: Age of Head of HH is less than 12. imputed P05=12	Impute P05 = 12	Total persons
P07	Place of birth missing and person never moved	P07-02:P07 missing and P10=999. imputed P07=current res.	Impute P07 by District of Residence(L01,L02)	
P09	Place of previous residence missing and person never moved	P07-02:P07 missing and P10=999. imputed P07=current res.	Impute P09 by District of Residence(L01,L02)	
P10	Place of birth different to Previous residence and Previous residence different to current residence	P10-02:Person has P07<>P09=L010 2. imputed P09=999	Impute P10 = 999	totphhres
	Place of birth is the same with previous residence and previous residence different to current residence	P10-03:Person has P07=P09=L0102. imputed P10=999	Impute P10 = 999	
	Place of birth is the same with previous residence and previous residence the same to current residence	P10-04:Person has P07=P09<>L010 2. imputed P10=998	Impute P10 = 998	
	Place of birth different to previous residence and previous residence	P10-05:Personhas	Impute P10 = 998	

	different to current residence	P07<>P09<>L01 02. imputed P10=998		
	Duration of residence greater than age	P10-06:Inconsistency between P05 and P10. imputed P10=998	Impute P10 = 998	
P11	Religion must be declared	P11-01:P11 invalid. Imputed by first P11 valid in res hh.	No religion, Imputed valid religion in hh.	
P12D	P12D equal to 0 P12c has to be not applicable	12D1-01:P12D1 inconsistent with P12C1. imputed P12C1=notappl.	If P12D = 0 P12c = notappl	
	P12D has a valid number P12c is not applicable	P12C1-02:incompatible with p12d1-p12c1 imputed 9	Impute P12D = 9	
P12C	P12C has a valid response and P12D not applicable	P12C1-02:incompatible with p12d1-p12c1 imputed 9	Impute P12C = 9	
P14a	P14a incompatible with sex and Sex of Head of HH	If P02 =3 and P03(HH)=2 and P14a<>1 then impute P14a =1	If P02 =3 and P03(HH)=2 and P14a<>1 then impute P14a =1	
P14c	P14a incompatible with sex and Sex of Head of HH	P14C-02: consistence between P02 and P03 of hh;Imputed P14C=1	If P02 =3 and P03(HH)=1 and P14c<>1 then impute P14c =1	
P17	If P18A is not NotAppl or P18B is not NotAppl or P19 is not NotAppl.	P17-02:Inconsistent with P18A up to P19. imputed P17=9	Impute P17 = 9	
	If P17 not equal 1 and If P18A equal NotAppl and P18B equal NotAppl and P19 equal NotAppl or P19 equal to zero	P17-03:Inconsistent with P18A up to P19. imputed P17=1	Impute P17 = 1	
	If not currently attending the school and P21 equal to 6	P17-04:Inconsistent with P21. imputed P17=3	Impute P17 = 3	
	If P17 is missing impute using age and education level	P17-05:Missing imputed with P05 and P18A. imputed P17	Impute using P05 and P18a	
P18a	Inconsistence check between the level of education with age	P18A-02:P18A is Inconsistent with P05. imputed P18A = 3	P18A>= 1 & P05 < 6 Impute P18A = 0 P18A>= 2& P05 <13 Impute P18A = 1 P18A = 4& P05 <18 Impute P18A = 3	
P18b	If the Level of education is missing number of year	P18B-02:P18A is missing. imputed	Impute P18b = 9	

	completed must be missing	P18B=9		
	Highest level and years completed must be compatible by age	"P18B-08:P18B incompatible with age. imputed P18B=%d",VP18B	Imputed by compatible number of year completed	
P19	Degree P19 must be compatible with level of education P18a and years completed P18b and Age	P19-03(to P19-24):P18A and P18B and P05 are Inconsistent with P19. imputed P19	Imputed according education matrix (see below)	
	If educational level is missing degree must be compatible with age	P19-25:P18A and P18B and P05 are Inconsistent with P19. imputed P19=0	Imputed according education matrix(see below)	
P20	P20 must be compatible with P21 thru P28	P20-02:Inconsistent with P21 and P25. imputed P20=2	If P20 = 1 and P21<> Blank and P22 <> Blank and P23 <> Blank and P24 <> Blank then impute P20=2	Total res. pop > 4
	P20 must be compatible with P21 thru P28	P20-02:Inconsistent with P21 and P25. imputed P20=2	If P20 = 2 and P21<> Blank and P22 <> Blank and P23 <> Blank and P24 <> Blank then impute P20=1	
	P20 must be compatible with P21 thru P28	P20-04:Missing imputed using P21 and P25. imputed P20=1	If P20 = 9 and P21<> Blank and P22 <> Blank and P23 <> Blank and P24 <> Blank then impute P20=1	
	P20 must be compatible with p21 thru P28 and P17	P20-05:Missing imputed using P21, P25 and P17. imputed P20=2	If P20 = blank and P21<> Blank and P22 <> Blank and P23 <> Blank and P24 <> Blank and P17 = 3 then impute P20=2	
	P20 must be compatible with p21 thru P28 and P17	P20-06:Missing imputed by hotdeck using P05. imputed P20	If P20 = blank and P21<> Blank and P22 <> Blank and P23 <> Blank and P24 <> Blank and P17 <> 3 then impute P20=Hotdeck by Age	
P21	If P21 missing impute using P17	P21-02:Missing imputed from P17. imputed P21=6	Impute P21 = 6	
	P21 must be compatible with P05	P21-03(P21-04):P21 incompatible with P05. imputed P21=9	Impute P21 = 9	
	P21 must be compatible with P17	P21-05:P21 Inconsistent with P17. imputed P21=9	Impute P21 = 9	

	If P21 is missing imputed using age, attending school and activities done during the last 7 day.	P21-06 –P21-07:Missing imputed by hotdeck with P05. imputed P21	Hotdeck P05	
	P21 must be consistent with P23 thru P28	P21-08:P21=1 Inconsistent from P25 to P28. imputed P21	If P22 = 1 and P25 thru P28 = notappl Impute P22 = 1 If P22 = 2 and P25 thru P28 = notappl Impute P22 = 2 If P22 <> 3 and P23 thru P25 = notappl Impute P22 = 3	
	P2 missing Impute P27 Other	P21-11: Missing imputed other. imputed P21=3	Impute P27 = 7	
P22	P22 Missing imputed by age hotdeck	P22-02: P22 –03: Missing imputed by hotdeck with P05.	Impute P22 by Hotdeck	
P23	P23 incompatible with P25 thru P28	P23-02:P23 Inconsistent with P24 thru P28. Imputed P23=1**.**	IF P23 = 1 and P25 <>notappl | P26 <>notappl | P27 <>notappl | P28 <>notappl then P23 = 1 IF P23 = 2 and P25 <>notappl | P26 <>notappl | P27 <>notappl | P28 <>notappl then P23 = 2	
	P23 Missing imputed from P24	P23-04:Missing imputed from P24. imputed P23	If P23= 9 and P24 = notappl Impute P23 = 2	
		P23-05:Missing imputed from P24. imputed P23=1	If P23= 9 and P24 <>notappl Impute P23 = 1	
P24	P24 incompatible with P25 thru P28	P24-02:P24 Inconsistent with P25 thru P28. imputed P24	IF P24 <> 2 and if P25 <>notappl | P26 <>notappl | P27 <>notappl | P28 <>notappl Impute P24 = 2	
		P24-03:P24 Inconsistent with P25 thru P28. Hotdeck imputed P24	Impute Hotdeck using Age	
P29	Missing P29 imputed using P30 thru P32	P29-02: Missing P29 imputed using P30 thru P32	if P24 = 9 and if P30 = notappl and P31 = notappl and P32 = notappl Impute 1	

