Estimating the Size of Populations through a Household Survey (ESPHS)

RWANDA

2011

REPUBLIC OF RWANDA

Estimating the Size of Populations through a Household Survey (ESPHS) Rwanda 2011

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UNAIDS

ICF International
Calverton, Maryland, USA

February 2012

Recommended citation:

Rwanda Biomedical Center/Institute of HIV/AIDS, Disease Prevention and Control Department (RBC/IHDPC), School of Public Health (SPH), UNAIDS, and ICF International. 2012. *Estimating the Size of Populations through a Household Survey*. Calverton, Maryland, USA: RBC/IHDPC, SPF, UNAIDS, and ICF International.

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PREFACE

This report presents the findings of the Estimating the Size of Populations through a Household Survey (ESPHS) study that took place in 2011. The study utilized a single household survey to estimate the size of several key populations, including sex workers, men who have sex with men (MSM), injecting drug users (IDU), and clients of sex workers. These populations include several groups outlined in the National Strategic Plan for HIV and AIDS as most at risk for HIV infection, specifically sex workers and MSM.

Obtaining reliable size estimates for key populations is crucial for the Rwanda Biomedical Center/Institute of HIV/AIDS, Disease Prevention and Control (RBC/IHDPC) and our partners to design an effective HIV response in line with the national HIV strategy. Estimating the size of key populations at higher risk for HIV not only allows us to understand the magnitude of the response that is needed, but also helps us to more accurately project the future of the epidemic in our country. To be effective, we need to be able to produce consistent and comparable estimates over time.

Measuring the size of key populations such as sex workers, MSM, or IDU is, however, very difficult given that they are most often hidden or hard to reach. Estimating the size of these populations is thus often not possible through traditional enumeration methods. The ESPHS study tests several new methods—the Network Scale-Up and Proxy Respondent methods—that aim to overcome the barriers of previously existing methods of estimating the size of such populations.

I would like to take this opportunity to thank the School of Public Health at the National University of Rwanda, UNAIDS, USAID, ICF International, and Princeton University for their financial and technical support in undertaking this important and innovative endeavour. I would also like to acknowledge the role of the Technical Committee in contributing to the successful implementation of the survey, and express appreciation for the work carried out by all the individuals involved in the collection and analysis of data, both in Rwanda and internationally.

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ACRONYMS

BSS — Behavioural Surveillance Survey

CDC — Centers for Disease Control and Prevention
CI — Confidence interval

DANSUM — Data-Augmented Network Scale-Up Method
DHS — Demographic and Health Surveys

EA — Enumeration area
ESPHS — Estimating the Size of Populations through a Household Survey

FSW — Female sex worker

HIV — Human Immunodeficiency Virus

ICRC — International Committee of the Red Cross
ICRW — International Center for Research on Women
IDU — Injecting drug user

LCL — Lower confidence limit

MSM — Men who have sex with men

NISR — National Institute of Statistics of Rwanda
NSUM — Network Scale-Up Method

PRM — Proxy Respondent Method
PSU — Primary sampling units

RBC/IHDPC — Rwanda Biomedical Center/Institute of HIV/AIDS and Disease Prevention and Control Department
RPHC — Rwanda Population and Housing Census

SPH — School of Public Health

UCL — Upper confidence limit
UNAIDS — Joint United Nations Programme on HIV/AIDS
USAID — United States Agency for International Development

EXECUTIVE SUMMARY

Knowing the number of people who have behaviours that increase risk to HIV infection – such as injecting drug users, sex workers, clients of sex workers, and men who have sex with men – is critical for national HIV responses. The sizes of these key populations at higher risk for HIV provide national programme planners with an estimate of the number of people to reach with tailored HIV services. Such estimates also provide national epidemiologists with an understanding of the impact of these populations on the HIV epidemic. Finally, these estimates allow planners to advocate for resources for key populations. Estimating the sizes of such key populations is challenging because they tend to be hidden or hard-to-reach. The behaviours that put individuals at increased risk are often stigmatizing, which pushes the population further into hiding. Estimating the sizes of key populations is thus often not possible through traditional enumeration methods.

In 2010, the Rwanda Biomedical Center/Institute for HIV Disease Prevention and Control (RBC/IHDPC) in collaboration with UNAIDS, the School of Public Health (SPH) of the National University of Rwanda, USAID and other partners, decided to test two new methods to address the important challenge of estimating the sizes of key populations. These methods improve on existing methods because they can estimate the sizes of all four key populations in one survey, they can provide national estimates, and they avoid many of the assumptions required in alternative size estimation methods. Both methods collect data from the general population to estimate the sizes of key populations.

The two methods are the network scale-up method and the proxy respondent method. The network scale-up method asks respondents in the general population to state the number of people they know with the specific high-risk behaviours. In addition, respondents are asked a series of questions to estimate the number of people (or "alters") that they know overall (according to a specific definition of what it means to "know" someone). This proportion, averaged over many respondents, estimates the proportion of the population with the high risk behaviour, i.e. the key population. The second method, the proxy respondent method, requires the respondent to answer questions on the behaviours of two distinct, but randomly selected, persons (or "alters") whom the respondent knows but who remain anonymous to the interviewer.

The purpose of the survey was to test the two methods, so a number of variations were tested for the network scale-up method including: two definitions of what it means to know someone and two approaches to estimate personal network size. Future surveys will only require one of these variations.

Critical to the network scale-up method is how the survey defines what it means for a survey respondent "to know" someone, or to determine who is in their personal network. The *basic* definition of "to know" was limited to people that a respondent knew by sight or name and with whom the respondent had contact in the past 12 months. The *meal* definition of "to know" restricted a respondent's personal network to alters with whom the respondent had shared a meal or drink in the past 12 months. The results suggested that the meal definition found larger proportions of a respondent's personal network to be members of the key populations. It can be assumed that the respondent is likely to be more familiar with the behaviours of alters they have shared a meal with than the behaviours of alters they have simply had contact with.

There are two different approaches for estimating respondents' personal network size, a key input into the network scale-up estimator. The *known populations* approach for estimating personal network size requires finding the actual size of 22 reference populations (see Table 4.1). This proved to be fairly easy in Rwanda although some populations were dropped from the final analysis because it was not possible to verify the "true" values. The *summation* approach requires an exercise to elicit mutually exclusive, but exhaustive categories for acquaintances

that were relevant to Rwanda. This was a time consuming and imprecise process. Analysis presented in Section 4.2 suggests that in this study, the known populations method provided a better estimate of the personal network size than the summation method.

The proxy respondent method requires identifying a set of unbiased names (i.e. not favoring specific age groups, religions, etc). This was also fairly easy in Rwanda due to the records of the National Identification Project Database, from which it was possible to illicit the most common names in Rwanda.

The survey used a similar methodology to the standard Demographic and Health Survey (DHS) and included a sub-set of DHS questions as well as the network scale-up and proxy respondent questions. The survey team administered the questionnaire to all male and female respondents age 15 and above in a new sample of Rwandan households. The pilot survey borrowed from the recent experience of the 2010 Rwanda DHS, using many of the same interviewers, the same sampling frame, and a similar supervisory structure. A total of 4,669 interviews were conducted on a nationally-representative sample of Rwandans between June and August, 2011.

Limitations

There are three known biases to these methods: response bias (when respondents are ashamed to admit they know a person with high risk behaviours), information transmission error (when respondents don't know about the behaviours of their acquaintances), and degree ratio (when the key populations have smaller networks than the general population resulting in a lower probability that they are known by respondents). All three of these biases will usually lead to an underestimate of the size of the key population. Unfortunately, reliable estimates of how much these biases are affecting the estimates are not available for Rwanda and hence no adjustments can be made for these biases at this time.

The proxy respondent method was tested for the first time in this survey. Despite a careful selection of names, only 67 percent of the respondents stated knowing someone with one of the ten randomly selected names (five for each sex). The average network size among the 67 percent who knew someone with one of the names was 20 percent larger than the average network size of the respondents that did not provide an alter. If the alters of people with larger networks are different than the alters of people with smaller networks, the information collected from the proxy respondent method will be biased. This method needs to be further refined and evaluated.

Results and Discussion

The survey found that it is feasible to collect data on these sensitive questions in a household survey in Rwanda. During a debriefing meeting with survey staff in November 2011, the interviewers and supervisors reported no instances where a respondent became upset by the questions or stopped the interview because of the questions about the key populations which are perceived to be sensitive. Twenty-one percent of the respondents knew at least one person in any of the four key populations.

The results suggest that there are over 30,000 sex workers in Rwanda. Similarly there are over 30,000 clients of sex workers. It is important to note that these point estimates may be underestimates because of the information transmission rate and the response bias due to stigma against these populations. In both the proxy respondent method and the network scale-up method the estimated number of female sex workers was remarkably similar to the number of clients of sex workers. Meta-analyses of the proportions of clients and the proportions of sex workers in sub-Saharan Africa would suggest that in most countries there are more clients than sex workers (Vandepitte 2006 and Carael 2006). The similar numbers from this study may be due to varying information transmission rates: acquaintances of sex workers may be more likely to know that they are sex workers since that knowledge is how they advertise their work, compared to acquaintances of clients who may know less often that those individuals are buying sex.

Another noteworthy finding from the proxy respondent method was that men also sell sex in Rwanda and have female clients. Although the numbers of male sex workers and female clients were quite low, the results suggest that this population should be considered as a key population at risk for HIV infection in Rwanda. Further, the majority of sex workers and clients were married, thus creating important bridging populations to the general public.

Injecting drug use and sex between men does exist in Rwanda. The results suggest that currently the number of people in these two key populations is relatively low (at a minimum 1,000 injecting drug users and 5,000 men who have sex with men). However, because the likelihood of HIV transmission in these populations is so high, it is important to ensure services are provided for these populations and to monitor the sizes and HIV prevalence in these groups. Stigma toward IDU might be fairly low in Rwanda because of the rarity of the behaviour. On the other hand stigma toward MSM is very high potentially resulting in a gross underestimate if their accompanying information transmission rate is very low.

Conclusions

The network scale-up and the proxy respondent methods are feasible to estimate the sizes of key populations at higher risk of HIV infection. However, the methods do not provide conclusive size estimates for Rwanda. The results are probably underestimates because we are not able to adjust for the known biases. We recommend that future studies should not be implemented without data, at a minimum, on the information transmission error for each population. The stigma questions showed very high levels of stigma toward key populations in Rwanda. This stigma could lead to a response bias that will also result in underestimates of the sizes.

There were a number of methodological findings:

- Known populations from a complete data set (or census-like dataset) without a sampling error was better than from a survey dataset.

- The known population method provided more accurate estimates of the personal network size than the summation method.

- The more restricted definition of the personal networks, or what it means "to know" someone, appears to provide more accurate estimates.

- Identifying specific definitions of who is included in the key populations at increased risk of HIV infection before starting size estimation studies will allow more accurate comparisons between different methods of size estimation.

Finally, although the proxy respondent method estimates from this study were not reliable, small changes to the implementation of the method could provide useful results for future studies.

INTRODUCTION

1

Planning a comprehensive response to the national HIV epidemic involves the identification of the main drivers of the epidemic, the population groups that are most affected, as well as those that represent the highest proportions of new infections. Rwanda has a generalized HIV epidemic with the HIV prevalence in the general population currently reported to be 3 percent (National Institute of Statistics of Rwanda (NISR) and ORC Macro, 2006). As per the pattern in Eastern and Southern Africa, prevalence is higher among women than men, and higher in urban areas than in rural areas. There are, however, certain groups within the population in Rwanda where HIV prevalence is substantially higher than in the general population, such as female sex workers (FSW). The 2010 Behavioural Surveillance Survey (BSS) revealed that 51 percent of female sex workers in Rwanda were HIV positive (RBC, 2010).

An important step in the process of planning the national HIV response is therefore to estimate the sizes of those populations at higher risk of HIV infection. These estimates facilitate planning, monitoring, and evaluating HIV responses. When they are conducted over time, size estimations of such populations help measure trends and the programme coverage needed to have an impact among the population. Size estimates also provide much needed data to develop appropriate policies and context-specific, appropriate interventions and can be used to justify an effective allocation of resources. Estimating the sizes of key populations is difficult because these populations, such as injecting drug users (IDU), sex workers, clients of sex workers, and men who have sex with men (MSM), are hidden or hard-to-reach (UNAIDS/WHO, 2010). Estimating the sizes of these populations is thus often not possible through traditional enumeration methods.

Existing methods for estimating the sizes of hard-to-reach populations require a number of assumptions that are often hard to establish (UNAIDS/WHO, 2010). In addition, these methods usually only provide estimates for a city or small region. Countries are therefore required to produce size estimates through multiple methods and triangulate different results to create the best estimate, and to aggregate sub-regional estimates for a national estimate. Additional size estimation methods are needed to create nationally representative estimates which avoid some of the difficult assumptions and which can be tested for statistical accuracy.

One promising statistical approach to the challenge of size estimation is the network scale-up method (NSUM) (Bernard et al., 2010). NSUM has been tested in the United States but more research and data collection experience are needed before it can be confidently used for stigmatized populations. In the past two years the method has been used in the Ukraine, Moldova, Brazil, Peru and Thailand. From these studies we have learned that it is feasible to collect this information in a timely manner. However, studies have shown that people often withhold information about their family or friends if there is substantial stigma involved in the behaviour under consideration (Shelley et al., 2006). In addition, persons with high-risk behaviours may have different personal network sizes than the general population, and that effects the estimation of the target population size (Johnsen et al., 1995).

Another promising method, the proxy respondent method (PRM), was recently proposed by Wolfgang Hladik (personal communication), which follows the same theories as the network scale-up method, but requires much less data collection. Proxy respondent asks the respondent to answer questions on the behaviours of one or a

few distinct and randomly selected persons who they know well, but who remain anonymous to the interviewer. This method has not been tested previously but appears to offer similar advantages as the network scale-up method.

Both the network scale-up and the proxy respondent methods offer the following advantages over existing size estimation methods such as capture-recapture, multiplier, or census:

- The data collection required can be embedded within a standard survey that is administered to the general population (e.g., a DHS).

- Further, from what we know of response effects, respondents should be more open to reporting about people whom they know in stigmatized populations than reporting about their own status as a member of those populations.

- The methods produce size estimates for many subpopulations in a single survey, whereas existing methods such as capture recapture, require separate studies to produce size estimates for each subpopulation of interest.

- In addition, the network scale-up method allows for criterion validity checks if researchers use the same data and estimators to estimate the sizes of known populations. For example, in addition to estimating the number of homeless in the United States, Killworth et al. (1998) also used the same data and estimator to estimate the number of airline pilots, the number of people named Michael and other populations whose size is known from reliable statistics. To the extent that scale-up estimates of known-size populations agree with such reliable statistics, this provides support for the estimated number of unknown-size populations. Such "reality checks" are difficult to incorporate in many methods currently in use.

In 2010, the Rwanda Biomedical Center/Institute of HIV/AIDS and Disease Prevention and Control (RBC/IHDPC) in collaboration with UNAIDS, the School of Public Health (SPH) of the National University of Rwanda, USAID, and other partners decided to test these two methods by conducting a pilot survey in Rwanda. Using a methodology similar to the standard DHS, a sub-set of DHS questions, as well as the network scale-up and proxy respondent questions, were asked to all male and female respondents age 15 and above in a sample of Rwandan households. The pilot survey borrowed from the recent experience of the 2010 Rwanda DHS, using many of the same interviewers, the same sampling frame, and a similar supervisory structure; although the households chosen did not overlap with those sampled in the 2010 Rwanda DHS.