	P29 must consistent with P30 thru P33	P29-04: Inconsistence with P31>=1, P29 imputed 2	If P03 = 1 & (P29 = 1 | P29 = 9) & P30 >= 1 Impute P29 = 2 If P03 = 2& (P29 = 1 | P29 = 9) &P30 >= 1 Impute P29 = 2	
P32	P32 must be compatible with Age	P32-02: P32 greater than P05. Imputed P32=99	If P32 > P05 then impute P32=99	
P34M	P34M must be compatible with P33M	P34M-02: More children alive than born. Imputed P34M = 99	Impute P34M = 99	
P34F	P34F must be compatible with P33F	P34F-02: More children alive than born. Imputed P34F = 99	Impute P34F = 99	
P36M	P36M must be compatible with P35M	P36M-02: More children alive than born. Imputed P36M = 9	Impute P36M = 9	
P36F	P36F must be compatible with P35F	P36F-02: More children alive than born. Imputed P36F = 9	Impute P36F = 9	
HOUSING RECORD				
Various	There must be a housing Record	HHREC-01: No Housing record. Imputed by neighbour. declared impute it by 9	If no housing record. Imputed from neighbor	tothh
H04	Roof H04 must be compatible with type of building H02	H04-02 not compatible with H02. Imputed 9	If H02 = 3 then H04 <>6:7 else Impute H04 =8	
H05	Wall H05 must be compatible with type of building H02	H05-02:H05 not compatible with H02. Imputed 0	If H02 = 3 then H05 <>1:4 else Impute H05 =0	
	Wall H05 must be compatible with Roof H04	-H05-03:H05 not compatible with H04. Imputed 0	if H04=5 and H05>0 and H05 <5) impute H05=0 if H04=5 and H05=7 impute H05=0	
H07	Number of rooms must not be more than15	H07-01:Greater than 15. imputed 15	if H07>15 Impute H07 = 15	
H08	Number of rooms must not be more than15	H08-01:Greater than 15. imputed 15	if H08>15 Impute H08 = 15	
	Number of bed rooms H08 must be compatible with number of rooms H07	H08-03:Greater than H07. imputed H08=H07	if H08 >H07 Impute H08 = H07	
H09	Number of persons must not be more than 30	H09-01: Greater than 30. imputed 30	if H09>30 Impute H09 = 30	
H11	Toilet facility H11 must be compatible with Walls H05	H11-02:Not compatible with H05.Imputed 9	If H11=1 and (H05>0 and H05 <5) impute H11 = 9	

	Toilet facility H11 must be compatible with Water source	H11-03:Notcompatible with H10. Imputed 9	If H11=1 and not(H10=1 or H10=2) impute H11 = 9	
H13	Energy for cooking must be compatible H13 with Main source of energy H12	H13-02: H13 is not compatible with H12. Imputed 9	If 13=1 and H12<>1 impute H13 = 8	
H17	Number of radio must not be more than 8	H17-01:H17 is more than 8. imputed H17=8	if H17>8 Impute H17 = 8	
H18	Number of television must not be more than 8	H18-01:H18 is greater than 8. imputed H18=8	if H18>8 Impute H18 = 8	
H19	Number of telephone fixe must not be more than 8	H19-01:H19 is greater than 8. imputed H18=8	if H19>8 Impute H19 = 8	
H20	Number of cell phone must not be more than 20	H20-01:H20 is greater than 20. imputed H20=20	if H20>20 Impute H20 = 20	
H21	Number of telephone fixe must not be more than 8	H21-01:H21 is greater than 8. imputed H21=8	if H21>8 Impute H21 = 8	
H22	Number of computer must not be more than 8	H22-01:H22 is greater than 8. imputed H22=8	if H22>8 Impute H22 = 8	
H23	Number of bicycles must not be more than 10	H23-01:H23 is greater than 10. imputed H23=10	if H23>10 Impute H23 = 10	
H24	Number of vehicles must not be more than 10	H24-01:H24 is greater than 10. imputed H24=10	if H24>8 Impute H24 = 10	
H25	Number of motorcycles must not be more than 10	H25-01:H25 is greater than 10. imputed H25=10	if H25>10 Impute H25 = 10	
H26	Internet access must be compatible with where you access it	H26-02:H26 Inconsistent with H27. imputed H26=1	if H26 = missing and if H27 in 1:15 Impute H26 = 1	
DEATH RECORD				
D2	Sex must be compatible with D5 through D7	D2-02: Missing sex imputed	If D2 = 9 and if D3 >= 12 & D3 <= 49 if (D5 <>notappl | D6 <>notappl | D7 <>notappl) Impute D2 = 2	
			If D2 = 9 and if D3 >= 12 & D3 <= 49 if (D5 =notappl | D6 =notappl | D7=notappl) Impute D2 = 1	
			If D3<12 & D3>49 Impute by previous sex	
D4	Cause of death D4 must be compatible with D5 through D7	D4-02: Inconsistent with D5, D6, D7	D2 = 2 and D3 >= 12 & D3 <= 49 if D5 <>notappl | D6<>notappl | D7 <>notappl and if D4 <> 6 impute D4 = 6	

Universe for POPREC variables

Variable	Universe (only SYSMIS allowed if not part of universe; only non-missing values allowed if part of universe)
P01	ALL
P02	L10=100
P03	ALL
P04M	ALL
P04Y	ALL
P05	ALL
P06	ALL
P07	(P06=1 OR P06=2)
P08	(P06=1 OR P06=2)
P09	(P06=1 OR P06=2)
P10	(P06=1 OR P06=2) AND (L10=100)
P11	(P06=1 OR P06=2) AND (L10=100)
P12D1	(P06=1 OR P06=2)
P12C1	(P06=1 OR P06=2) AND (P12D1<=9)
P12D2	(P06=1 OR P06=2) AND (P12D1<=9)
P12C2	(P06=1 OR P06=2) AND (P12D2<=9)
P12D3	(P06=1 OR P06=2) AND (P12D2<=9)
P12C3	(P06=1 OR P06=2) AND (P12D3<=9)
P12D4	(P06=1 OR P06=2) AND (P12D3<=9)
P12C4	(P06=1 OR P06=2) AND (P12D4<=9)
P12D5	(P06=1 OR P06=2) AND (P12D4<=9)
P12C5	(P06=1 OR P06=2) AND (P12D5<=9)
P12D6	(P06=1 OR P06=2) AND (P12D5<=9)
P12C6	(P06=1 OR P06=2) AND (P12D6<=9)
P13	(P06=1 OR P06=2) AND (L10=100)
P14A	(P06=1 OR P06=2) AND (L10=100) AND (P05<18)
P14B	(P06=1 OR P06=2) AND (L10=100) AND (P05<18) AND (P14A=1)
P14C	(P06=1 OR P06=2) AND (L10=100) AND (P05<18)
P14D	(P06=1 OR P06=2) AND (L10=100) AND (P05<18) AND (P14C=1)
P15	(P06=1 OR P06=2) AND (L10=100) AND (P05<18)
P16	(P06=1 OR P06=2) AND (L10=100) AND (P05>=3)
P17	(P06=1 OR P06=2) AND (P05>=3)
P18A	(P06=1 OR P06=2) AND (P05>=3) AND (P17=2 OR P17=3)
P18B	(P06=1 OR P06=2) AND (P05>=3) AND (P17=2 OR P17=3)
P19	(P06=1 OR P06=2) AND (L10=100) AND (P05>=3) AND (P17=2 OR P17=3)
P20	(P06=1 OR P06=2) AND (L10=100) AND (P05>=5)
P21	(P06=1 OR P06=2) AND (L10=100) AND (P05>=5) AND (P20 = 2)
P22	(P06=1 OR P06=2) AND (L10=100) AND (P05>=5) AND (P21=0 OR P21=1 OR P21=2)
P23	(P06=1 OR P06=2) AND (L10=100) AND (P05>=5) AND ((P22 in 5:6) OR (P21 in 4:7))
P24	(P06=1 OR P06=2) AND L10=100 AND P05>=5 AND P23=1
P25	(P06=1 OR P06=2) AND L10=100 AND P05>=5 AND (P20 = 1 OR P21 = 3 OR (P22 in 1:4) OR P24 = 2)
P26	(P06=1 OR P06=2) AND L10=100 AND P05>=5 AND (P20 = 1 OR P21 = 3 OR (P22 in 1:4) OR P24 = 2)