The study, known as Estimating the Size of Populations through a Household Survey (EPSHS), sought to assess the feasibility of the network scale-up and proxy respondent methods for estimating the sizes of key populations at higher risk of HIV infection and to compare the results to other estimates of the population sizes. The study was undertaken based on the assumption that if these methods proved to be feasible with a reasonable amount of data collection for making adjustments, countries would be able to add this module to their standard household survey to produce size estimates for their key populations at higher risk of HIV infection. This would facilitate better programmatic responses for prevention and caring for people living with HIV and would improve the understanding of how HIV is being transmitted in the country.

The specific objectives of the ESPHS were:

1. To assess the feasibility of the network scale-up method for estimating the sizes of key populations at higher risk of HIV infection in a Sub-Saharan African context;

2. To assess the feasibility of the proxy respondent method for estimating the sizes of key populations at higher risk of HIV infection in a Sub-Saharan African context;

3. To estimate the population size of MSM, FSW, IDU, and clients of sex workers in Rwanda at a national level;

4. To compare the estimates of the sizes of key populations at higher risk for HIV produced by the network scale-up and proxy respondent methods with estimates produced using other methods; and

5. To collect data to be used in scientific publications comparing the use of the network scale-up method in different national and cultural environments.

The results of the study are presented in this report as follows: in Chapter 2, the survey process is described; Chapter 3 describes the household characteristics; Chapter 4 and Chapter 5 provide detailed descriptions of the two methods (the network scale-up method and the proxy respondent method), as well as the results of the two methods; and Chapter 6 summarizes the size estimates produced by both methods and compares the estimates to alternative size estimates from Rwanda.

ORGANISATION AND IMPLEMENTATION OF THE SURVEY

2

T he ESPHS was commissioned by the Rwanda Biomedical Center/Institute of HIV/AIDS and Disease Prevention and Control Department (RBC/IHDPC). The survey was carried out by the School of Public Health (SPH) of the National University of Rwanda. The National Institute of Statistics of Rwanda (NISR) provided data and logistical advice on the survey. Technical support was provided by UNAIDS and ICF International through the MEASURE DHS programme, Princeton University, the Centers for Disease Control (CDC), and University of Florida. Funding for the survey came from the United States Agency for International Development (USAID) through the DHS programme, the UNAIDS secretariat in Geneva, and the Japanese Government.

Data collection was conducted from June 2 to August 9, 2011 on a nationally representative sample of 2,125 households. Each of these households was visited to obtain information using the Household Questionnaire. All women and all men age 15 years and above were eligible to be individually interviewed, if they were either usual residents of the household or visitors present in the household on the night before the survey. A total of 4,669 women and men were successfully interviewed.

2.1 QUESTIONNAIRES

RBC/IHDPC and UNAIDS organized a workshop in November 2010 to design and develop a first draft of the questionnaires. About 15 participants from different Rwandan government institutions (RBC/IHDPC, NISR, SPH), NGOs working in the field of HIV, and donor agencies (USAID, UNAIDS) attended the workshop. This group constituted the Technical Working Group for size estimates. The workshop was facilitated by ICF International, UNAIDS, CDC-Uganda, Princeton University, and the University of Florida. The draft questionnaire that was initially field tested during the November workshop and was refined during the following months. The final modifications were made during the interviewer training in May 2011. The draft questionnaires were first developed in English, then translated into Kinyarwanda.[1] The entire survey protocol, including questionnaires and other instruments, were reviewed and approved by the Rwanda National Ethics Committee, the ICF Institutional Review Board, the Princeton Institutional Review Board, the International Center for Research on Women Institutional Review Board, and CDC-Atlanta.

The ESPHS used two types of questionnaires: a household questionnaire and an individual questionnaire. The same individual questionnaire was used to interview both women and men. In addition, two versions of the individual questionnaire were developed, using two different definitions of what it means "to know" someone. Each version of the individual questionnaire was used in half of the selected households.

Household questionnaire

The Household Questionnaire was a short version of the 2011 Rwanda DHS questionnaire. It was primarily used to list all the usual members and visitors in the selected households and to collect some basic information on the characteristics of each person listed, including age, sex, status of residence, and marital status. The main purpose of the Household Questionnaire was to identify women and men who were eligible for the individual interview.

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[1] The English version of the questionnaires is provided in Appendix D.

The Household Questionnaire also collected information on characteristics of the household's dwelling unit, such as the source of water, type of toilet facilities, and ownership of various durable goods. This information was used to create an index representing the wealth of the households. The wealth index is a proxy for long-term standard of living of the households and is used in the following analysis as a background characteristic of the respondents who are members of these households.

Individual questionnaire

As mentioned earlier, the main purpose of the ESPHS was to apply the "network scale-up method" (NSUM) to estimate the sizes of key populations at higher risk of HIV infection, as well as an alternative method, the "proxy respondent method" (PRM), which follows a similar logic to NSUM. The NSUM requires estimating the number of people in the key populations known by the respondent, as well as the size of the respondent's personal network. There are two approaches for making an estimate of network size: the known population approach and the summation approach. All respondents were asked all questions relevant to both the network scale-up method and the proxy respondent method. In addition, all respondents were asked all questions to estimate the size of their network using both the population approach and the summation approach. The individual questionnaire was organized accordingly and included six sections:

- Respondent's background;

- Known population;

- Summation;

- Target population;

- Proxy respondent; and

- Stigma.

Respondent's background. This section collected some information on the socio-demographic characteristics of the respondent, including age, level of education, religion, marital status, as well as information on knowledge and behaviour related to HIV and AIDS. All of these questions were part of the 2011 Rwanda DHS individual questionnaire.

Known population. The first approach to estimate the size of the respondent's network requires collecting data on a number of populations of which the size is already known. During the workshop held in Kigali in November 2010, a first list of 25 populations was chosen (e.g., number of teachers, number of doctors and nurses, etc.). However, statistics were not available for all of these "known" populations. Therefore, 12 categories were dropped from the list of known populations and replaced by questions about persons with specific last (Kinyarwanda) names for which the number was available in the National Identification Project Database. The final set of known populations includes these 12 categories, five categories for which the size can be calculated from DHS findings, and seven for which the size is available from public records.

Adult mortality. A short module was added to the questionnaire to see whether mortality could be accurately estimated using the estimate of personal network size from NSUM. Although this was not one of the original objectives of the survey it was added since it could provide useful information on additional potential of the network scale-up method.

Summation. The second approach to estimate the size of the respondent's network requires defining a set of mutually exclusive and exhaustive relationship categories: the sum of these categories provides the total network

size. During the November 2010 workshop, the participants compiled an exhaustive list of different ways they knew people in their personal social networks. All responses were transcribed, sorted, and a distribution was calculated to isolate the most frequent responses. The participants were then each asked to list 30 people they knew in Rwanda and categorize their relationships with the individuals using one or more of the most frequent relationship categories. Finally, a tally of the incidence of overlapping relationship categories was made and visualized to allow the participants to identify categories which were mutually overlapping and could be excluded from the survey instrument. A total of 29 categories were identified and used in this section of the questionnaire.

Target populations. This section collects the number of persons known by the respondent in each key population at higher risk of HIV infection, namely the number of female sex workers, men who have sex with men, injecting drug users, and clients of sex workers.

Proxy respondent. The proxy respondent method (PRM) requires asking the respondent to answer questions about a person she/he knows with a specific name. This person is referred to as an "alter". Respondents were offered five names and then asked whether they knew anyone with any of those names. To emphasize the anonymity of the responses, the respondent was told not to inform the interviewer which name they had chosen. Five names were chosen to be the optimal number because it would ensure the probability that a respondent would know someone with one of those five names, and yet the number was small enough to allow the respondent to remember the name they had identified on the list. Respondents were asked whether the alter had any of the risk behaviours. The respondent was asked these questions for up to two alters who were men and two alters who were women.

In addition to the questions about risk behaviours of the alter, four general descriptive questions were asked about the alter. These were useful for two purposes: to compare the characteristics of all of the alters to the general population, and to describe the characteristics of the alters who have high-risk behaviours.

Stigma toward key populations. In other countries where NSUM was tested, an attempt was made to estimate the *response bias* by measuring the "prestige" of the population to determine how often respondents would adjust their responses because they were socially undesirable. This measure of prestige was estimated by gauging the stigma toward the key populations and a few of the known populations to estimate the different levels of stigma (or shame or prestige) in the populations. Questions on the level of shame the community had toward different populations were included in this section of the questionnaire for the four key populations at higher risk of HIV infection and for three "known" populations.

Stigma toward people living with HIV. In addition, the Global Stigma Indicator Working Group, an international group working on the development of indicators related to stigma and discrimination, requested that eight questions be added to the survey to test their utility in measuring HIV-related stigma and discrimination. These questions were based on the results of cognitive interviews conducted in Rwanda in April 2011.

Since questions on stigma and discrimination were added to the ESPHS without being directly related to the main purpose of the survey, namely estimating the size of populations, findings on this part of the survey will not be presented in this report. The results of the reliability and validity analyses of the new stigma and discrimination questions tested in the ESPHS will be presented in a separate report available from the International Center for Research on Women (ICRW).

Two versions of the individual questionnaire were developed for the survey with all of the same sections and questions but using two different definitions of what it means "to know" someone. This definition determines who is included in a respondent's personal network (See Chapter 4 for a full description of how these definitions are used). Each version of the individual questionnaire was used in half of the selected households.

The first questionnaire used the "basic" definition of "to know", which has been used in other network scale-up surveys. The basic definition restricts the universe of who a respondent "knows" to:

- people the respondent knows by sight AND name, and who also know the respondent by sight and name;

- people the respondent has had some contact with – either in person, over the telephone, or on the computer – in the previous 12 months; and

- people of all ages who live in Rwanda.

The second questionnaire used a definition that was more specific. The "meal" definition restricts the universe of who a respondent "knows" to:

- people the respondent knows by sight AND name, and who also know the respondent by sight and name;

- people of all ages who live in Rwanda; and

- people the respondent has shared a meal or drink with in the past 12 months, including family members, friends, co-workers, or neighbours. This definition includes meals or drinks taken at any location, such as at home, at work, or in a restaurant.

The "meal" definition was intended to refine the measurement of who one "knows" to be people that are known better by the respondent than those identified using the basic definition.

Figure 2.1 summarizes the "structure" of the survey and of the questionnaires. Two methods—the NSUM and the PRM—were tested for estimating the sizes of key populations. For the network scale-up method, two approaches for measuring personal network size were used: the known populations approach, and the summation approach. Finally the survey also tested two definitions of the personal network, or two definitions of what it means "to know" someone: the "basic" definition and the "meal" definition.

Figure 2.1 Methods tested in the ESPHS
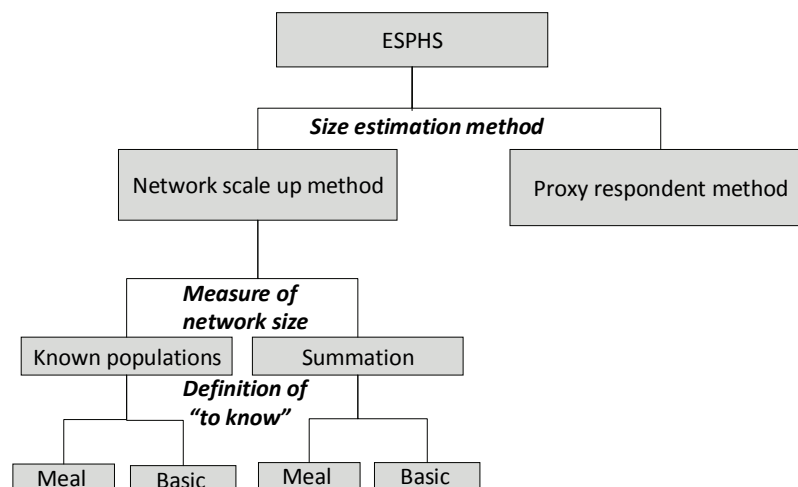
2.2　SAMPLE DESIGN

The ESPHS used a two-stage sample design, implemented in a representative sample of 2,125 households selected nationwide in which all women and men age 15 years and above where eligible for an individual interview.[2]

The sampling frame used was the preparatory frame for the Rwanda Population and Housing Census (RPHC), which will be conducted in 2012; it was provided by the National Institute of Statistics of Rwanda (NISR). The sampling frame is a complete list of natural villages covering the whole country (14,837 villages). Two strata were defined: the city of Kigali and the rest of the country. One hundred and thirty Primary Sampling Units (PSU) were selected from the sampling frame (35 in Kigali and 95 in the other stratum). To reduce clustering effect, only 20 households were selected per cluster in Kigali and 15 in the other clusters. As a result, 33 percent of the households in the sample were located in Kigali.

The list of households in each cluster was updated upon arrival of the survey team in the cluster. Once the listing had been updated, a number was assigned to each existing household in the cluster. The supervisor then identified the households to be interviewed in the survey by using a table in which the households were randomly pre-selected. This table also provided the list of households pre-selected for each of the two different definitions of what it means "to know" someone.

2.3　TRAINING AND FIELDWORK

Training was conducted in May 2011 by three staff of SPH, with assistance from UNAIDS, Princeton University, CDC-Uganda, and ICF International. Fifty-five people attended the training to work as either a team supervisor, interviewer, or data entry staff.

The first three days of training were comprised of classroom work, during which interviewers were familiarized with the overall purpose of the survey, the individual modules within the survey, and procedures for listing households in the selected clusters. Days four and five of training included fieldwork practice on listing households and implementing the survey questionnaire.

Since all interviewers selected for the EPSHS worked on the recent 2010 Rwanda DHS, they were very familiar with the format and logic of the EPSHS questionnaires, the ethics of conducting household surveys and the skills required for conducting an interview. Training focused on the appropriateness and understanding of the questions, with special attention paid to the Kinyarwanda questionnaires. Special focus was given to the importance of repeating the definition of what it means to know someone multiple times during the survey and the importance of using the exact wording for the key populations.

The sixth day of training included a debriefing session with the interviewers. Many changes in both the content and wording of the questions were suggested and discussed with the interviewers. In addition, results of the two-day field practice in data collection were presented to the interviewers so they could better understand the purpose of the survey. The presentation of results also provided an opportunity for the analysts to check for potential problems in the questionnaires. Based on this analysis, two additional days were spent making final changes to the questionnaires and revising the translations into Kinyarwanda. All manuals (Interviewer, Supervisor, and Listing manuals) were also finalized.

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[2] A complete description of the sample design is provided in Appendix A.

Trainees were assigned to eight data collection teams; each team consisted of a team supervisor, two female interviewers and two male interviewers. Senior staff from SPH coordinated and supervised the fieldwork activities. The eight teams began the main data collection on June 2, 2011 in Kigali and completed fieldwork on August 9, 2011.