P27	(P06=1 OR P06=2) AND L10=100 AND P05>=5 AND (P20 = 1 OR P21 = 3 OR (P22 in 1:4) OR P24 = 2)
P28	(P06=1 OR P06=2) AND L10=100 AND P05>=5 AND (P20 = 1 OR P21 = 3 OR (P22 in 1:4) OR P24 = 2)
P29	(P06=1 OR P06=2) AND (P05>=12)
P30	(P06=1 OR P06=2) AND (L10=100) AND (P05>=12) AND (P03=1) AND (P29=2 OR P29=3)
P31	(P06=1 OR P06=2) AND (L10=100) AND (P05>=12) AND (P03=2) AND (P29=2 OR P29=3)
P32	(P06=1 OR P06=2) AND (L10=100) AND (P05>=12) AND (P29=2 OR P29=3 OR P29=4 OR P29=5)
P33M	(P06=1 OR P06=2) AND (L10=100) AND (P05>=12) AND (P03=2)
P33F	(P06=1 OR P06=2) AND (L10=100) AND (P05>=12) AND (P03=2)
P34M	(P06=1 OR P06=2) AND (L10=100) AND (P05>=12) AND (P03=2)
P34F	(P06=1 OR P06=2) AND (L10=100) AND (P05>=12) AND (P03=2)
P35M	(P06=1 OR P06=2) AND (L10=100) AND (P05>=12) AND (P03=2)
P35F	(P06=1 OR P06=2) AND (L10=100) AND (P05>=12) AND (P03=2)
P36M	(P06=1 OR P06=2) AND (L10=100) AND (P05>=12) AND (P03=2)
P36F	(P06=1 OR P06=2) AND (L10=100) AND (P05>=12) AND (P03=2)

Education degree validity matrix

	None	CE/FE	EMA/ENTA	A3/D4/D5	A2/D6/D7	A1:Bacc/Diploma	A0: Bachelor	MA: Master	PHD: Doctorate
P18A = 0 and P18B = 0									
P18A = 0 and P18B = 1									
P18A = 0 and P18B = 2									
P18A = 0 and P18B = 3									
P18A = 1 and P18B = 0									
P18A = 1 and P18B = 1									
P18A = 1 and P18B = 2									
P18A = 1 and P18B = 3									
P18A = 1 and P18B = 4									
P18A = 1 and P18B = 5									
P18A = 1 and P18B = 6									
P18A = 2 and P18B = 0									
P18A = 2 and P18B = 1									
P18A = 2 and P18B = 2									
P18A = 2 and P18B = 3									
P18A = 3 and P18B = 0									
P18A = 3 and P18B = 1									
P18A = 3 and P18B = 2									

P18A = 3 and P18B = 3									
P18A = 3 and P18B = 4									
P18A = 3 and P18B = 5									
P18A = 3 and P18B = 6									
P18A = 3 and P18B = 7									
P18A = 4 and P18B = 0									
P18A = 4 and P18B = 1									
P18A = 4 and P18B = 2									
P18A = 4 and P18B = 3									
P18A = 4 and P18B = 4									
P18A = 4 and P18B = 5									
P18A = 4 and P18B = 6									
P18A = 4 and P18B = 7									

Annex C RPHC4 imputation report (version August 2013)