2.4   DATA PROCESSING

The processing of the ESPHS data began shortly after the fieldwork commenced. Completed questionnaires were returned periodically from the field to the SPH office in Kigali, where they were entered and checked for consistency by data processing personnel who were specially trained for this task. Data were entered using CSPro, a programme specially developed for use in DHS surveys. All data were entered twice (100 percent verification). The concurrent processing of the data was a distinct advantage for data quality, because the School of Public Health had the opportunity to advise field teams of problems detected during data entry. The data entry and editing phase of the survey was completed in late August 2011.

2.5   RESULTS OF THE HOUSEHOLD AND INDIVIDUAL INTERVIEWS

Table 2.1 shows household and individual response rates for the ESPHS, by type of questionnaire (basic and meal). A total of 2,125 households were selected in the sample, of which 2,120 were actually occupied at the time of the interview. The number of occupied households successfully interviewed was 2,102, yielding a household response rate of 99 percent.

From the households interviewed, 2,629 women were found to be eligible and 2,567 were interviewed, giving a response rate of 98 percent. Interviews with men covered 2,102 of the eligible 2,149 men, yielding a response rate of 98 percent. The response rates do not significantly vary by type of questionnaire or residence.

Table 2.1 Results of the household and individual interviews

Number of households, number of interviews, and response rates, according to residence (unweighted), ESPHS Rwanda, 2011

| | Residence | | |
Result	Kigali City	Other Provinces	Total
Household interviews			
Households selected	700	1,425	2,125
Households occupied	696	1,424	2,120
Households interviewed	687	1,415	2,102
Household response rate	98.7	99.4	99.2
Individual Interview (Basic Questionnaires)			
Interviews with women age 15+			
Number of eligible women	438	846	1,284
Number of eligible women interviewed	421	833	1,254
Eligible women response rate	96.1	98.5	97.7
Interviews with men age 15+			
Number of eligible men	409	627	1,036
Number of eligible men interviewed	402	617	1,019
Eligible men response rate	98.3	98.4	98.4
Individual Interview (Meal Questionnaires)			
Interviews with women age 15+			
Number of eligible women	427	918	1,345
Number of eligible women interviewed	416	897	1,313
Eligible women response rate	97.4	97.7	97.6
Interviews with men age 15+			
Number of eligible men	391	722	1,113
Number of eligible men interviewed	380	703	1,083
Eligible men response rate	97.2	97.4	97.3
Individual Interview (All Questionnaires)			
Interviews with women age 15+			
Number of eligible women	865	1,764	2,629
Number of eligible women interviewed	837	1,730	2,567
Eligible women response rate	96.8	98.1	97.6
Interviews with men age 15+			
Number of eligible men	800	1,349	2,149
Number of eligible men interviewed	782	1,320	2,102
Eligible men response rate	97.8	97.9	97.8

HOUSEHOLD POPULATION AND RESPONDENT CHARACTERISTICS

3

This chapter provides a summary of the characteristics of household population and a demographic and socio-economic profile of respondents interviewed in the ESPHS. Basic characteristics collected include age, level of education, marital status, religion, as well as exposure to mass media. In addition, a few questions on knowledge and attitudes regarding HIV and AIDS were asked to the respondents. This information will be used to evaluate the representativeness of the ESPHS sample. In addition, such background information is essential for understanding the results presented later in the report.

The ESPHS collected information from all usual residents of a selected household (*de jure* population) and persons who had stayed in the selected household the night before the interview (*de facto* population). Although the difference between these two populations is small, to avoid double counting all tables in this report refer to the *de facto* population unless otherwise specified. The ESPHS survey used the same definition of households as in the 2005 Rwanda DHS. A household was defined as a person or group of related and unrelated persons who live together in the same dwelling unit, who acknowledge one adult member as head of the household, and who have common arrangements for cooking and eating meals.

3.1 CHARACTERISTICS OF THE HOUSEHOLD POPULATION

Age and Sex Composition

The survey collected information on age in completed years for each household member. Table 3.1 presents the percent distribution of the household population by five-year age groups, according to residence and sex. The population spending the night before the survey in the households selected for the survey included 8,699 individuals of which 878, or 10 percent, live in Kigali City and 7,822 in the rest of the country.

The age structure is typical of a young population: the population is concentrated in the younger age groups, and the percentage of the population in each age group decreases rapidly as age increases. The proportions do not always decrease from one age group to the next due to rounding and age transferring. This irregularity, however, does not affect the overall pattern. In this survey, as in the 2005 Rwanda DHS, 46 percent of the population is under age 15, and 54 percent is age 15 and above and thus eligible for the individual interview. In addition, there is a notable gender imbalance (87 males for every 100 females), as already noted in the 2005 Rwanda DHS (88 males for 100 females).

Table 3.1 Household population by age, sex, and residence

Percent distribution of the de facto household population by five-year age groups, according to sex and residence, ESPHS Rwanda, 2011

	Kigali City			Other provinces			Total		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total
<5	13.6	15.5	14.6	18.0	14.4	16.1	17.5	14.5	16.0
5-9	13.8	11.1	12.4	17.1	15.5	16.2	16.8	15.0	15.9
10-14	9.5	11.4	10.5	15.5	14.8	15.1	14.9	14.5	14.7
15-19	9.4	8.9	9.1	9.0	7.5	8.2	9.0	7.6	8.3
20-24	11.3	14.8	13.1	7.4	8.3	7.9	7.8	8.9	8.4
25-29	15.8	11.2	13.4	8.4	8.7	8.6	9.2	9.0	9.1
30-34	9.6	7.1	8.3	6.1	6.2	6.1	6.5	6.3	6.3
35-39	4.3	5.4	4.9	3.6	5.0	4.4	3.7	5.1	4.4
40-44	4.2	3.8	4.0	3.2	4.2	3.7	3.3	4.1	3.7
45-49	2.6	2.8	2.7	2.6	3.5	3.1	2.6	3.4	3.0
50-54	2.1	2.4	2.3	3.1	3.4	3.2	3.0	3.3	3.1
55-59	1.4	1.5	1.4	2.0	3.1	2.6	1.9	2.9	2.5
60-64	1.0	1.5	1.3	1.0	1.6	1.3	1.0	1.6	1.3
65-69	0.4	0.6	0.5	1.0	1.2	1.1	0.9	1.1	1.0
70-74	0.3	0.5	0.4	0.7	1.1	0.9	0.7	1.0	0.9
75-79	0.3	1.0	0.6	0.8	0.6	0.7	0.7	0.6	0.7
80 +	0.2	0.7	0.4	0.6	1.0	0.8	0.6	0.9	0.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	420	457	878	3,614	4,201	7,822	4,034	4,658	8,699

Note: Total includes 7 (unweighted number) persons whose sex was not recorded.

Household Composition

Table 3.2 shows the distribution of households in the survey by sex of the head of household and by number of household members. Households in Rwanda are predominantly male-headed. However, as in the 2005 RDHS, more than one-third (35 percent) of households are headed by women, with 29 percent of households in Kigali headed by women, compared with 35 percent of households in the rest of the country.

Table 3.2 Household composition

Percent distribution of households by sex of head of household and by household size; mean size of household, ESPHS Rwanda, 2011

	Residence		
Characteristic	Kigali City	Other provinces	Total
Household headship			
Male	70.8	64.6	65.3
Female	29.2	35.4	34.7
Total	100.0	100.0	100.0
Number of usual members			
1	16.2	7.9	8.8
2	15.7	12.5	12.8
3	21.4	18.4	18.8
4	14.0	20.1	19.5
5	12.0	17.5	16.9
6	7.6	10.6	10.3
7	6.5	7.7	7.6
8	4.0	3.1	3.2
9+	2.5	2.1	2.2
Total	100.0	100.0	100.0
Mean size of households	3.8	4.2	4.1
Number of households	232	1,870	2,102

Note: Table is based on de jure household members, i.e., usual residents.

The average household size is 4.1 persons, smaller than the 4.6 persons per household observed in the 2005 RDHS. In Kigali, households have 3.8 persons per household on average and are slightly smaller than households in the other provinces (4.2 persons). However, large households with seven or more members are as common in Kigali as elsewhere (13 percent in both cases).

3.2   CHARACTERISTICS OF SURVEY RESPONDENTS

Throughout this report, numbers in the tables reflect weighted numbers. Due to the way the sample was designed, the number of weighted cases in some categories appears small, since they are weighted to make the distribution by residence nationally representative. However, the number of unweighted cases is always large enough to calculate the presented estimates.

The background characteristics of the 4,669 women and men age 15 years and above interviewed in the ESPHS are shown in Table 3.3, regardless of the type of questionnaire (basic or meal) used during the individual interview. This table is important in that it provides the background for interpreting findings presented later in the report.

The distribution of the respondents according to age shows a generally similar pattern for men and women. Forty-six percent of women and 51 percent of men are in the 15-29 age group. Although the proportion of respondents in each age group usually declines with increasing age for both sexes, the proportions do not decline as regularly as expected among the youngest age groups due to rounding and age transferring. However, these irregularities in the age distribution should not affect the measurements made in the ESPHS since none of them is based on an age-specific calculation.

The distribution of respondents by religion shows a pattern similar to that seen in the 2005 Rwanda DHS, with slightly more men than women being Catholic (47 percent versus 43 percent), and in contrast, slightly more women than men being Protestant (42 and 36 percent respectively).

Since the ESPHS includes all women and men age 15 years and above while the previous Rwanda DHS survyes were limited to women age 15-49 and men age 15-59, the proportion of women and men who have never married is significantly lower than in the Rwanda DHS surveys. Fifty-two percent of women and 58 percent of men are currently married or living with a partner as married. In addition, one in five women is no longer in union: 6 percent are divorced or separated, and 14 percent are widowed.

As found in the Rwanda DHS surveys, the proportion of men living in Kigali City (13 percent) is slightly higher than that of the women (11 percent).

As expected, since the ESPHS includes respondents of older ages, the proportion of both women and men with no education is higher than in the Rwanda DHS surveys. As shown in Table 3.3, 25 percent of women have no education, compared with 15 percent of men. Furthermore, 19 percent of the men have attended secondary or higher education, compared with 14 percent of the women.

Table 3.3 Background characteristics of all respondents

Percent distribution of women and men age 15+ by selected background characteristics, ESPHS Rwanda, 2011

Background characteristic	Women			Men		
	Weighted percent	Weighted number	Unweighted number	Weighted percent	Weighted number	Unweighted number
Age						
15-19	13.8	360	368	17.8	367	362
20-24	16.0	417	459	15.4	317	343
25-29	16.3	427	428	18.0	371	417
30-34	11.3	296	290	12.6	259	281
35-39	9.2	240	233	7.4	152	149
40-44	7.5	196	179	6.6	136	136
45-49	6.2	161	149	5.1	106	104
50-59	11.2	294	260	9.7	200	177
60-69	4.9	127	114	3.9	80	74
70+	3.6	95	87	3.3	68	59
Religion						
Catholic	43.2	1,129	1,047	47.0	966	965
Protestant	42.1	1,099	1,107	35.6	731	730
Adventist	11.6	303	295	11.1	229	237
Muslim	1.4	35	65	3.0	61	93
Other	0.9	23	28	0.7	14	16
No religion	0.9	23	23	2.6	53	60
Missing	0.1	2	2	0.1	2	1
Marital status						
Never married	28.1	734	805	39.1	803	908
Married	35.8	936	845	43.5	894	831
Living together	15.9	416	416	14.9	306	312
Divorced/separated	6.2	163	157	1.1	23	26
Widowed	13.9	363	344	1.4	29	25
Residence						
Kigali City	10.9	284	837	12.9	266	782
Other Provinces	89.1	2,329	1,730	87.1	1,790	1,320
Education						
No education	25.2	659	553	15.3	314	273
Primary	60.8	1,589	1,509	66.0	1,356	1,303
Secondary+	14.0	365	505	18.8	386	526
Wealth quintile						
Lowest	13.3	348	260	9.2	189	138
Second	18.7	488	386	16.0	328	259
Middle	25.3	661	555	23.5	483	402
Fourth	22.8	597	526	26.5	544	477
Highest	19.9	520	840	24.9	511	826
Total 15-49	80.2	2,097	2,106	83.1	1,708	1,792
Total 15+	100.0	2,613	2,567	100.0	2,056	2,102

Note: Education categories refer to the highest level of education attended, whether or not that level was completed.

In addition to standard background characteristics, many of the results in this report are shown by wealth quintiles, an indicator of the economic status of households. The information collected on dwelling and household characteristics, consumer goods, and assets are used as a measure of socio-economic status. The resulting wealth index is an indicator of the level of wealth that is consistent with expenditure and income measures. Each household asset for which information is collected is assigned a weight or factor score generated through principal components analysis. The resulting asset scores are standardized in relation to a standard normal distribution with a mean of zero and a standard deviation of one. Each household is assigned a standardized score for each asset, where the score differs depending on whether or not the household owned that asset. These scores are summed by household, and individuals are ranked according to the total score of the household in which they reside. The sample was then divided into quintiles from one (lowest) to five (highest).

About one-third of women and a quarter of men interviewed (32 percent and 25 percent respectively) are in the two lowest wealth quintiles, while 43 percent of women and 51 percent of men are in the two highest quintiles. These differentials by gender are partly the consequence of the different distribution of men and women by residence.

3.3 ACCESS TO MASS MEDIA

Access to information is essential for increasing people's knowledge and awareness of what is taking place around them, which may eventually affect their perceptions and behaviours. In the survey, exposure to the media was assessed by asking how often a respondent reads a newspaper, watches television, or listens to a radio. Table 3.4 shows the percentage of women and of men who were exposed to different types of media by age, level of education, and wealth quintile.

Table 3.4 Exposure to mass media

Percentage of women and men age 15+ who are exposed to specific media on a weekly basis, by background characteristics, ESPHS Rwanda, 2011

Background characteristic	Reads a newspaper at least once a week	Watches television at least once a week	Listens to radio at least once a week	Accesses all three media at least once a week	Accesses none of the three media at least once a week	Number of women
WOMEN						
Age						
15-24	2.9	13.0	72.8	1.1	25.2	777
25-29	3.8	12.2	68.4	1.6	30.8	427
30-39	4.1	8.7	63.0	2.2	36.4	536
40-49	1.9	5.7	63.1	0.9	36.6	357
50-59	1.5	4.2	58.2	0.2	41.5	294
60+	1.5	3.5	38.9	0.1	60.2	223
Education						
No education	0.2	2.2	44.6	0.0	55.1	659
Primary	1.7	6.1	67.5	0.3	31.7	1,589
Secondary+	12.6	35.5	85.4	7.5	11.5	365
Wealth quintile						
Lowest	0.3	0.0	32.5	0.0	67.5	348
Second	0.3	1.5	51.6	0.0	48.4	488
Middle	1.4	0.8	63.0	0.0	36.4	661
Fourth	2.5	4.3	76.9	0.5	23.0	597
Highest	9.2	39.0	84.4	5.5	11.6	520
Total 15-49	3.2	10.5	67.8	1.5	31.2	2,097
Total 15+	2.9	9.2	64.2	1.2	34.8	2,613
MEN						
Age						
15-24	7.9	25.5	84.5	3.6	13.1	684
25-29	7.5	31.6	89.6	5.3	9.7	371
30-39	9.4	23.1	86.4	5.8	12.7	411
40-49	10.3	21.3	90.1	7.2	8.1	242
50-59	3.5	11.3	88.3	1.4	10.9	200
60+	0.8	5.9	74.7	0.6	25.3	148
Education						
No education	0.4	8.9	77.6	0.0	21.6	314
Primary	3.8	17.8	85.7	1.4	12.8	1,356
Secondary+	26.2	52.2	94.6	18.2	4.1	386
Wealth quintile						
Lowest	4.0	5.8	65.0	0.8	31.0	189
Second	2.1	8.6	73.6	0.5	24.3	328
Middle	4.0	9.8	88.9	0.5	9.9	483
Fourth	5.3	13.8	90.9	2.2	8.6	544
Highest	17.7	60.3	94.3	14.0	4.6	511
Total 15-49	8.5	25.7	86.9	5.0	11.5	1,708
Total 15+	7.5	22.9	86.1	4.3	12.5	2,056

In general, women are less likely than men to have access to mass media; this is true for all types of media. Only 3 percent of women and 8 percent of men read newspapers at least once a week, while 9 percent of women and 23 percent of men watch television. Listening to the radio is the most common way of accessing the media: 64 percent of women and 86 percent of men listen to the radio at least once a week. Only 1 percent of women and 4 percent of men are exposed to all three of these media sources. In contrast, about one-third of women and 13 percent of men do not access any form of media at least once a week.

The proportion of women who are not exposed to any type of media at least once a week generally increases gradually with age. The largest proportion of women who do not have access to any media at least once a week are those age 60 and above (60 percent). Among men, there is no clear pattern by age, however, as for the women, the men age 60 and above are the most likely to have no access to any form of media (25 percent).

Media exposure increases with both the educational level and wealth quintile of the respondent. For example, 39 percent of women in the highest wealth quintile watch television at least once per week compared with 2 percent of women in the second wealth quintile. Regarding the printed media, less than one percent of women with no education reported reading a newspaper at least once a week, compared with 2 percent of women with primary education and 13 percent of women with secondary and higher education

3.4 KNOWLEDGE OF HIV AND AIDS AND OF TRANSMISSION AND PREVENTION METHODS

Respondents to the ESPHS were asked whether they had heard of AIDS. Those who reported having heard of AIDS were asked a number of questions about whether and how HIV and AIDS can be avoided. Virtually all women and men of all ages and all levels of education have heard of AIDS (Table 3.5). In addition, Table 3.5 shows that knowledge of methods to avoid HIV transmission is generally widespread in Rwanda. For example, 89 percent of women and 95 percent of men know that the chance of getting HIV can be reduced by using condoms. Similarly, 84 percent of women and 89 percent of men know that limiting sex to one faithful partner reduces chances of getting HIV.

Women and men age 50 and above are somewhat less likely to have knowledge of the various modes of prevention than younger people (Table 3.5). There is no significant variation in knowledge among respondents younger than 50. Similarly, women and men with no education are less likely than those with some schooling to be aware of various preventive methods. However, Table 3.5 does not show any clear pattern in knowledge according to wealth quintiles.

Table 3.5 Knowledge of AIDS

Percentage of women and men age 15+ who have heard of AIDS and percentage who in response to prompted questions, say that people can reduce the risk of the ADIS virus by using condoms every time they have sexual intercourse, and by having one sex partner who is not infected and has no other partners, by background characteristics, ESPHS Rwanda, 2011

Background characteristic	Women				Men			
	Has heard of AIDS	Using condoms[1]	Limiting sexual intercourse to one uninfected partner[2]	Number of respondents	Has heard of AIDS	Using condoms[1]	Limiting sexual intercourse to one uninfected partner[2]	Number of respondents
Age								
15-24	100.0	93.1	85.4	777	100.0	95.1	85.9	684
25-29	100.0	92.6	87.0	427	100.0	93.6	91.0	371
30-39	100.0	92.2	86.4	536	100.0	96.5	89.5	411
40-49	100.0	92.4	86.5	357	100.0	97.9	95.3	242
50-59	100.0	80.8	81.7	294	100.0	94.4	90.7	200
60+	99.4	60.5	65.2	223	98.2	88.7	87.7	148
Education								
No education	99.8	77.6	79.2	659	99.6	92.2	87.1	314
Primary	100.0	91.9	85.1	1,589	99.9	95.2	90.0	1,356
Secondary+	100.0	94.3	86.7	365	100.0	96.1	88.1	386
Wealth quintile								
Lowest	100.0	86.1	87.3	348	100.0	94.7	91.1	189
Second	99.7	87.7	83.4	488	99.6	92.2	89.6	328
Middle	100.0	88.2	84.0	661	99.7	93.7	87.3	483
Fourth	100.0	89.8	82.4	597	100.0	96.6	88.3	544
Highest	100.0	90.4	83.5	520	100.0	95.9	91.1	511
Total 15-49	100.0	92.7	86.2	2,097	100.0	95.5	89.2	1,708
Total 15+	99.9	88.6	83.9	2,613	99.9	94.9	89.2	2,056

[1] Using condoms every time they have sexual intercourse
[2] Partner who has no other partners

The ESPHS included questions to assess the prevalence of common misconceptions about HIV transmission and infection. Respondents were asked whether they think it is possible for a healthy-looking person to have the AIDS virus.[3] They were asked whether a person can get AIDS from mosquito bites, by supernatural means, or by sharing food with a person who has AIDS.

The data indicate that only a few people in Rwanda still have some misconceptions on how HIV is transmitted (Table 3.6): about 9 in 10 women and men know that a healthy-looking person can have the virus that causes AIDS and know that HIV cannot be transmitted by supernatural means or by sharing food with a person who has AIDS. However, misunderstandings about transmission through insects are more widespread; only 82 percent of women and 83 percent of men believe that HIV cannot be transmitted through mosquito bites. Overall, 70 percent of women and 73 percent of men are able to reject the two most common misconceptions about AIDS—that HIV can be transmitted by mosquito bites and that a person can become infected with the AIDS virus by sharing food with someone who is infected—and know that a healthy-looking person can have the AIDS virus.

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[3] The term "AIDS virus" is used in DHS surveys; to allow for comparisons we have used the same term in this survey.

Table 3.6 Comprehensive knowledge about AIDS

Percentage of women and men age 15+ who say that a healthy-looking person can have the AIDS virus and who, in response to prompted questions, correctly reject local misconceptions about HIV transmission or prevention, and the percentage with a comprehensive knowledge about AIDS by background characteristics, ESPHS Rwanda, 2011

Background characteristic	Percentage of respondents who say that:				Percentage who say that a healthy looking person can have the AIDS virus and who reject the two most common local misconceptions[1]	Percentage with a compre-hensive knowledge about AIDS[2]	Number of respondents
	A healthy-looking person can have the AIDS virus	HIV cannot be transmitted by mosquito bites	HIV cannot be transmitted by supernatural means	A person cannot become infected by sharing food with a person who has AIDS			
WOMEN							
Age							
15-24	85.1	87.4	95.3	91.7	70.9	60.4	777
25-29	93.7	81.8	95.2	94.9	75.0	65.2	427
30-39	92.8	83.9	94.7	91.2	74.9	63.7	536
40-49	92.5	79.6	94.0	90.9	71.4	59.2	357
50-59	90.3	75.9	90.0	87.4	65.9	52.0	294
60+	75.0	67.7	87.5	80.3	47.6	33.0	223
Education							
No education	82.0	69.2	86.0	81.4	52.4	41.6	659
Primary	90.4	84.8	95.9	92.6	73.6	62.3	1,589
Secondary+	94.3	90.9	98.2	98.1	85.7	72.0	365
Wealth quintile							
Lowest	83.5	81.1	94.6	86.9	63.9	55.7	348
Second	88.2	80.0	93.7	88.5	66.2	53.8	488
Middle	88.6	80.9	91.1	89.2	69.7	60.9	661
Fourth	89.4	79.5	93.5	91.0	68.9	56.4	597
Highest	92.4	87.4	96.7	96.3	78.9	63.8	520
Total 15-49	90.0	84.0	94.9	92.1	72.8	62.0	2,097
Total 15+	88.8	81.7	93.7	90.6	69.9	58.4	2,613
MEN							
Age							
15-24	85.5	87.7	95.2	91.6	71.0	60.0	684
25-29	93.6	78.2	97.4	91.1	68.8	59.7	371
30-39	95.4	84.7	98.0	95.8	80.1	71.3	411
40-49	96.4	80.5	96.9	94.9	78.1	73.8	242
50-59	95.2	74.7	93.0	88.2	70.5	62.7	200
60+	89.3	78.4	88.4	85.1	65.9	55.5	148
Education							
No education	89.2	73.1	92.8	87.1	62.5	52.7	314
Primary	90.1	81.9	95.5	91.3	70.4	62.5	1,356
Secondary+	98.2	92.7	98.6	98.2	89.9	77.0	386
Wealth quintile							
Lowest	92.1	81.2	91.7	88.1	70.0	61.3	189
Second	91.7	79.3	94.3	87.6	67.6	57.4	328
Middle	88.5	80.4	95.5	91.7	69.5	61.0	483
Fourth	90.3	82.4	97.0	93.0	72.0	62.8	544
Highest	95.1	87.5	96.7	95.3	81.2	72.4	511
Total 15-49	91.2	83.9	96.6	93.0	73.7	64.6	1,708
Total 15+	91.4	82.6	95.7	92.0	72.8	63.8	2,056

[1] Two most common local misconceptions: "HIV can be transmitted by mosquito bites." and "A person CAN become infected by sharing food with a person who has AIDS."
[2] Comprehensive knowledge means knowing that consistent use of condom during sexual intercourse and having just one uninfected faithful partner can reduce the chance of getting the AIDS virus, knowing that a healthy-looking person can have the AIDS virus, and rejecting the two most common local misconceptions about HIV transmission or prevention.

Table 3.6 also provides an assessment of the level of comprehensive knowledge of HIV prevention and transmission. Comprehensive knowledge is defined as: 1) knowing that both condom use and limiting sex partners to one uninfected person are HIV prevention methods; 2) being aware that a healthy-looking person can have HIV; and 3) rejecting the two most common local misconceptions—transmission through mosquito bites and by sharing food. According to the ESPHS results, 58 percent of women and 64 percent of men age 15 years and above have comprehensive knowledge of HIV prevention and transmission.

Men and women age 50 and above are less likely to have comprehensive knowledge about AIDS than their younger counterparts. The proportion with comprehensive knowledge about AIDS rises with increasing level of education. For men, the proportion with comprehensive knowledge about AIDS increases from 53 percent of men with no education to 77 percent of men with secondary education or more. Only 42 percent of women with no education have comprehensive knowledge of AIDS versus 72 percent of women with secondary or higher education. Finally, women and men in the highest wealth quintiles have better comprehensive knowledge of AIDS than those in the lowest wealth quintiles.

Educating people in the ways in which HIV can be transmitted from mother-to-child is critical to reducing mother-to-child transmission (MTCT) of HIV. To obtain information on these issues, respondents were asked if the virus that causes AIDS can be transmitted from a mother to a child during pregnancy, during delivery, and by breastfeeding (Table 3.7).

Table 3.7 Knowledge of prevention of mother-to-child transmission of HIV

Percentage of women and men age 15+ who know that HIV can be transmitted from mother to child during pregnancy, delivery and breastfeeding, by background characteristics, ESPHS Rwanda, 2011

Background characteristic	Women				Men			
	HIV can be transmitted during pregnancy	HIV can be transmitted during delivery	HIV can be transmitted during breastfeeding	Number of respondents	HIV can be transmitted during pregnancy	HIV can be transmitted during delivery	HIV can be transmitted during breastfeeding	Number of respondents
Age								
15-24	60.8	90.6	91.9	777	61.3	85.8	88.6	684
25-29	57.8	97.8	93.5	427	52.9	92.5	91.5	371
30-39	52.5	92.7	91.5	536	48.6	94.9	92.1	411
40-49	52.1	93.6	91.7	357	47.7	91.7	89.1	242
50-59	58.5	89.2	91.1	294	60.1	92.6	91.8	200
60+	60.2	81.9	83.1	223	55.6	82.8	82.5	148
Education								
No education	57.6	85.3	87.3	659	53.7	87.2	86.9	314
Primary	57.0	93.6	92.2	1,589	56.5	88.8	89.2	1,356
Secondary+	56.7	95.2	93.8	365	51.4	96.4	94.0	386
Wealth quintile								
Lowest	58.9	91.0	90.7	348	64.7	84.2	90.2	189
Second	57.0	90.4	90.5	488	55.5	89.5	87.4	328
Middle	56.2	90.3	91.0	661	52.2	85.6	87.3	483
Fourth	56.7	93.4	90.9	597	53.2	92.5	91.2	544
Highest	57.6	93.2	92.8	520	56.1	93.7	92.0	511
Total 15-49	56.6	93.1	92.1	2,097	54.5	90.3	90.2	1,708
Total 15+	57.1	91.7	91.2	2,613	55.1	90.0	89.8	2,056

Although more than 9 in 10 women and men know that HIV can be transmitted during delivery and by breastfeeding, only 57 percent of women and 55 percent of men reported that HIV can be transmitted during pregnancy. Knowledge about HIV transmission during pregnancy is slightly higher among the oldest and youngest women and men than among those aged 30-49, but there is no clear variation according to level of education and wealth quintiles. In contrast, knowledge of transmission during delivery and by breastfeeding is the highest among women aged 25-49 and men aged 25-39, among women and men with highest education and those in the highest wealth quintiles.

NETWORK SCALE-UP

<div style="text-align: right; font-size: 2em;">**4**</div>

4.1 NETWORK SCALE-UP METHOD

T he assumption behind the network scale-up method is that people's social networks are, on average, representative of the overall population (Bernard et al., 1991, 2010). For example, if a respondent knows 100 people, 2 of whom are sex workers, then we might estimate that 2 out of 100 people in the general population are sex workers. Combining that estimate with the total population size of the country, say 10 million, we could estimate that there are 200,000 sex workers in the country (2/100 * 10,000,000). This estimate can be improved by averaging over many respondents who will vary in their network sizes and number of sex workers known. This yields the following maximum likelihood estimator (Killworth et al., 1998):

$$\hat{e} = \frac{\sum_i m_i}{\sum_i \hat{c}_i} \bullet t \qquad (1)$$

Where $\hat{e}$ is the estimated size of the key population (such as sex workers or injecting drug users), m_i is the number of people in the key population known by respondent i, $\hat{c}_i$ is the estimated social network size of respondent i, and t is the total population size of the country.

The network scale-up method requires estimates of the network size of each respondent (the $\hat{c}_i$ in eq. 1). In the literature on social networks, the members of an individual's social network are referred to as his or her "alters." There are two preferred approaches for estimating the number of alters in someone's personal network: the summation approach and the known populations approach, both of which currently require about 15 to 30 questions per respondent (McCarty et al., 2001). Both methods have been found to produce similar results, but have different data requirements. The known populations method requires a number of populations of known size. The summation method, in contrast, requires a set of mutually exclusive and exhaustive relationship categories. These categories need to be developed on a country-by-country basis (McCarty et al., 2001).

The network scale-up method also requires that respondents are asked whether they know anyone who injects drugs, sells or buys sex, or is a man who has sex with other men. When aggregated over all respondents, this variable provides the numerator for equation 1.