Line	Freq	Pct.	Message text	Denom
233	21931	-	QUEST-01: Empty Person record found. Deleted pers	-
264	10913	-	QUEST-02: Invalid death record. deleted	-
274	8	0.0	QUEST-03: More than 1 Housing record. First kept	2428326
299	471	0.0	Temp3. found in lookup reviewed duplicate	2428326
312	243	0.0	QUEST-04: Wrong L09. imputed 999	2428326
316	1	0.0	QUEST-05: Wrong L09. imputed 998	2428326
363	51185	2.1	L07-01: Wrong U/R. imputed by U/R in lookup.	2428326
367	0	0.0	L07-02: Wrong EA	2428326
374	102	0.0	L08-01: Wrong struct. imputed 999	2428326
382	6	0.0	L09-01: Wrong household number. imputed 999	2428326
390	151	0.0	L10-01: type of HH wrong. imputed 100	2428326
395	2	0.0	L10-02: type of HH wrong. imputed 100	2428326
400	32	0.0	L10-03: type of HH wrong. imputed 215	2428326
405	1	0.0	L10-04: type of HH wrong. imputed 100	2428326
410	0	0.0	L10-05: type of HH wrong. imputed 215	2428326
472	44272	0.4	POPREC-01: Visitor or invalid has resident inform	*******
479	2384	0.0	POPREC-02: P06 incorrect. imputed 3	*******
500	5772	0.1	Temp: Invalide age. inputed 999	*******
523	261448	2.5	POPREC-03: Age imputed by DoB.	*******
534	167	0.0	POPREC-04: Age invalide. imputed with hotdeckusi	*******
545	32	0.0	POPREC-05: Age invalide. imputed with hotdeckusi	*******
555	277	0.0	POPREC-06: Age invalide. imputed with hotdeckusi	*******
566	1611	0.0	POPREC-07: Age invalide. imputed with hotdeckusi	*******
576	835	0.0	POPREC-08: Age invalide. imputed by previous pers	*******
591	10751	0.1	POPREC-09: Invalide relationship. inputed P02=9	*******
599	2473	0.1	POPREC-10. No Head. Oldest member made head	2428326
611	2959	0.1	POPREC-11. More than 1 Head. First head kept	2428326
637	91	0.0	POPREC-12. Head is less than 12. Imputed oldest P	2428326
664	39977	1.6	POPREC-13. Visitor head. Imputed resident oldest	2428326
697	33	0.0	P02-01:Out of universe. imputednotappl	*******
706	4115	0.0	P03-01: Sex incompatible with P30 Imputed 1	*******
712	6505	0.1	P03-02: Sex incompatible with P31 Imputed 2	*******
719	6730	0.1	P03-03: Sexeinvalid;fertlity exist. imputed 2	*******
735	216	0.0	P03-04: Invalid sex of head. imputed from spouse'	*******
741	4939	0.0	P03-05: Sex invalid. imputed P03 by previous pers	*******
748	12392	0.1	P03-06: Sex incompatible.Spouse's imputed opposit	*******
758	821700	7.5	P04M-01: Month invalid. Imputed P04M=99	*******
765	5167	0.0	P04Y-01: invalid year of brith. imputed P04Y=9999	*******
773	212	0.0	P05-01: Age of Head of HH is less than 12. impute	2428326
800	13039	0.1	P07-01:Out of range. imputed 999	*******
805	1589	0.0	P07-02:P07 missing and P10=999. imputed P07=curre	*******
811	0	0.0	P07-03:Out of universe. imputednotappl	*******
819	12463	0.1	P08-01:Out of range. imputed 999	*******
825	0	0.0	P08-02:Out of universe. imputednotappl	*******
833	15665	0.1	P09-01:Out of range. imputed 999	*******
838	2444	0.0	P09-02:P09 missing and P10=999. imputed P09=curre	*******
844	0	0.0	P09-03:Out of universe. imputednotappl	*******
852	80296	0.8	P10-01:Out of range. imputed P10=998	*******
857	123389	1.2	P10-02:Person has P07<>P09=L0102. imputed P09=999	*******
863	261857	2.5	P10-03:Person has P07=P09=L0102. imputed P10=999	*******
870	82087	0.8	P10-04:Person has P07=P09<>L0102. imputed P10=998	*******
877	55818	0.5	P10-05:Person has P07<>P09<>L0102. imputed P10=99	*******
884	58009	0.6	P10-06:Inconsistency between P05 and P10. imputed	*******
891	19	0.0	P10-07:Out of universe. imputednotappl	*******
905	60388	0.6	P11-01:P11 invalid. imputed by first P11 valid in	*******
912	2418	0.0	P11-02:P11 invalid. imputed P11=9	*******
919	76	0.0	P11-03:Out of universe. imputednotappl	*******
927	2258	0.0	P12D1-01:P12D1=0 and P12C1=0. imputed P12C1=notap	*******
932	15435	0.1	P12D1-02:Out of range. imputed P12D1=0	*******
938	1810	0.0	P12D1-03:Information found in P12C1. imputed P12D	*******
945	0	0.0	P12D1-04:Out of universe. imputednotappl	*******
953	157	0.0	P12C1-01:Out of range. imputed 9	*******
958	554	0.0	P12C1-02:incompatible with p12d1- p12c1 imputed 9	*******
964	0	0.0	P12C1-03:Out of universe. imputednotappl	*******
972	272	0.0	P12D2-01:P12D2=0 and P12C2=0. imputed P12C2=notap	*******
97710064580	95.7	P12D2-02:Out of range. imputed P12D2=0	*******	
983	129	0.0	P12D2-03:Information found in P12C2. imputed P12D	*******
990	0	0.0	P12D2-04:Out of universe. imputednotappl	*******
998	157	0.0	P12C2-01:Out of range. imputed 9	*******
1003	317	0.0	P12C2-02:incompatible with p12d2- p12c2 imputed 9	*******
1009	0	0.0	P12C2-03:Out of universe. imputednotappl	*******
1017	21	0.0	P12D3-01:P12D3=0 and P12C3=0. imputed P12C3=notap	*******
102210484927	99.7	P12D3-02:Out of range. imputed P12D3=0	*******	
1028	43	0.0	P12D3-03:Information found in P12C3. imputed P12D	*******