The method estimates how many people the respondent knows who are in the key populations among all the people that they know in Rwanda. The result is a proportion of the total population that is in the key population. Thus the resulting proportion is multiplied by the entire population of the country, and not just the female population or the adult population to estimate the key population size.

Definition of what it means to know someone

In the network scale-up method, the interviewer asks the respondent how many people in the key population he or she knows. There are many ways to define what it means "to know" someone, ranging from very strong relationships to very weak relationships. Because it was not known which definition of "to know" would be optimal, we used two definitions of what it means to know someone. The basic definition of "to know" used in the ESPHS was:

- people you know by sight AND name, and who also know you by sight and name. In other words, you should not consider famous people that you know about, but who do not know about you;

- people you have had some contact with — either in person, over the phone, or on the computer — in the past 12 months; and

- people of all ages who live in Rwanda.

The acquaintance must meet all three of these criteria to be counted in the respondent's personal network.

In addition, we tested a second definition of "to know" which was:

- people you know by sight AND name, and who also know you by sight and name. In other words, you should not consider famous people that you know about, but who do not know about you;

- people you have shared a meal or drink with in the past 12 months. These could be family members, friends, co-workers, or neighbours. You should include meals or drinks taken at any location, such as at home, at work, or in a restaurant; and

- people of all ages who live in Rwanda.

Again, the acquaintance must meet all three of the criteria to be counted in the respondent's personal network. Half the respondents were interviewed using the basic definition and half were interviewed using the meal definition. See the questionnaire in Appendix D for examples of the questions.

Potential biases and limitations to network scale-up

Responses to questions such as "*How many people do you know who are drug injectors*?" are critical for size estimates (these are the m_i in eq. 1), but may be inaccurate for a number of reasons:

1) Respondents may know people who are drug injectors, but might not know that they are drug injectors, a phenomenon called *information transmission error* or *masking* (Shelley et al., 1995, 2006; Salganik et al., 2011). Because the populations under study are often stigmatized, failure to adjust for the information transmission error may lead to an underestimate of unknown size.
2) Respondents may know people who are drug injectors, but may be unwilling to provide this information because of the possible stigma involved. This is called *response bias*, and would also lead to an underestimate of that population's size.
3) Drug injectors might, on average, have smaller networks than the general population making them less likely to be counted by individuals reporting on people they know. This would lead to an underestimate. On the other hand, if drug injectors had, on average, larger networks than the general population, it would lead to an overestimate (Salganik and Feehan, 2009).

Further discussions on these biases are included in Chapter 4.

In addition, there are a number of limitations to the method, including:

- There is evidence that respondents *systematically over-recall* how many people they know in small subpopulations and *under-recall* how many people they know in large subpopulations (Killworth et al., 2003; Zheng et al. 2006). This could lead to either a positive or negative bias in the estimates.

- The subpopulations of interest are often not *randomly distributed* in the general population, meaning that some respondents have a higher propensity to know people in these subpopulations (Killworth et al., 1998; Zheng et al., 2006). If the sampling frame is incomplete and systematically excludes those more likely to know members of the hidden population (e.g., truck drivers, soldiers, etc.), then an underestimate would result. However, if the sampling frame excludes those less likely to know members of the hidden populations (e.g., extremely rural people), then an overestimate would result. The likely magnitudes of these problems are unknown.

- If the subpopulation in question is *extremely rare*, scale-up estimates may be susceptible to false positives from a small fraction of respondents resulting in an overestimate. More generally, this problem is sometimes referred to as the "*needle in a haystack*" problem and is common in survey-based approaches to estimating rare events (Hemenway, 1997).

4.2   PERSONAL NETWORK SIZE

Estimates of personal network size, the number of people known by each respondent, are necessary for the network scale-up method. The two approaches most appropriate for estimating personal network size from a survey are the *known population* approach and the *summation* approach (Killworth et al., 1998; McCarty et al., 2001). We included both approaches in the ESPHS. Unlike the definition of "to know," however, each respondent answered the questions needed for both the known population approach and the summation approach. Therefore, overall, we have four different estimates of personal network size. From half the respondents we have known population and summation estimates using the "basic" definition, and for the other half of the respondents we have known population and summation estimates using the "meal" definition. See Figure 2.1 for a diagram of the survey structure.

Note that in this chapter we will present both weighted and unweighted estimates. When describing the sample, we will present unweighted results, and when making estimates about the population of Rwanda we will present weighted results.

Known population approach

To estimate personal network size using the known population approach, each respondent is asked the number of people he or she is connected to in populations of known size. For example, a respondent is asked: "How many people do you know named Nsabimana?" If the respondent reports knowing one Nsabimana, we combine that with the fact that there were about 50,000 people named Nsabimana living in Rwanda, to estimate that the respondent knows about 1 out of 50,000 of all Rwandans. If there were 10 million people living in Rwanda, we would estimate that the respondent is connected to about 200 people (1/50,000 * 10 million). Note that the same logic of estimation applies using either the basic definition or the meal definition. To improve the accuracy of this estimate, we can ask about many populations of known size (Killworth et al, 1998).

The groups that were used and their sizes are presented in Table 4.1. Following standard practice, we have top-coded all responses at 30 (Zheng et al., 2006; McCormick et al., 2010; Salganik et al., 2011), which means that for all responses over 30 we have recoded the response to be 30. This affected 5 percent of respondents and 0.2 percent of responses. Mean responses (unweighted) for all groups are presented in Table 4.1.

Table 4.1 Known populations used in the ESPHS study

Description, size, and data source for the known populations used in the known population approach of network size estimation, ESPHS Rwanda, 2011.

Category of population	Size	Source	Mean number of connections (basic definition of "to know")	Mean number of connections (meal definition of "to know")
People named:				
		National Identification Project		
Bizimana	38,497	Database (ID database)	1.1	0.5
Mukamana	51,449	ID database	1.3	0.5
Mukandekezi	10,520	ID database	0.5	0.2
Murekatete	30,531	ID database	0.9	0.4
Mukandayisenga	35,055	ID database	0.7	0.3
Ndagijimana	37,375	ID database	0.9	0.4
Ndayambaje	22,724	ID database	0.9	0.4
Nsabimana	48,560	ID database	1.2	0.5
Nsengimana	32,528	ID database	0.9	0.4
Nyirahabimana	42,727	ID database	0.8	0.3
Nyiraneza	21,705	ID database	0.8	0.3
Twahirwa	10,420	ID database	0.7	0.3
Teachers	47,745	Ministry of Educ.	3.4	1.2
Priests	1,004	Catholic Church	0.3	0.1
Nurses or Doctors	7,807	Ministry of Health	1.3	0.4
Male Community Health Worker	22,000	Ministry of Health	1.4	0.8
Incarcerated people	68,000	ICRC 2010 report	1.5	0.4
Divorced Men	50,698	RDHS (2005, 2007, 2010)	0.5	0.3
Widowers	36,147	RDHS (2005, 2007, 2010)	0.9	0.6
Women who smoke	119,438	RDHS (2005)	2.2	1.0
Muslim	195,449	RDHS (2005, 2007, 2010)	2.2	1.1
Women who gave birth in the past 12 months	256,164	RDHS (2010)	2.8	2.0

The mean estimated personal network size in Rwanda using the known population approach is 251 under the basic definition and 108 under the meal definition. Figure 4.1 plots the estimated distribution in Rwanda under both connection definitions. The estimates using the basic definition are qualitatively similar to estimates from previous studies in the United States and Brazil (McCarty et al. 2001; Zheng et al., 2006; McCormick et al. 2010; Salganik et al., 2011). We cannot compare the results under the meal definition with other studies because it has not been used previously.

Two patterns suggest that responses to questions such as "How many people do you know named Nsabimana?" are reasonable. First, as the size of the group increases the mean number of people respondents know in that group increases. This holds true for both the meal definition and the basic definition (Figure 4.2). Further, for each group, the responses under the meal definition are smaller than the responses under the basic definition which is expected as the meal definition of "to know" is restricted to alters that the respondent is likely to know better (Table 4.1).

Figure 4.1 Estimated distribution of network sizes from the known population method, using the basic definition and the meal definition of a connection, ESPHS 2011
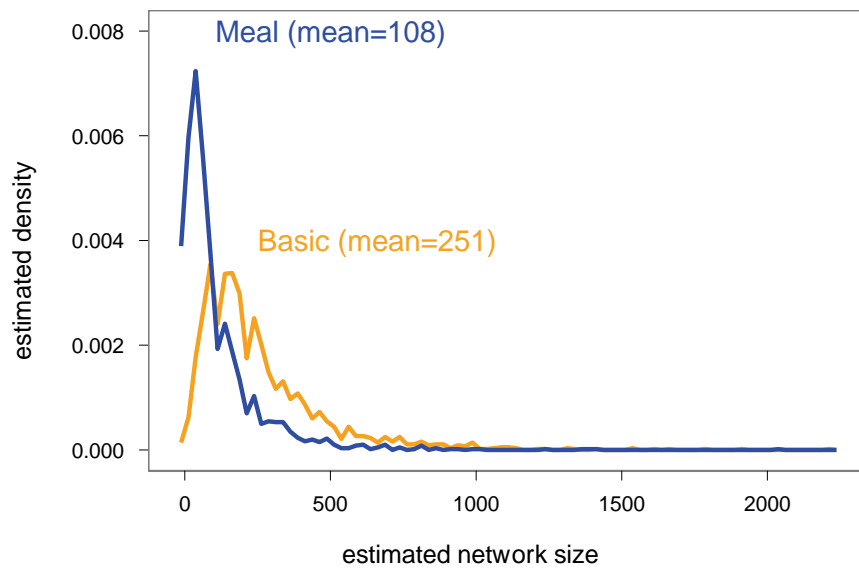
Note: On average, the basic definition results in a larger network than the meal definition. Sampling weights were used in producing these estimates.

Figure 4.2 Average number of reported connections and true subpopulation size, ESPHS 2011
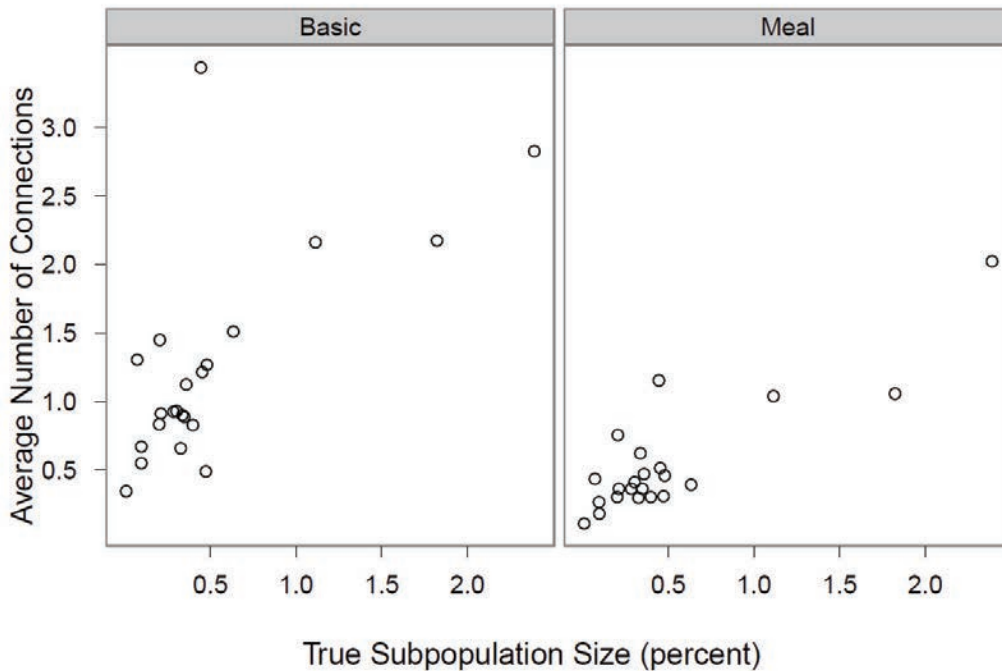
Note: The left-hand panel shows the results for the basic definition of a connection, while the right-hand panel has the results for the meal definition. In both cases, the average number of reported connections has a strong positive relationship with the true subpopulation size. These results are unweighted, and individual responses to each question were top-coded at 30**.**

Summation approach

To estimate personal network size using the summation approach, one attempts to create a set of exhaustive and mutually exclusive relationship types (McCarty et al., 2001). Each respondent is asked the number of people he or she is connected to in each category. For example, a respondent is asked: "How many people do you know who are your co-workers?"

Through a series of free listing activities and focus groups, our study developed 28 relationship types appropriate to the Rwandan context. A full list of these groups is presented in Table 4.2.

Table 4.2 Average number of persons known (Summation approach)

Categories used for the summation approach of estimating personal network size, along with the average number of reported connections using the basic and meal definitions, ESPHS Rwanda, 2011

Category of population	Average number of persons known	
	Basic definition of "to know"	Meal definition of "to know"
Immediate family	10.4	7.7
Larger family	10.6	4.8
In-law family	6.1	3.0
Best friends	3.3	3.1
Ordinary friends	17.1	7.1
Sport mates	2.2	1.2
People who have the same problems as you	3.0	1.8
People that you meet at church	21.0	7.3
Neighbors	19.1	5.3
People with whom you do umuganda (community work)	13.5	2.3
People met at parties or weddings	7.3	5.7
People known from sharing taxis or bus	1.2	0.5
Coworkers	4.0	2.2
Former coworkers	3.1	1.2
Training providers	0.8	0.4
People met at trainings	2.9	1.7
People that you join at non-family meetings	8.2	2.5
Classmates	7.6	2.3
Former teachers	1.5	0.3
Medical providers	0.5	0.1
Service providers	1.9	0.8
Benefactors	1.2	0.8
People that you assist or help	1.5	1.1
People met at the market	5.4	1.9
Favorite sellers	2.0	0.8
People from your cooperatives	7.2	3.1
Policemen /Soldiers	1.8	0.7
Leaders (village leaders, church leaders, work leaders)	3.9	1.4
Average total network size (using the Summation approach)	168	71
Number of respondents	2,236	2,433

Using the summation approach, personal network size is estimated by summing the responses of each respondent. The mean estimated personal network size in Rwanda using the summation approach is 168 for the basic definition of a connection, and the mean estimated personal network size for the meal definition is 71. We note that, as one would expect, for each category, the responses under the meal definition are smaller than the responses under the basic definition (Table 4.2). Figure 4.3 plots the estimated distribution of personal network size in Rwanda according to the summation approach under both definitions of "to know." Estimated network sizes by demographic characteristic are presented in Table 4.3. The summation estimates are qualitatively similar to the known population estimates, and a more precise comparison of the estimates will be presented below.