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   1035       0   0.0  P12D3-04:Out of universe. imputednotappl         *******
   1043      27   0.0  P12C3-01:Out of range. imputed 9                  *******
   1048      68   0.0  P12C3-02:incompatible with p12d3- p12c3 imputed 9 *******
   1054       0   0.0  P12C3-03:Out of universe. imputednotappl         *******
   1062       4   0.0  P12D4-01:P12D4=0 and P12C4=0. imputed P12C4=notap *******
 106710512314 100.0  P12D4-02:Out of range. imputed P12D4=0             *******
   1073      19   0.0  P12D4-03:Information found in P12C4. imputed P12D *******
   1080       0   0.0  P12D4-04:Out of universe. imputednotappl         *******
   1088      23   0.0  P12C4-01:Out of range. imputed 9                  *******
   1093      28   0.0  P12C4-02:incompatible with p12d4- p12c4 imputed 9 *******
   1099       0   0.0  P12C4-03:Out of universe. imputednotappl         *******
   1107       1   0.0  P12D5-01:P12D5=0 and P12C5=0. imputed P12C5=notap *******
 111210515253 100.0  P12D5-02:Out of range. imputed P12D5=0             *******
   1118      14   0.0  P12D5-03:Information found in P12C5. imputed P12D *******
   1125       0   0.0  P12D5-04:Out of universe. imputednotappl         *******
   1133       6   0.0  P12C5-01:Out of range. imputed 9                  *******
   1138       8   0.0  P12C5-02:incompatible with p12d5- p12c5 imputed 9 *******
   1144       0   0.0  P12C5-03:Out of universe. imputednotappl         *******
   1152       4   0.0  P12D6-01:P12D6=0 and P12C6=0. imputed P12C6=notap *******
 115710515739 100.0  P12D6-02:Out of range. imputed P12D6=0             *******
   1163     277   0.0  P12D6-03:Information found in P12C6. imputed P12D *******
   1170       0   0.0  P12D6-04:Out of universe. imputednotappl         *******
   1178      26   0.0  P12C6-01:Out of range. imputed 9                  *******
   1183       2   0.0  P12C6-02:incompatible with p12d6- p12c6 imputed 9 *******
   1189       0   0.0  P12C6-03:Out of universe. imputednotappl         *******
   1197   24231   0.2  P13-01:Out of range- imputed 99                   *******
   1203      15   0.0  P13-02:Out of universe. imputednotappl           *******
1211  125654   2.5  P14A-01:Out of range. imputed P14A=9              5015128
   1217   23706   0.5  P14A-02: consistence between P02 and P03 of hh;Im 5015128
   1224   19261   0.2  P14A-03:Out of universe. imputednotappl          *******
   1232   27005   0.5  P14B-01:Out of range. imputed P14B=9              5015128
   1238   25051   0.2  P14B-02:Out of universe. imputednotappl          *******
1246  134215   2.7  P14C-01:Out of range. imputed P14C=9              5015128
   1252   68992   1.4  P14C-02: consistence between P02 and P03 of hh;Im 5015128
   1259   19096   0.2  P14C-03:Out of universe. imputednotappl          *******
   1267   72448   1.4  P14D-01:Out of range. imputed P14D=9              5015128
   1273   35774   0.3  P14D-02:Out of universe. imputednotappl          *******
1281  190937   3.8  P15-01:Out of range. imputed P15=9                5015128
   1287   20763   0.2  P15-02:Out of universe. imputednotappl           *******
   1295   72848   0.8  P16-01:Out of range. imputed P16=99               9618310
   1301    6576   0.1  P16-02:Out of universe. imputednotappl           *******
1309  247831   2.6  P17-01:Out of range. imputed P17=9                9618310
   1315    3435   0.0  P17-02:Inconsistant with P18A up to P19. imputed  9618310
   1322   65860   0.7  P17-03:Inconsistant with P18A up to P19. imputed  9618310
1329  306635   3.2  P17-04:Inconsistant with P21. imputed P17=3       9618310
1334  104526   1.1  P17-05:Missing imputed with P05 and P18A. imputed 9618310
   1371    8183   0.1  P17-06:Out of universe. imputednotappl           *******
   1380   91718   1.0  P18A-01:Out of range. imputed P18A=9              9618310
   1385   37067   0.4  P18A-02:P18A is Inconsistant with P05. imputed P1 9618310
   1392   29493   0.3  P18A-03:P18A is Inconsistant with P05. imputed P1 9618310
   1398   10022   0.1  P18A-04:P18A is Inconsistant with P05. imputed P1 9618310
   1403    1149   0.0  P18A-05:P18A is Inconsistant with P05. imputed P1 9618310
   1410    4253   0.0  P18A-06:Out of universe. imputednotappl          *******
   1419   50104   0.5  P18B-01:Out of range. imputed P18B=9              9618310
   1429   52881   0.5  P18B-02:P18A is missing. imputed P18B=9           9618310
   1447    6576   0.1  P18B-03:Out of range. imputed P18B=3              9618310
   1454     883   0.0  P18B-04:Out of range. imputed P18B=6              9618310
   1461     414   0.0  P18B-05:Out of range. imputed P18B=3              9618310
   1468       0   0.0  P18B-06:Out of range. imputed P18B=7              9618310
   1475       0   0.0  P18B-07:Out of range. imputed P18B=7              9618310
   1493   96633   1.0  P18B-08:P18B incompatible with age. imputed P18B= 9618310
   1505    4262   0.0  P18B-09:Out of universe. imputednotappl          *******
   1514   77568   0.8  P19-01:Out of range. imputed P19=9                9618310
   1542   75780   0.8  P19-02:P18A and P18B are inconsistant with P19. i 9618310
   1549   12549   0.1  P19-03:P18A and P18B and P05 are inconsistant wit 9618310
   1557    4366   0.0  P19-04:P18A and P18B are inconsistant with P19. i 9618310
   1563     302   0.0  P19-05:P18A and P18B are inconsistant with P19. i 9618310
   1571    4814   0.1  P19-06:P18A and P18B and P05 are inconsistant wit 9618310
   1579     430   0.0  P19-07:P18A and P18B are inconsistant with P19. i 9618310
   1585     134   0.0  P19-08:P18A and P18B are inconsistant with P19. i 9618310
   1593   17996   0.2  P19-09:P18A and P18B and P05 are inconsistant wit 9618310
   1601    1206   0.0  P19-10:P18A and P18B are inconsistant with P19. i 9618310
   1607     349   0.0  P19-11:P18A and P18B are inconsistant with P19. i 9618310
   1615   18469   0.2  P19-12:P18A and P18B and P05 are inconsistant wit 9618310
   1621    4832   0.1  P19-13:P18A and P18B and P05 are inconsistant wit 9618310
   1628     657   0.0  P19-14:P18A and P18B and P05 are inconsistant wit 9618310
   1634     307   0.0  P19-15:P18A and P18B and P05 are inconsistant wit 9618310
   1640    1631   0.0  P19-16:P18A and P18B and P05 are inconsistant wit 9618310
   1647      45   0.0  P19-17:P18A and P18B and P05 are inconsistant wit 9618310
   1653     148   0.0  P19-18:P18A and P18B and P05 are inconsistant wit 9618310
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   1659    1516   0.0  P19-19:P18A and P18B and P05 are inconsistant wit 9618310
   1666      36   0.0  P19-20:P18A and P18B and P05 are inconsistant wit 9618310
   1672     187   0.0  P19-21:P18A and P18B and P05 are inconsistant wit 9618310
   1678     859   0.0  P19-22:P18A and P18B and P05 are inconsistant wit 9618310
   1685       0   0.0  P19-23:P18A and P18B and P05 are inconsistant wit 9618310
   1691      54   0.0  P19-24:P18A and P18B and P05 are inconsistant wit 9618310
   1701    1228   0.0  P19-25:P18A and P18B and P05 are inconsistant wit 9618310
   1707      61   0.0  P19-26:P18A and P18B and P05 are inconsistant wit 9618310
   1713      47   0.0  P19-27:P18A and P18B and P05 are inconsistant wit 9618310
   1719      38   0.0  P19-28:P18A and P18B and P05 are inconsistant wit 9618310
   1725       5   0.0  P19-29:P18A and P18B and P05 are inconsistant wit 9618310
   1731       1   0.0  P19-30:P18A and P18B and P05 are inconsistant wit 9618310
   1739    6661   0.1  P19-31:Out of universe. imputednotappl          *******
   1747   81892   0.9  P20-01:Out of range. imputed 9                   8975946
   1754   23904   0.3  P20-02:Inconsistant with P21 and P25. imputed P20 8975946
   1761   19956   0.2  P20-03:Inconsistant with P21 and P25. imputed P20 8975946
   1773    6211   0.1  P20-04:Missing imputed using P21 and P25. imputed 8975946
   1779    6354   0.1  P20-05:Missing imputed using P21, P25 and P17. im 8975946
   1783   38228   0.4  P20-06:Missing imputed by hotdeck using P05. impu 8975946
   1791    4331   0.0  P20-07:Out of universe. imputednotappl          *******
   1799   86680   1.0  P21-01:Out of range. imputed P21=9               8975946
   1806   23710   0.3  P21-02:Missing imputed from P17. imputed P21=6    8975946
   1813    1269   0.0  P21-03:P21 incompatible with P05. imputed P21=9   8975946
   1819   17928   0.2  P21-04:P21 incompatible with P05. imputed P21=9   8975946
   1825       0   0.0  P21-05:P21 inconsistant with P17. imputed P21=9   8975946
   1838    7724   0.1  P21-06:Missing imputed by hotdeck with P05. imput 8975946
   1842   74443   0.8  P21-07:Missing imputed by hotdeck with P05. imput 8975946
   1849       0   0.0  Temp1:P21 incompatible with P05. imputed P21=9    8975946
   1855       0   0.0  Temp2:P21 incompatible with P05. imputed P21=9    8975946
   1861       0   0.0  Temp3:P21inconsistant with P17. imputed P21=9    8975946