Figure 4.3 **Estimated distribution of network sizes from the summation approach, using the basic definition and the meal definition of a connection, ESPHS 2011**

Meal (mean=71)

Basic (mean=169)
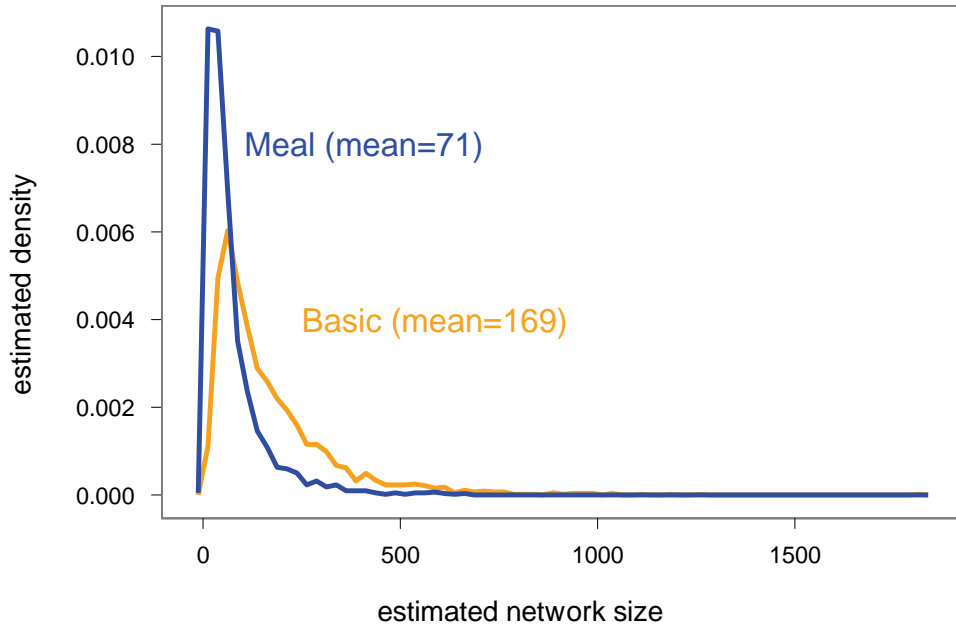
Note: On average, the basic definition of "to know" results in a larger network than the meal definition. Sampling weights were used in producing these estimates.

Comparing personal network size estimates

A comparison of Figures 4.1 and 4.3 shows that both approaches produce qualitatively similar results at the population-level. At the individual-level, the results are reasonably consistent as well. For the meal definition, the correlation between the known population approach and summation estimates is 0.63, and for the basic definition the correlation is 0.63. These results are similar to earlier studies that found correlations between these two estimates of 0.56 in the United States (McCarty et al., 2001) and 0.49 in Brazil (Salganik et al., 2011). Figure 4.4 shows scatter plots of individual level estimates.

Figure 4.4 Individual-level comparison between degree estimates produced using the known population approach (x axis) and the summation approach (y axis), ESPHS 2011
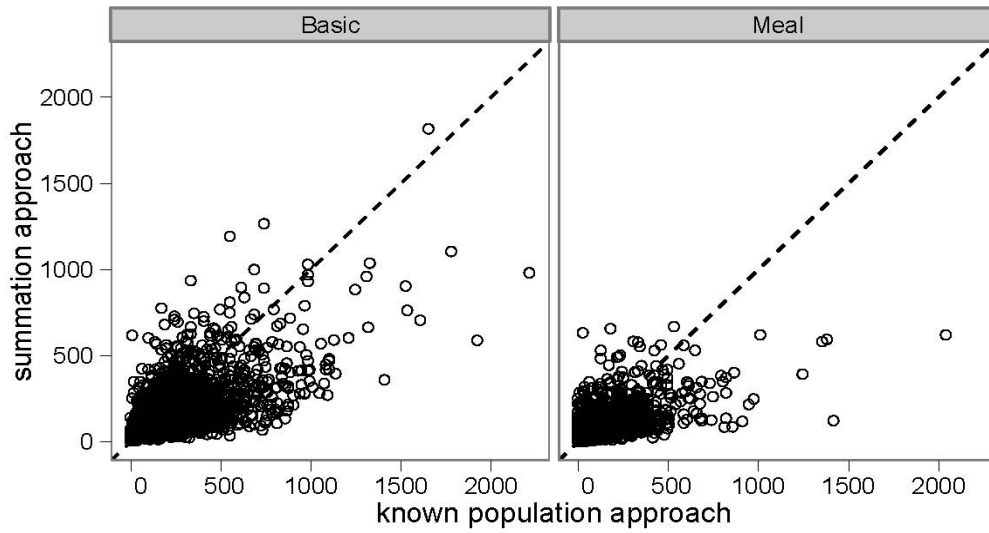
Note: Sampling weights not used in this plot.

Table 4.3 Average network size by selected characteristics

Weighted estimated mean personal network size for the known population approach and summation approach under the basic and meal definitions of a connection, by background characteristics, ESPHS Rwanda, 2011

Background characteristics	Known population approach		Summation approach	
	Basic definition	Meal definition	Basic definition	Meal definition
Sex				
Male	301.8	141.3	222.8	94.9
Female	212.3	81.8	126.7	52.5
Age				
15-24	226.8	86.6	135.9	56.3
25-34	282.1	119.0	203.5	82.5
35-44	277.2	132.7	188.9	84.4
45-54	255.7	125.7	178.9	80.0
55-64	220.9	114.0	151.2	68.8
65+	180.3	65.9	109.4	49.8
Marital status				
Divorced/separated	220.5	103.7	126.4	67.3
Living together	236.7	99.7	170.2	59.5
Married	282.4	128.7	201.6	85.9
Never Married	239.3	95.8	148.1	66.3
Widowed	194.2	80.2	115.0	48.4
Residence				
Other Provinces	250.2	107.8	167.8	70.8
Kigali	260.0	111.4	174.9	75.2
Education				
No education	165.3	75.0	122.6	53.4
Primary	252.0	108.4	169.7	69.2
Secondary+	351.4	154.3	219.9	105.8
Wealth quintile				
Lowest	187.4	77.7	126.9	52.6
Second	211.4	95.8	132.3	60.8
Third	217.4	109.3	148.2	63.6
Fourth	274.2	116.7	200.3	81.7
Highest	320.6	125.6	201.6	88.6

Validation test and choosing a preferred estimate

While it is reassuring that, for a given definition of a connection, the two approaches produce similar results, quantitatively the estimates are different. Therefore, we need to choose which personal network size definition and methodology to use. To make this choice, we follow the procedure used in Salganik et al. (2011). First, we use these methods to estimate the sizes of the known populations (Table 4.1). Then, we compare the estimated population size to the actual population size. Results are presented in Figure 4.5.

Figure 4.5 Internal validity checks, which assess the accuracy of the different approaches of network size estimation in predicting the sizes of the known subpopulations, ESPHS 2011
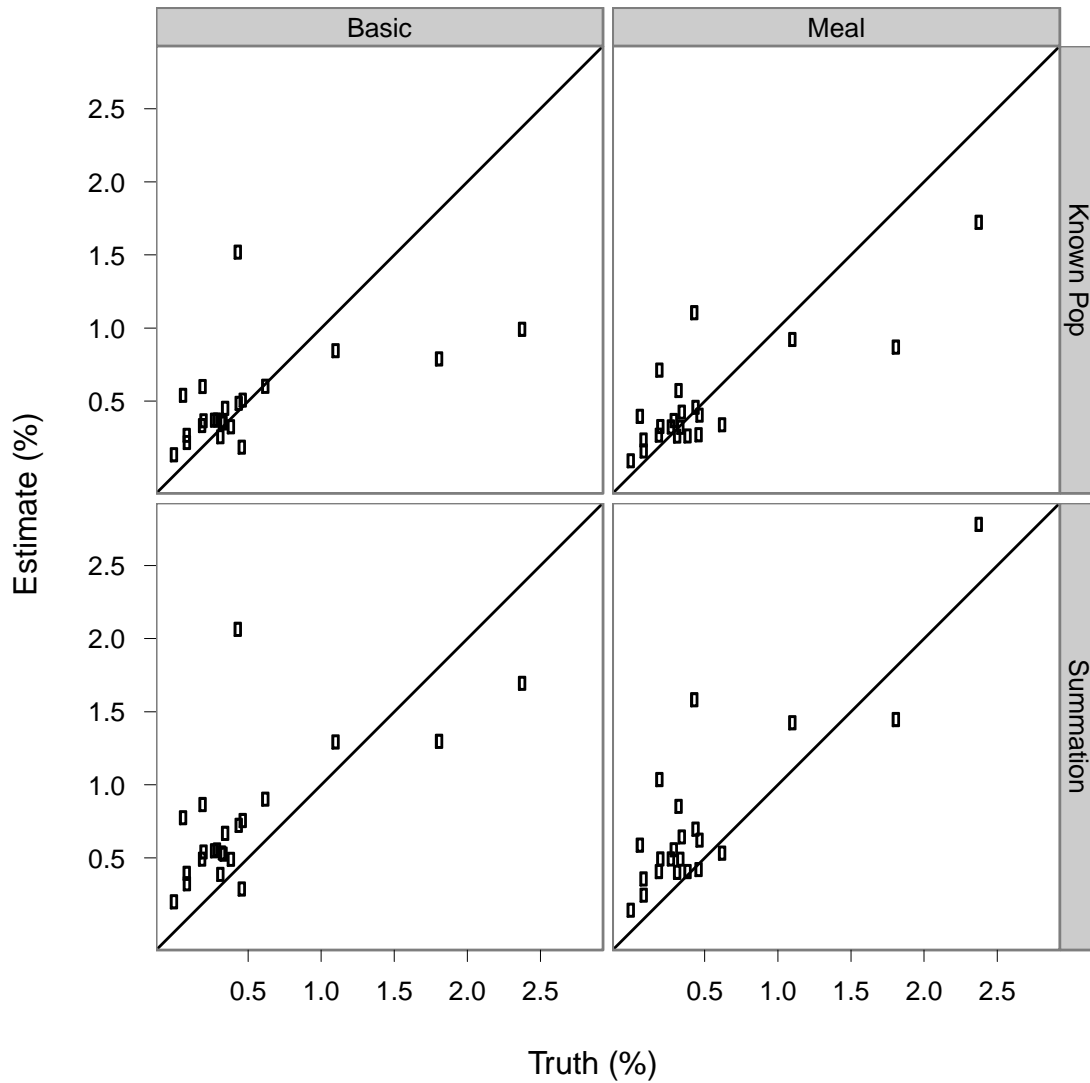
Note: The top row shows the results from the known population approach, while the bottom row shows results from the summation approach; the left-hand column shows results from the basic definition of a connection, while the right-hand column shows results from the meal definition of a connection. Sampling weights were used in producing this plot.

We calculated several summary measures to describe the distance between the estimated population sizes and the true population sizes: average relative error, root mean square error, and mean absolute error (Figure 4.6).

Figure 4.6 Average relative error, root mean square error, and mean absolute error between estimated population size and true population size, for populations of known size, ESPHS 2011
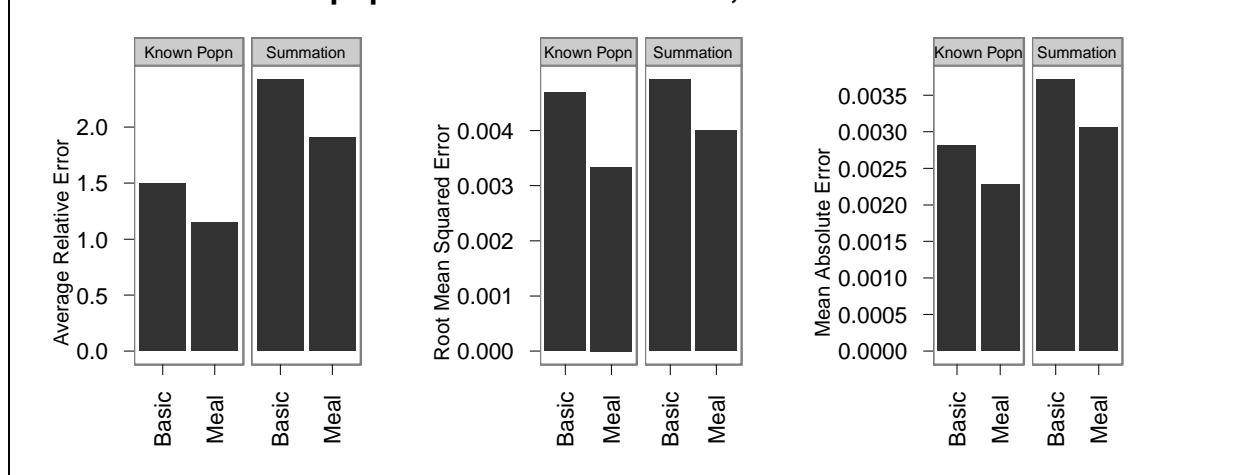
Each of these three methods summarizes the prediction error in a different way; the biggest difference between them is that average relative error weights errors in estimating all of the populations equally, regardless of their size, while root mean square error and mean absolute error both weight larger populations more heavily. Based on these three measures, the meal definition outperforms the basic definition and the known population approach outperforms the summation approach. Given this pattern, and given previous results from Brazil which also showed better performance for the known population approach than the summation approach (Salganik et al., 2011), we use the known population approach under the meal definition when estimating the sizes of the key populations.

4.3 ESTIMATED SIZE OF KEY POPULATIONS

Section 4.2 describes how the personal network size was calculated. In this section the personal network size is used as a denominator to estimate the proportion of that network that is composed of persons with a behaviour that puts them at risk for HIV. This proportion is then used to estimate the size of the key populations at higher risk of HIV infection.

Respondents were asked how many women or men they knew in the key populations (see Appendix D for the actual wording). Specifically, the respondents were asked how many of their acquaintances were prostitutes; were men who had sex with other men; injected drugs; or paid for sex. The results presented in this chapter are based on the respondent reporting on his/her perception of the acquaintance's behaviour. Some respondents might not provide accurate responses to these questions because of stigma surrounding these behaviours. In addition, respondents might not know if their acquaintances have these behaviours because the behaviour is hidden. These two potential biases are discussed later in this section.

Twenty-one percent of the 4,669 respondents reported know-ing at least one person in the key populations (Table 4.4). Sixteen percent knew at least one sex worker, 11 percent knew at least one client of a sex worker, one percent knew at least one man who had sex with other men, and less

Table 4.4 Percentage of respondents reporting that they know at least one person in the key populations

Percentage of respondents who know at least one acquaintance in the key populations, ESPHS Rwanda 2011

Key populations	Percentage who know at least one acquaintance in the key population:
Female sex workers	16
MSM	2
IDU	1
Clients	11
Any of the above	21
Number of respondents	4,669

than 1 percent knew at least one person who injected drugs. Respondents are thus willing to share this information with interviewers, although the accuracy of this information is not known.

People usually have similar characteristics to their acquaintances. We might expect to see higher levels of sex work or injection drug use among the more wealthy and urban population since purchasing drugs to inject and buying sex require financial resources that are more available to wealthy persons.

Table 4.5 shows the average number of acquaintances in the key populations by background characteristics of the respondents. Using both the basic definition of "to know" and the meal definition, the results confirm the expected trends. Young, urban, male respondents are more likely to have acquaintances who sell sex, who are men who have sex with men, or who buy sex. Wealthy respondents are more likely to know female sex workers, injecting drug users, and clients of sex workers.

Marital status seems to have mixed association with having an acquaintance in the key populations. The numbers of injecting drug users and MSM who were known by the respondents were small, so the results for these populations should be interpreted with caution.

Table 4.5 Average number of known key populations at higher risk

Average number of known key populations at higher risk according to key population and type of questionnaire, by background characteristics, ESPHS Rwanda, 2011

Background characteristics of respondents	Basic definition of "to know"					Meal definition of "to know"				
	Average number of known sex workers	Average number of known men having sex with men	Average number of known injecting drug users	Average number of known clients of sex workers	Number of respondents	Average number of known sex workers	Average number of known men having sex with men	Average number of known injecting drug users	Average number of known clients of sex workers	Number of respondents
Sex										
Women	0.56	0.02	0.08	0.40	1,261	0.26	0.02	0.00	0.08	1,352
Men	0.92	0.05	0.01	1.00	975	0.46	0.02	0.01	0.70	1,080
Age										
15-24	0.54	0.03	0.03	0.39	690	0.28	0.02	0.01	0.33	771
25-29	1.32	0.07	0.04	1.43	380	0.57	0.01	0.01	0.56	417
30-39	0.81	0.03	0.11	0.99	453	0.43	0.05	0.00	0.50	494
40-49	0.61	0.02	0.07	0.38	297	0.39	0.01	0.00	0.26	302
50-59	0.61	0.02	0.00	0.33	240	0.12	0.03	0.00	0.14	253
60+	0.18	0.00	0.02	0.11	176	0.13	0.00	0.00	0.10	195
Marital status										
Never married	0.73	0.04	0.03	0.70	739	0.34	0.02	0.02	0.49	798
Married	0.63	0.03	0.05	0.63	884	0.32	0.01	0.00	0.26	946
Living together	1.13	0.05	0.04	0.80	328	0.46	0.07	0.00	0.43	395
Divorced/separated	0.77	0.02	0.09	0.80	105	0.43	0.01	0.00	0.31	82
Widowed	0.31	0.00	0.10	0.25	180	0.22	0.00	0.00	0.14	212
Residence										
Kigali City	1.17	0.08	0.08	0.88	280	0.56	0.03	0.02	0.90	270
Other Provinces	0.65	0.02	0.05	0.63	1,956	0.32	0.02	0.00	0.29	2,163
Education										
No education	0.38	0.01	0.04	0.25	467	0.25	0.02	0.00	0.18	506
Primary	0.75	0.04	0.06	0.52	1,379	0.36	0.01	0.00	0.34	1,566
Secondary+	1.00	0.04	0.02	1.64	390	0.43	0.09	0.03	0.68	360
Wealth quintile										
Lowest	0.31	0.03	0.00	0.17	229	0.20	0.00	0.00	0.30	308
Second	0.40	0.01	0.06	0.43	393	0.32	0.02	0.00	0.23	422
Middle	0.56	0.03	0.03	0.33	536	0.31	0.01	0.00	0.27	608
Fourth	0.80	0.04	0.09	0.80	564	0.38	0.00	0.00	0.34	577
Highest	1.21	0.05	0.04	1.23	514	0.45	0.07	0.02	0.61	517
Total	0.717	0.032	0.050	0.659	2,236	0.345	0.022	0.006	0.355	2,433

The average number of individuals in each category is lower for the meal definition of "to know" than the basic definition. This is to be expected because the number of people a respondent shared a meal with in the past 12 months will always be smaller than the number of people he or she had contact with in the past 12 months.

Table 4.6.1 provides the estimated proportion of the total population in the key populations using the two different definitions for acquaintances for the known populations approach. Table 4.6.2 presents the results for the summation approach. The average number of persons known in the key populations is divided by the average network size of the respondents to estimate the proportion of the population in each key population. Caution should be taken when interpreting these proportions since they are the proportion of the full population. (Keep in mind that the personal network size, the denominator, is based on all people that the respondent knows regardless of sex or age.)

The estimated proportions were fairly similar between the two definitions of "to know." This was the case for both the known populations approach and the summation approach. The meal definition is likely to include acquaintances the respondent knows better than the acquaintances included in the basic definition and thus the answers might be more accurate.

It is interesting to note that the proportion of the population who are female sex workers and the proportion who buy sex from female sex workers are similar. We would expect that the number of clients would be higher than the number of female sex workers. The 2010 Behavioural Surveillance Survey of street and venue-based sex workers found that 46 percent of sex workers had 3 to 5 sex partners per week (RBC, 2010). If these were different partners we would expect there to be more clients than sex workers.

Table 4.6.1 Estimated proportion of the total population in key populations using known populations approach, ESPHS 2011

Key populations	Average number of acquaintances in the key population		Estimated proportion of the total population in the key population	
	Basic definition of "to know"	Meal definition of "to know"	Basic definition of "to know"	Meal definition of "to know"
Sex workers	0.7167	0.3451	0.29%	0.32%
MSM	0.032	0.0219	0.01%	0.02%
IDU	0.0497	0.0062	0.02%	0.01%
Clients	0.6587	0.3554	0.26%	0.33%
Network size	251	108	-	-

Table 4.6.2 Estimated proportion of the total population in the key populations using summation approach, ESPHS 2011

Key populations	Average number of acquaintances in the key population		Estimated proportion of the total population in the key population	
	Basic definition of "to know"	Meal definition of "to know"	Basic definition of "to know"	Meal definition of "to know"
Sex workers	0.7167	0.3451	0.43%	0.49%
MSM	0.0320	0.0219	0.02%	0.03%
IDU	0.0497	0.0062	0.03%	0.01%
Clients	0.6587	0.3554	0.39%	0.50%
Network size	168	71	-	-

Adjustments

As described earlier in this chapter in the section on *Potential biases and limitations to network scale-up,* there are a few adjustments that have been proposed to overcome the expected biases. In this survey, stigmatization might lead to under-reporting because of two biases. First, an individual with a high-risk behaviour might not tell his or her acquaintances about this risky behavoiur, resulting in *information transmission error* (Bernard et al., 2010).

Second, some respondents might be embarrassed to admit that they know people with high-risk behaviours, resulting in a *response bias* (Bernard et al., 2010).

Researchers are currently developing adjustments to overcome these biases (Salganik and Feehan, 2009, Paniotto 2009, Salganik et al., 2011). Potential adjustments for the information transmission error have been used previously (Salganik et al., 2011). During the planning of the ESPHS, it was believed that a measure of the information transmission error would be collected during a behavioural surveillance survey among MSM in early 2011. However, due to a delay in the behavioural surveillance survey, the results are not available for this analysis.

A pilot study to measure the information transmission rate (in preparation for the behavioural surveillance survey) was conducted in Kigali in late 2010. Only 17 respondents were included in the pilot study and this group is not representative of the MSM population in Rwanda. In the pilot study, men who have sex with other men were asked how many of their acquaintances knew that they had sex with other men. Among the men in the study, fewer than 20 percent reported that their acquaintances knew of their behaviour (Feehan and Salganik, 2011). The men reported that the acquaintances that they shared a meal or drink with in the past 12 months were more likely to know of their behaviour than those with whom they had not shared a meal in the last 12 months. These results suggest the network scale-up estimates for MSM are significant underestimates. But, given the limited nature of this pilot study, we cannot speculate as to the exact magnitude of this underestimate.

The other behaviours among the key populations, selling and buying sex, and injecting drugs, are likely to also have some information transmission error since the behaviours are not publically evident and often not discussed among acquaintances. Future studies need to include a measure of the information transmission rate so that an adjustment factor can be used to account for the underestimate due to information transmission error (Salganik et al., 2011).

The response bias is more difficult to measure since levels of stigma are difficult to quantify and the relationship between group stigma and survey respondents' reports is not known. A variation of a method to estimate this potential bias was included in the ESPHS. The method assumes that it is possible to create a rough approximation of the stigma or level of respect of a key population by measuring the level of respect the community holds for that key population in relation to other populations. A set of questions was asked of respondents in order to estimate the level of stigma that the population holds against individuals in the key populations.

First, questions were asked about how much people in the community respected unstigmatized individuals (doctors, civil servants). These questions were followed by questions about potentially stigmatized individuals. Finally, respondents were asked how much people in their community respected individuals in the key populations. These results could be used to create a respect index; based on the differentiation in the "respect" index the response rate can be adjusted (Paniotto, 2009).

Virtually all respondents reported their communities were not ashamed at all of being a doctor or nurse or of being a civil servant (Table 4.7). Over 99 percent of respondents said they were very ashamed of men who had sex with men. Similarly 95, 97 and 98 percent of respondents were ashamed of persons who inject drugs, men who pay for sex, and women who sell sex, respectively.

There are very high levels of stigma towards individuals in the key populations at increased risk of HIV infection. Therefore, respondents are likely to underreport knowing individuals in these populations due to the stigma attached to these populations.

Table 4.7 Percentage of respondents reporting on how people in their community feel about different populations, ESPHS 2011

	Percentage not ashamed at all	Percentage somewhat ashamed	Percentage very ashamed
Being a doctor or nurse	99.7	0.2	0.1
Being a civil servant	99.7	0.1	0.2
People who inject drugs	0.5	3.8	95.4
Men who have sex with other men	0.1	0.6	99.2
Men who pay for sex	0.4	1.8	97.8
Women who sell sex	0.3	1.1	98.6

This measure was not detailed enough to create an index or an adjustment factor. The number of categories of stigma needed to be increased from three to five or seven, to get a better gradient of the lack of respect for the different populations. Second, the lack of a neutral category, or a category that was obviously a disrespected population (other than the key populations) in society made it difficult to create relative values. Finally, the relationship between measured stigma and respondents' reports needs to be understood. However, the results clearly show that the key populations are highly stigmatized, and thus respondents are likely to hide their acquaintance with persons in these populations. This response bias suggests the estimates from network scale-up will be underestimates.

Calculating uncertainty bounds

All surveys that do not cover every person in the population have some degree of uncertainty in the results due to sampling. This uncertainty is summarized in sampling errors that are provided and described in Appendix A of this report. In addition, there is uncertainty due to the network scale-up methodology. Measures of uncertainty due to the network scale up methodology are under development. To present the estimated uncertainty due to the sampling design we have used the 95 percent confidence intervals (CIs) to calculate estimated uncertainty bounds for the size estimates.[4]

Appendix B provides an uncertainty bound for the average number of people in the key populations and for the average network size for the summation approach. No confidence interval was calculated for the average network size for the known population approach. Assuming that the network size from the summation approach will have a sampling error similar to the known population approach, we have applied the proportional difference between the low bound and the estimate, and the high bound and the estimate, from the summation approach to the estimate of personal network size from the known population.

The CIs from Appendix B and the estimated CIs for the known population network size are used to calculate the uncertainty bounds for the proportion of the population in each of the key populations. For example, the *low* CI for the average number of people reported to be sex workers (the numerator) is divided by the *high* CI for the average network size using the known population approach (the denominator) to get the low estimate of the proportion who are sex workers. Similarly, the high CI for the numerator is divided by the low CI for the denominator to estimate the high bound. This was calculated for both the known populations approach and the summation approach. These bounds are conservative estimates.

The uncertainty bound for the proportion was then multiplied by the total population of Rwanda to calculate the low and high range values of the number of people in each of the key populations.

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[4] Note that we do not refer to the uncertainty bounds as 95 percent confidence intervals since they are only rough approximations of the uncertainty. Also, note that we cannot currently quantify the uncertainty introduced by the many possible types of non-sampling error.

Estimated population sizes

The Rwanda National Institute of Statistics estimates that the total population of Rwanda in 2011 was 10,714,792 (NISR, 2009). As described earlier, the method estimates the average number of people known in each key population. In addition the method estimates how many people in all of Rwanda the respondent knows. Thus the result is the proportion of all people in Rwanda who are in the key population. Since the proportion relates to all people, old and young, male and female, the national population is applied to each of the proportions to determine the estimated size of the key populations.

Using the personal network size from the known populations approach and the meal definition, the estimated number of female sex workers in Rwanda is between 25,000-45,000, the estimated number of MSM is between 100-4,700, the estimated number of IDU is between 100-1,200, and the estimated number of clients of female sex workers is between 25,000-47,000 (Tables 4.8.1 And 4.8.2).

The basic definition gives slightly lower estimates, again this is assumed to be because individuals are more familiar with people they have had a meal with then those they have simply had contact with in the past 12 months.

The summation approach gives higher estimates of the populations. As described earlier, the results from summation approach are not as reliable as the results from the known populations approach.

Table 4.8.1 Estimated percentage of the key populations among the total population of Rwanda and estimated size of the key populations, using known populations approach, ESPHS 2011

	Estimated percentage of the key populations among the total population of Rwanda				Estimated size of the key populations			
	Basic definition of "to know"		Meal definition of "to know"		Basic definition of "to know"		Meal definition of "to know"	
	Low	High	Low	High	Low	High	Low	High
Sex workers	0.22%	0.36%	0.23%	0.42%	23,000	39,000	25,000	45,000
MSM	0.01%	0.02%	0.00%	0.04%	800	2,100	<100	4,700
IDU	0.01%	0.04%	0.00%	0.01%	600	3,800	<100	1,200
Clients	0.14%	0.40%	0.23%	0.44%	15,000	43,000	25,000	47,000

Note: NISR projected total population in 2011: 10,718,378

Table 4.8.2 Estimated percentage of the key populations among the total population of Rwanda and estimated size of the key populations, using summation approach, ESPHS 2011

	Estimated percentage of the key populations among the total population of Rwanda				Estimated size of the key populations			
	Basic definition of "to know"		Meal definition of "to know"		Basic definition of "to know"		Meal definition of "to know"	
	Low	High	Low	High	Low	High	Low	High
Sex workers	0.32%	0.54%	0.36%	0.64%	35,000	58,000	38,000	68,000
MSM	0.01%	0.03%	0.00%	0.07%	1.100	3,100	<100	7.100
IDU	0.01%	0.05%	0.00%	0.02%	900	5,700	<100	1,900
Clients	0.21%	0.60%	0.35%	0.67%	22,000	64,000	38,000	72,000

Note: NISR projected total population in 2011: 10,718,378

4.4   ROBUSTNESS CHECKS

In this section we present results describing the stability of our estimates. These stability checks are divided into two main parts: 1) robustness checks to assess how decisions that were made affected the final results; and 2) bounding checks to assess how sensitive the estimates are to unmeasured social factors. All comparisons are made to our preferred estimate based on the known population approach under the meal definition of "to know."

Check 1: Top-coding

Previous scale-up studies have top-coded known population approach responses at 30, in order to prevent a few extreme results from exerting undo influence on estimates (Zhang et al., 2006; McCormick et al., 2010; Salganik et al., 2011). Data are top-coded when all of the responses that were values over 30 are recoded to be 30. Throughout the report, top-coded results were presented. Figure 4.7 plots the size of the four key populations with both top-coded and not top-coded responses.