1868  115790   1.3  P21-08:P21=1 inconsistant from P25 to P28. impute 8975946
   1874   59581   0.7  P21-09:P21=2 inconsistant from P25 to P28. impute 8975946
   1882   15274   0.2  P21-10:P21 inconsistant with P22 thru P25. impute 8975946
   1889   63447   0.7  P21-11:Missing imputed other. imputed P21=3       8975946
   1895    6827   0.1  P21-12:Out of universe. imputednotappl          *******
   1903   50623   0.6  P22-01:Out of range. imputed P22=9               8975946
   1915    8293   0.1  P22-02:Missing imputed by hotdeck with P05.      8975946
   1919   42330   0.5  P22-03:Missing imputed by hotdeck with P05.      8975946
   1926   91491   0.8  P22-04:Out of universe. imputednotappl          *******
   1934   80537   0.9  P23-01:Out of range. imputed 9                   8975946
   1940   26021   0.3  P23-02:P23 inconsistant with P24 thru P28. impute 8975946
   1948   67637   0.8  P23-03:P23 inconsistant with P24 thru P28. impute 8975946
   1955       0   0.0  P23-04:Missing imputed from P24. imputed P23=2    8975946
   1959     655   0.0  P23-05:Missing imputed from P24. imputed P23=1    8975946
   1966   21864   0.2  P23-06:Out of universe. imputednotappl          *******
   1974   30194   0.3  P24-01:Out of range. imputed P24=9               8975946
   1981   32302   0.4  P24-02:P24 inconsistant with P25 thru P28. impute 8975946
   1987   14303   0.2  P24-03:P24 inconsistant with P25 thru P28. Hotdec 8975946
   1996    7168   0.1  P24-04:Out of universe. imputednotappl          *******
   2014   87945   1.0  P25-01: Out of range. Imputed P25=9999           8975946
   2020     172   0.0  P25-02:Out of universe. imputednotappl          *******
2031  172073   1.9  P26-01:Out of range. imputed P26=9               8975946
   2037     157   0.0  P26-02:Out of universe. imputednotappl          *******
   2055   89983   1.0  P27-01:Out of range. Imputed P27=9999            8975946
   2061     161   0.0  P27-02:Out of universe. imputednotappl          *******
2069  106186   1.2  P28-01:Out of range. imputed P28=9               8975946
   2075     174   0.0  P28-02:Out of universe. imputednotappl          *******
   2085   78232   1.1  P29-01: Out of range. Imputed P29 = 9            6937678
   2091   54448   0.8  P29-02: Empty P29. Imputed 1 from P30,P31,P32    6937678
   2097    8042   0.1  P29-03: Inconsistence with P30>=1, P29 imputed 2  6937678
   2103   14532   0.2  P29-04: Inconsistence with P31>=1, P29 imputed 2  6937678
   2110    9546   0.1  P29-05:Out of universe. imputednotappl          6937678
   2122   27059   0.4  P30-01: Out of range. Imputed P30 = 9            6937678
   2128    6963   0.1  P30-02:Out of universe. imputednotappl          6937678
   2140   57875   0.8  P31-01: Out of range. Imputed P31 = 9            6937678
   2146   14923   0.2  P31-02:Out of universe. imputednotappl          6937678
2159  105563   1.5  P32-01: Out of range. Imputed 99                 6937678
2165  116073   1.7  P32-02: P32 greater than P05. Imputed P32=99     6937678
   2173    5901   0.1  P32-03:Out of universe. imputednotappl          6937678
2181  104630   1.5  P33M-01: Out of range value. Imputed P33M=99     6937678
   2187    8863   0.1  P33M-02:Out of universe. imputednotappl          6937678
2195  107252   1.5  P33F-01: Out of range value. Imputed P33F=99     6937678
   2201    8851   0.1  P33F-02:Out of universe. imputednotappl          6937678
2213  111643   1.6  P34M-01: Out of range value. Imputed P34M=99     6937678
   2218   10594   0.2  P34M-02: More children alive than born. Imputed P 6937678
   2224    7325   0.1  P34M-03:Out of universe. imputednotappl          6937678
2235  112957   1.6  P34F-01: Out of range value. Imputed P34F=99     6937678
   2240   11076   0.2  P34F-02: More children alive than born. Imputed P 6937678
   2246    7313   0.1  P34F-03:Out of universe. imputednotappl          6937678
2257  212112   3.1  P35M-01: Out of range value. Imputed P35M=9      6937678
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2263	6901	0.1	P35M-02:Out of universe. imputednotappl	6937678
2276	215157	3.1	P35F-01: Out of range value. Imputed P35F=9	6937678
2282	6882	0.1	P35F-02:Out of universe. imputednotappl	6937678
2299	220717	3.2	P36M-01: Out of range value. Imputed P36M=9	6937678
2305	9894	0.1	P36M-02: More children alive than born. Imputed P	6937678
2311	5414	0.1	P36M-03:Out of universe. imputednotappl	6937678
2328	221376	3.2	P36F-01: Out of range value. Imputed P36F=9	6937678
2334	8596	0.1	P36F-02: More children alive than born. Imputed P	6937678
2340	8633	0.1	P36F-03:Out of universe. imputednotappl	6937678
2601	290	1.0	D2-01: Out of range. Imputed 9	27917
2605	290	1.0	D2-02: Missing sex imputed	27917
2623	388	1.4	D3-01: Out of range. Imputed 999	27917
2630	1158	4.1	D4-01: Out of range. Imputed 9	27917
2637	102	0.4	D4-02: Inconsistent with D5, D6, D7	27917
2648	1516	5.4	D5-01: Out of range. Imputed 9	27917
2654	143	0.5	D5-02: Out of universe. Imputed notapplicable	27917
2663	1636	5.9	D6-01: Out of range. Imputed 9	27917
2669	115	0.4	D6-02: Out of universe. Imputed notapplicable	27917
2677	1670	6.0	D7-01: Out of range. Imputed 9	27917
2683	115	0.4	D7-02: Out of universe. Imputed notapplicable	27917
2745	11693	0.5	HHREC-01: No Housing record. Imputed by neighbour	2428326
2796	2493	0.1	H01-01:Out of range. imputed 9	2424898
2802	6757	0.3	H02-01: Out of range. imputed 9	2424898
2808	2409	0.1	H03-01: Out of range. imputed 9	2424898
2814	3179	0.1	H04-01: Out of range. imputed 9	2424898
2819	0	0.0	H04-02 not compatible with H02. Imputed 9	2424898
2826	6577	0.3	H05-01:Out of range. imputed 0	2424898
2832	1027	0.0	H05-02:H05 not compatible with H02. Imputed 0	2424898
2838	256	0.0	H05-03:H05 not compatible with H04. Imputed 0	2424898
2844	10237	0.4	H06-01:Out of range. imputed 9	2424898
2850	1363	0.1	H07-01:Greater than 15. imputed 99	2424898
2855	12559	0.5	H07-02:Invalide character. imputed 99	2424898
2861	20	0.0	H07-01:Greater than 15. imputed 15	2424898
2866	9318	0.4	H08-02:Invalide character. imputed 99	2424898
2871	10189	0.4	H08-03:Greater than H07. imputed H08=H07	2424898
2878	2	0.0	H09-01:Greater than 30. imputed 30	2424898
2884	25860	1.1	H09-02:Invalide character. imputed 99	2424898
2890	26563	1.1	H10-01:Out of range. imputed 0	2424898
2896	8318	0.3	H11-01: Out of range. imputed 9	2424898
2901	32310	1.3	H11-02:Not compatible with H05.Imputed 9	2424898
2907	1715	0.1	H11-03:Not compatible with H10. Imputed 9	2424898
2913	10919	0.5	H12-01: Out of range. imputed 9	2424898
2919	12758	0.5	H13-01: Out of range. imputed 9	2424898
2924	3139	0.1	H13-02: H13 is not compatible with H12. Imputed 9	2424898
2932	44573	1.8	H14-01: Out of range. imputed 9	2424898
2938	22439	0.9	H15-01: Out of range. imputed 9	2424898
2944	13340	0.6	H16-01: Out of range. imputed 9	2424898
2950	0	0.0	H17-01:H17 is more than 8. imputed H17=8	2424898
2955	7680	0.3	H17-02: No numerical character. imputed 9	2424898
2961	0	0.0	H18-01:H18 is greater than 8. imputed H18=8	2424898
2966	15576	0.6	H18-02: No numerical character. imputed 9	2424898
2972	0	0.0	H19-01:H19 is greater than 8. imputed H19=8	2424898
2977	17103	0.7	H19-02: No numerical character. imputed 9	2424898
2983	5	0.0	H20-01:H20 greater than 20. imputed 20	2424898
2988	9458	0.4	H20-02: No numerical character. imputed 99	2424898
2994	0	0.0	H21-01:H21 is more than 8. imputed H21=8	2424898
2999	16737	0.7	H21-02: No numerical character. imputed 9	2424898
3005	0	0.0	H22-01:H22 is more than 8. imputed H22=8	2424898
3010	18137	0.7	H22-02: No numerical character. imputed 9	2424898
3016	6	0.0	H23-01:H23 greater than 10. imputed H23=10	2424898
3021	15706	0.6	H23-02: No numerical character. imputed 99	2424898
3027	96	0.0	H24-01:H24 greater than 10. imputed 10	2424898
3032	16948	0.7	H24-02: No numerical character. imputed 99	2424898
3038	102	0.0	H25-01:H25 greater than 10. imputed 10	2424898
3043	17747	0.7	H25-02: No numerical character. imputed 99	2424898
3049	11841	0.5	H26-01: Out of range. imputed 9	2424898
3055	1077	0.0	H26-02:H26 Inconsistant with H27. imputed H26=1	2424898
3063	994	0.0	H27-01:Out of range. imputed 99	2424898
3069	1976	0.1	H27-02:Out of univers. imputednotappl	2424898
3076	788	0.0	H28A-01:H28A greater than 500. imputed 500	2424898
3081	16027	0.7	H28A-02: No numerical character. imputed 9999	2424898
3087	132	0.0	H28B-01:H28B greater than 500. imputed 500	2424898
3092	15923	0.7	H28B-02: No numerical character. imputed 9999	2424898
3098	58	0.0	H28C-01:H28C greater than 500. imputed 500	2424898
3103	17563	0.7	H28C-02: No numerical character. imputed 9999	2424898
3109	212	0.0	H29-01:H29 greater than 500. imputed 500	2424898
3114	13696	0.6	H29-02: No numerical character. imputed 9999	2424898
3120	84	0.0	H30-01:H30 greater than 500. imputed 500	2424898
3125	17385	0.7	H30-02: No numerical character. imputed 9999	2424898
3131	55	0.0	H31-01:H31 greater than 500. imputed 500	2424898

3136	15702	0.6	H31-02: No numerical character. imputed 9999	2424898
3142	21	0.0	H32-01:H32 greater than 500. imputed 500	2424898
3147	17186	0.7	H32-02: No numerical character. imputed 9999	2424898
3153	128	0.0	H33-01:H33 greater than 500. imputed 500	2424898
3158	14860	0.6	H33-02: No numerical character. imputed 9999	2424898
3164	27	0.0	H34-01:H34 greater than 500. imputed 500	2424898
3169	21373	0.9	H34-02: No numerical character. imputed 9999	2424898
3176	5769	0.2	H35-01:Out of range. imputed 9	2424898

PERSONS AND INSTITUTIONS THAT CONTRIBUTED TO THE FOURTH RWANDA POPULATION AND HOUSING CENSUS, 2012

National Census Commission

Chairperson:	
Claver GATETE	Minister of Finance and Economic Planning
John RWANGOMBWA	Former Minister of Finance and Economic Planning
Vice Chairperson:	
James MUSONI	Minister of Local Government
Secretary:	
Yusuf MURANGWA	Director General of NISR
Dr. Diane KARUSISI	Former Acting Director General of NISR

Members of the National Census Commission

Venantia TUGIREYEZU	Minister in the Office of the President
Stella Ford MUGABO	Minister of Cabinet Affairs
James KABAREBE	Minister of Defense
Sheikh Mussa HARERIMANA	Minister of Internal Security
Louise MUSHIKIWABO	Minister of Foreign Affairs and Cooperation
Dr. Vincent BIRUTA	Minister of Education
Dr. Mathias HAREBAMUNGU	Minister of State in charge of Primary and Secondary Education
Dr. Agnes BINAGWAHO	Minister of Health
Odda GASINZIGWA	Minister in Prime Minister's Office in charge of Gender and Family Promotion
Jean Philbert NSENGIMANA	Minister of Youth and ICT
Prof. Silas LWAKABAMBA	Minister of Infrastructure
Albert NSENGIYUMVA	Former Minister of Infrastructure
Anastase MUREKEZI	Minister of Public Service and Labour
Stanislas KAMANZI	Minister of Natural Resources
Willy RUKUNDO	Former Acting Director General of ORINFOR
Arthur ASIIMWE	Director General of RBA
Hannington NAMARA	CEO of the Private Sector Federation
Robert BAYIGAMBA	Former CEO of the Private Sector Federation

National Technical Committee

Chairperson:	
Leonard MINEGA RUGWABIZA	Former Director of National Development Planning and Research in MINECOFIN
Vice Chairperson:	Director General of Planning in MINALOC
Egide RUGAMBA	
Secretary:	Census Coordinator of the RPHC4
Prosper NKAKA MUTIJIMA	

Members of the National Technical Committee

Dr. Agnes NTIBANYURWA	Assistant Representative of UNFPA in charge of Population and Development
Esther MUTAMBA	Director General of Rwanda Housing Authority
Anna MUGABO	Director General of Labour and Employment
Dr. Erasme RWANAMIZA	Director General of Education
Innocent MUSABYIMANA	Director of Planning in MINIRENA
Jeanne d'Arc UMULISA	Director of Planning and M&E in MIGEPROF
Parfait UWARIRAYE	Director of Planning in MINISANTE
Redempter BATETE MUKUNZI	Director of Youth Employment and Program Coordination
Antonio MUTORO	Former Executive Director of IPAR-Rwanda

Branches of the National Census Commission

Members of the Branches of the NCC at Province Level (Governors of Provinces)

Kigali City:
Fidele NDAYISABA, Mayor

Sothern Province:
Alphonse MUNYENTWARI, Governor

Western Province:
Celestin KABAHIZI, Former Governor
Caritas MUKANDASIRA, Governor

Northern Province:
Aime BOSENIBAMWE, Governor

Eastern Province:
Odette UWAMARIYA, Governor

Members of the Branches of the NCC at District Level (Mayors of Districts)

Solange MUKASONGA	Nyarugenge District	Gedeon RUBONEKA	Ngororero District
Willy NDIZEYE	Gasabo District	Oscar NZEYIMANA	Rusizi District
Paul Jules NDAMAGE	Kicukiro District	Jean Baptiste HABYARIMANA	Nyamasheke District
Abdallah MURENZI	Nyanza District	Justus KANGWAGYE	Rulindo District
Leandres KAREKAZI	Gisagara District	Deogratias NZAMWITA	Gakenke District
Francois HABITEGEKO	Nyaruguru District	Winifrida MPEBYEMUNGU	Musanze District
Eugene MUZUKA KAYIRANGA	Huye District	Samuel SEMBAGARE	Burera District
Philbert MUGISHA	Nyamagabe District	Alexandre MVUYEKURE	Gicumbi District
Francois Xavier MBABAZI	Ruhango District	Nehemie UWIMANA	Rwamagana District
Yvonne MTAKWASUKU	Muhanga District	Fred SABITI ATUHE	Nyagatare District
Jacques RUTSINGA	Kamonyi District	Ambrose RUBONEZA	Gatsibo District
Bernard KAYUMBA	Karongi District	John MUGABO	Kayonza District
Gaspard BYUKUSENGE	Rutsiro District	Protais MURAYIRE	Kirehe District
Sheikh Hassan BAHAME	Rubavu District	Aphrodice NAMBAJE	Ngoma District
Abdoulatif TWAHIRWA	Nyabihu District	Louis RWAGAJU	Bugesera District

National Directors

Yusuf MURANGWA, Director General of NISR

Dr. Diane KARUSISI, Former Acting Director General of NISR

Census Technical Director

Willy MPABUKA GASAFARI

Census National Coordinator

Prosper NKAKA MUTIJIMA

Census Field Operations

Census National Coordinators

Prosper NKAKA MUTIJIMA	National Institute of Statistics of Rwanda
Major-General Jacques MUSEMAKWELI	Rwanda Defence Force
Eric KAYIRANGA	Rwanda National Police
Alex MUGISHA	Rwanda Correctional Services

Census Province Coordinators

Juvenal MUNYARUGERERO	Kigali City
Baudouin RUTERANA	Southern Province
Willy MPABUKA GASAFARI	Western Province
Francois SEKAMONDO	Northern Province
Astrid SEGAHWEGE	Eastern Province

Census District Coordinators

Jean Nepo. RWABUKUMBA	Nyarugenge District	Patrick NSHIMIYIMANA	Rusizi District
Franck Mine	Gasabo District	Jean BIZIMANA	Nyamasheke District
Jean Paul RUSHAKU	Kicukiro District	Issa MUSABEMUNGU	Rulindo District
Francois ABALIKUMWE	Nyanza District	Clement BIZIMUNGU	Gakenke District
Evelyne KANYONGA	Gisagara District	Beatrice UWAYEZU	Musanze District
Etienne KWIZERA	Nyaruguru District	Esther MAHUKU	Burera District
Juvenal NTAMBARA	Huye District	Vital HABINSHUTI	Gicumbi District
Albert KARERA	Nyamagabe District	Ephrem RUKUNDO	Rwamagana District
Annonciata MUKABAGIRE	Ruhango District	Dominique M. KANOBANA	Nyagatare District
Francois KABAYIZA	Muhanga District	Nicolas MWIZERWA	Nyagatare District
Andre KAJABIKA	Kamonyi District	David MASENGEHO	Gatsibo District
Jean Baptiste SERUGENDO	Karongi District	Venuste NKURUNZIZA	Kayonza District
Jean Marc MUKUNDABANTU	Rutsiro District	Basile NJAMAHORO	Kirehe District
Jean MUGABO	Rubavu District	Dominique MICOMYIZA	Ngoma District
Immaculee MUKANGENDO	Nyabihu District	Eugene UWIRAGIYE	Ngoma District
Olivier MBANGUTSE	Ngororero District	Florence UWIMBABAZI	Bugesera District
Wellars MUDASHIMA	Rusizi District		

Zone and Sector Controllers and Enumerators

Zone Controllers:
127 (mostly Districts Education Officers and Headmasters of some Secondary Schools)

Sector Controllers:
451 (mostly Sector Education Officers)

Enumerators:
24,005 (mostly Primary School Teachers)

Cartography and Data Processing

Programmer:
Augustin TWAGIRUMUKIZA, Director of ICT

Assistant Programmers:
Didier UYIZEYE
Donath NKUNDIMANA
Massoud HARERIMANA

Coders:
Number = 308

Data Entry Clerks:
Number = 308

Cartography:
Florent BIGIRIMANA
Olivier MBANGUTSE
Clement BIZIMUNGU
Albert KARERA
James RWAGASANA

Archiving:
Eric RUSA
Pierre Claver KABANDANA

Administration and Finance

Odette MBABAZI	Deputy Director General in charge of Corporate Services in NISR
Didier GAKUBA	Former Director of Finance in NISR
Liberal SEBULIKOKO	Former Coordinator of Basket Fund
Jean Pierre UWINEZA	Former Acting Director of Finance in NISR
Andre GASHUGI	Director of Administration in NISR
Silas MUNYEMANA	Director of Finance in NISR
Jerome UWIBAMBE	Accountant in NISR
Alicia INGABIRE	Accountant in NISR
Jocelyne UWAMAHORO	HR Manager of Permanent Staff in NISR
Esperance UWIMANA	Former HR Manager of Temporary Staff in NISR
Nina RURANGIRWA	HR Manager of Temporary Staff in NISR
Maureen TWAHIRWA	Former Public Relations Officer
Yolande KABEGA	Former Public Relations Officer
Antoinette HABINSHUTI	Planning Officer
Theodore RUGANZU	Former Planning Officer
Jean Paul NDISANZE	Planning Officer
Hassan YAHYA	Coordinator of Basket Fund
Eric BUGINGO	Procurement Officer
Alphonse SHUMBUSHO	Procurement Officer
Gerald YEMUKAMA	Procurement Officer
Nadine BABYEYI	Administrative Assistant
Elias DUSENGE	Messenger
Sita KAZIMBAYA	Messenger

Census Data Analysis
National Data Analysts

Jean RUGARAMA	Population Size and Spatial Distribution
Dieudonne MUHOZA	Marital Status and Nuptiality
Beatrice UWAYEZU	Fertility
Willy MPABUKA GASAFARI	Mortality
Dr. Bosco BINENWA	Socio-Cultural Characteristics of the Population
Pierre Claver RUTAYISIRE	Migration and Spatial Mobility
Prof. Emmanuel TWARABAMENYE	Characteristics of Housing and Households
James BYIRINGIRO	Labour Force
Charles RURANGA	Measurement and Mapping of Non-Monetary Poverty
Annonciata MUKABAGIRE	Education
Dominique M.KANOBANA	Gender
Apolline MUKANYONGA	Socio-Economic Status of Persons with Disability
Jules RUBYUTSA	Socio-Economic Status of Children
Venant HABARUGIRA	Socio-Economic Status of Youth
Michel NDAKIZE	Socio-Economic Status of Elderly
Prosper NKAKA MUTIJIMA	Population Projections

International Technical Support

National Institute of Statistics of Rwanda (NISR):

Dr. Mohamed ABULATA

United Nations Population Fund (UNFPA):

Dr, Bolaji TAIWO, Chief Technical Adviser
Dr. Mady BIAYE, Regional Technical Adviser
Jean Marc HIE, International Data Processing Expert
Dr. Macoumba THIAM, International Census Analyst
Dr. Ben MWASI, International GIS Expert

Oxford Policy Management (OPM):

Mary STRODE
Felix SCHMIEDING
Cora MEZGER Jean Michel DURR
Gilberto RIBEIRO
Philippe N. GAFISHI
Prof. Sabu PADMADAS
Ludovico CARRARO
Juste NITIEMA
Prof. James BROWN
Wine LANGERAAR
Stephi SPRINGHAM
Sophia KAMARUDEEN
Paul JASPER
Johnson FIFI

NISR MANAGEMENT TEAM

Yusuf MURANGWA, Director General
Odette MBABAZI, Deputy Director General/CS
Andre GASHUGI, Director of Administration
Jean Pierre UWINEZA, Director of Finance
Willy GASAFARI, Director of Census
Juvenal MUNYARUGERERO, Census Field Expert
Prosper MUTIJIMA, Census Coordinator
Augustin TWAGIRUMUKIZA, Director of ICT
Sebastien MANZI, Director of Economic Statistics
Dominique HABIMANA, Director of Statistical Methods, Research and Publications
Antoinette HABINSHUTI, Planning Officer
Jean Paul NDISANZE, Planning Officer