Figure 4.7 **Top-coded and not top-coded size estimates for the 4 key populations, and for the two definitions of a network connection, ESPHS 2011**
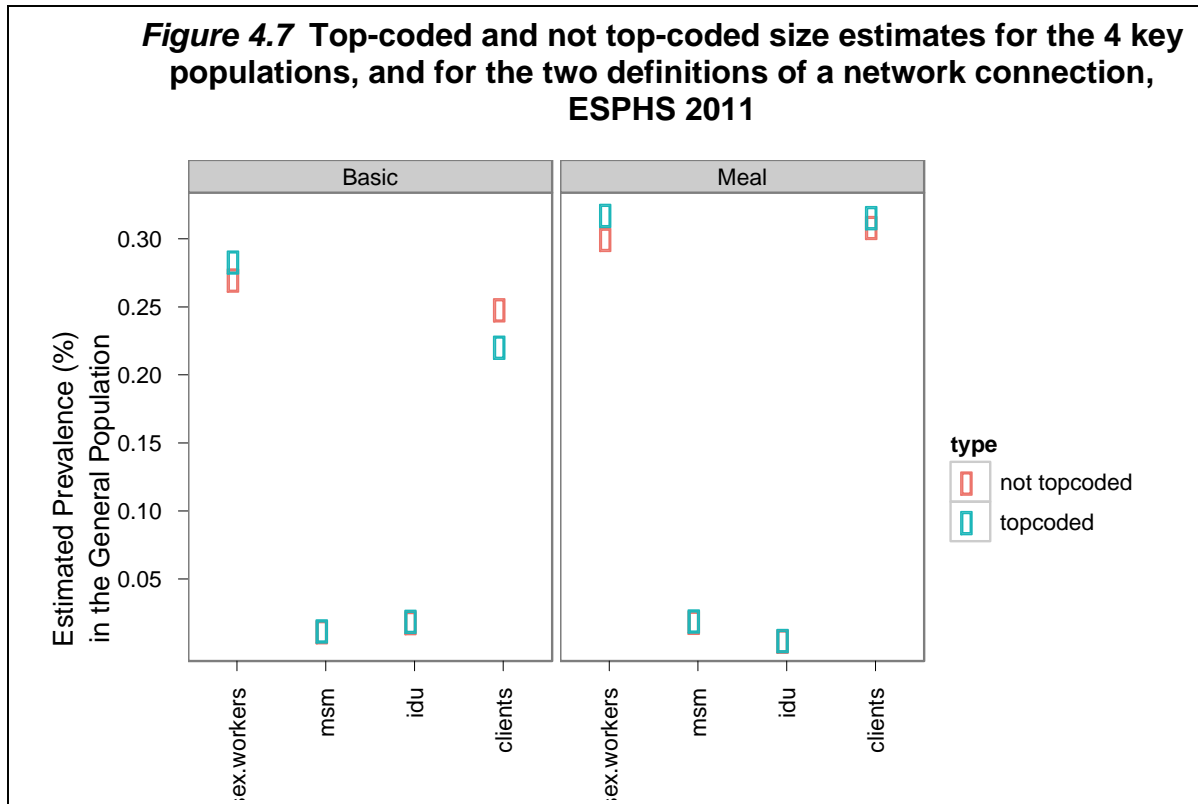
Check 2: Only names groups

The study used 22 populations of known size, but the data on the sizes of the populations defined by names (12 groups) is likely to be particularly accurate because it comes from the National Identification Project Database. Throughout the report, results using all groups were presented. Figure 4.8 plots the size of the four key populations with all groups and only with the groups based on names. Note that the populations defined by the names are, in general, quite small when compared to the rest of the known populations.

Figure 4.8 Size estimates for the 4 key populations computed using all known populations and only the name known populations, for the two definitions of a network connection, ESPHS 2011
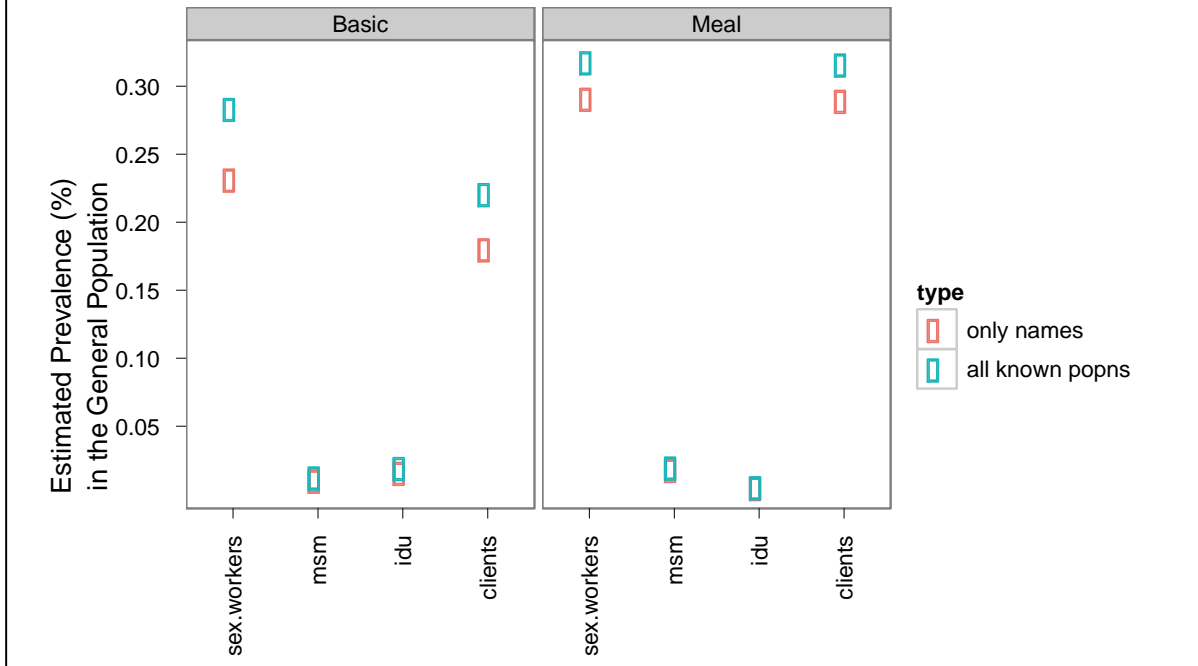
Check 3: Only DHS groups

The study used 22 groups of known size, and for five of these groups the sizes were derived from the Rwanda Demographic and Health Surveys from 2005, 2007, and 2010 (RDHS). Since future studies may only have information from the DHS, Figure 4.9 plots the size of the key populations based on all groups and only based on DHS groups. Note that the populations taken from the DHS are, in general, quite large compared to the rest of the known populations.

Figure 4.9 Size estimates for the 4 key populations computed using all known populations and only the known populations from the DHS, for the two definitions of a network connection, ESPHS 2011
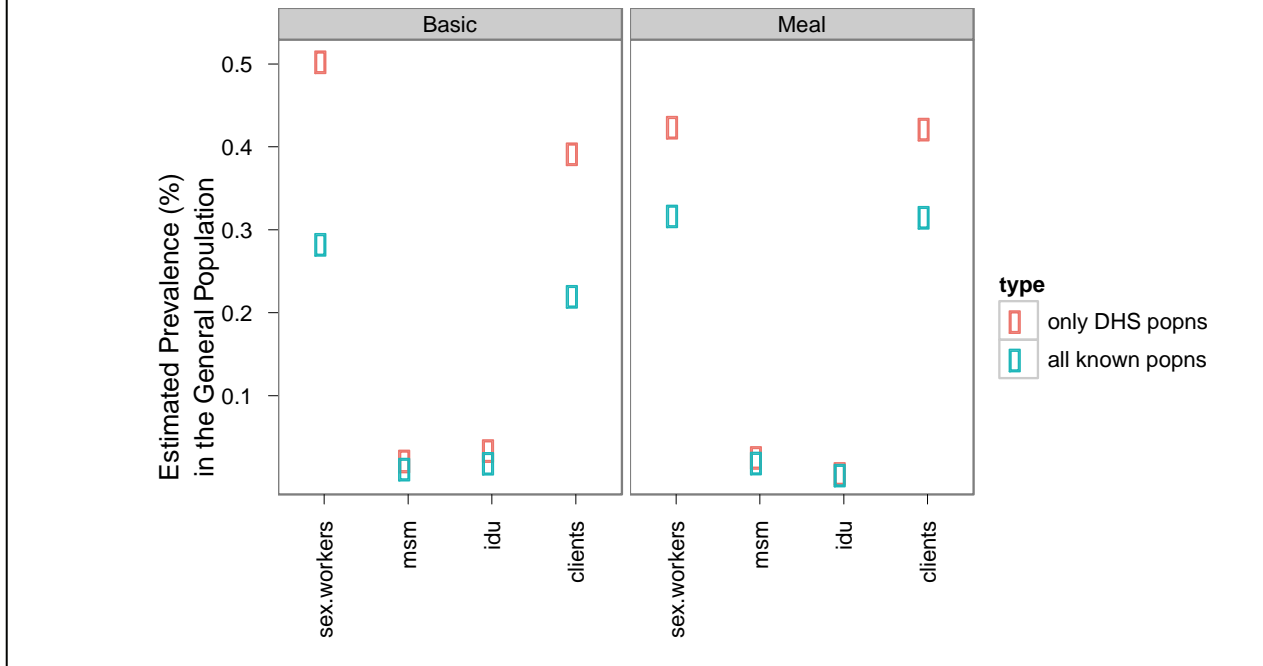
Bounds

The network scale-up estimates can be affected by numerous social factors that deviate from the statistical assumptions of the method. Two issues in particular have been investigated in previous scale-up studies and will be investigated here: the *information transmission rate* and the *degree ratio* (Salganik and Feehan, 2009). Given additional data collection with the key populations, one could estimate the information transmission rate and degree ratio (Salganik and Feehan, 2009; Salganik et al., 2011), but this data collection was not feasible as part of this project. Therefore, we provide hypothetical estimates for the size of the key populations for a range of hypothetical adjustment factors.

One major implicit assumption of the network scale-up method is that people are perfectly aware of everything about their connections. However, this is unlikely to be the case for traits that are stigmatized or illegal. For example, respondents might know a female sex worker but they might be unaware that she exchanges sex for money. This problem is called "information transmission error" in the scale-up literature because information about network alters is not always "transmitted" to ego (Shelley et al., 1995, Shelley et al., 2006, Salganik et al., 2011). To adjust for information transmission error, one needs to estimate the information transmission rate, which is the probability that a randomly chosen alter of an individual who belongs to one of the target populations is aware that the person he or she is connected to is in the target population (Salganik et al., 2011).

In this project we did not estimate the information transmission rate, but if we had, one might expect that our hypothetical estimated information transmission rate would range from 0.05 to 1. Figure 4.10 plots the hypothetical estimated size of the four key populations as a function of the hypothetical estimated information transmission rate. Note that the network scale-up estimate implicitly assumes an information transmission rate of 1. A previous study of heavy drug users in Curitiba, Brazil estimated an information transmission rate of 0.77 (Salganik et al., 2011). And, as mentioned earlier in this report, a small pilot survey among 17 MSM in Rwanda also suggested there was a low information transmission rate between MSM and their acquaintances in Rwanda.

Figure 4.10 **Changes in estimated subpopulation size as hypothetical information transmission rate varies from 0.05 to 1 for each key population, ESPHS 2011**
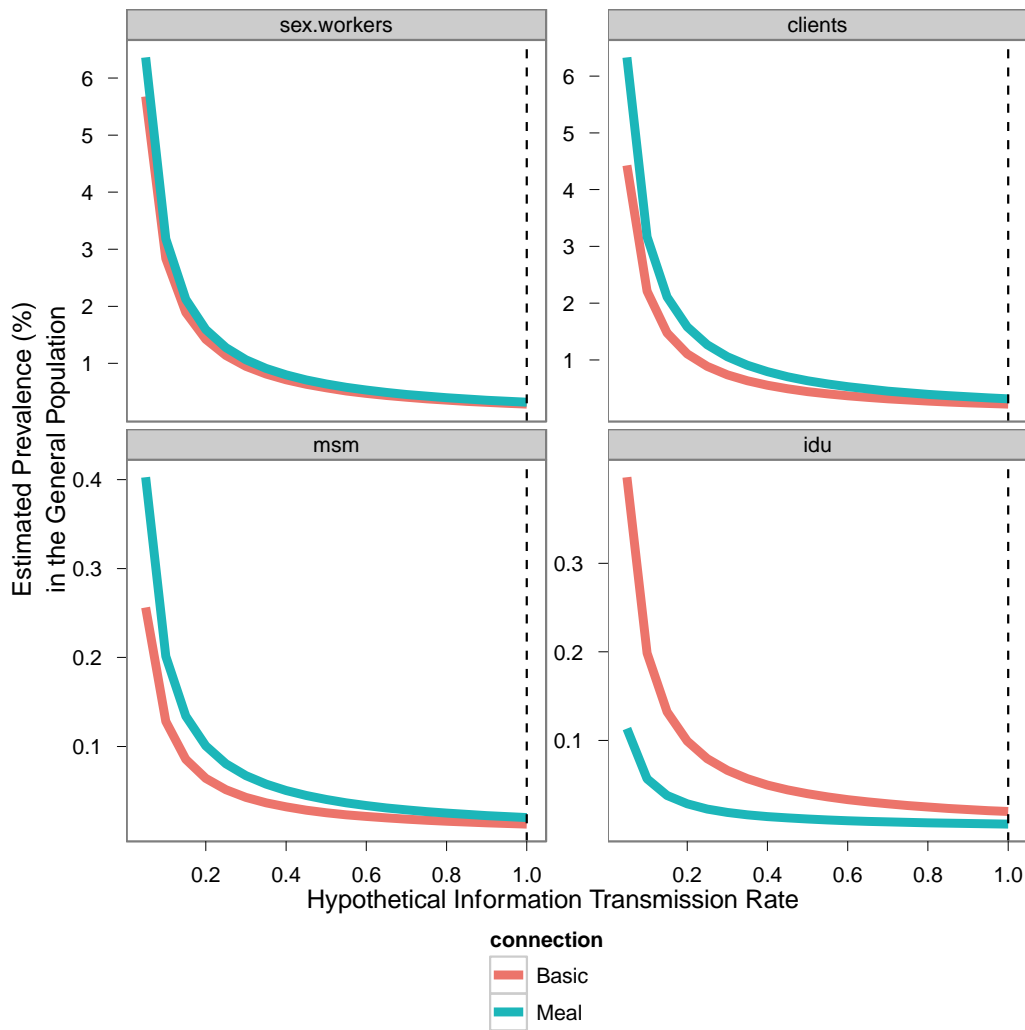
Note: The dashed line shows the estimate for an information transmission rate of 1, which is what we assume. Note that the scales on the y axis are different for each panel.

A second implicit assumption of the network scale-up method is that the target population has the same average personal network size as the general population. Intuitively, we can imagine that if female sex workers know fewer people on average they will be underrepresented in the set of people that we learn about using the network scale-up method. Or, if female sex workers know more people than average, they would be over-represented. To adjust for this factor, one needs to know the degree ratio: the mean personal network size of members of the target population divided by the mean person network size of members of the entire population (Salganik and Feehan, 2009).

We did not estimate the degree ratio, but if we had, one might expect that our hypothetical estimated degree ratio might range from 0.25 to 1.75. Figure 4.11 plots the hypothetical estimated size of the four key populations as a function of the hypothetical estimated degree ratio; note that the network scale-up estimate implicitly assumes a degree ratio of 1. A previous study of heavy drug users in Curitiba, Brazil estimated a degree ratio of 0.69 (Salganik et al., 2011).

Figure 4.11 **Change in estimated population size as the hypothetical degree ratio varies from 0.25 to 1.75, ESPHS 2011**
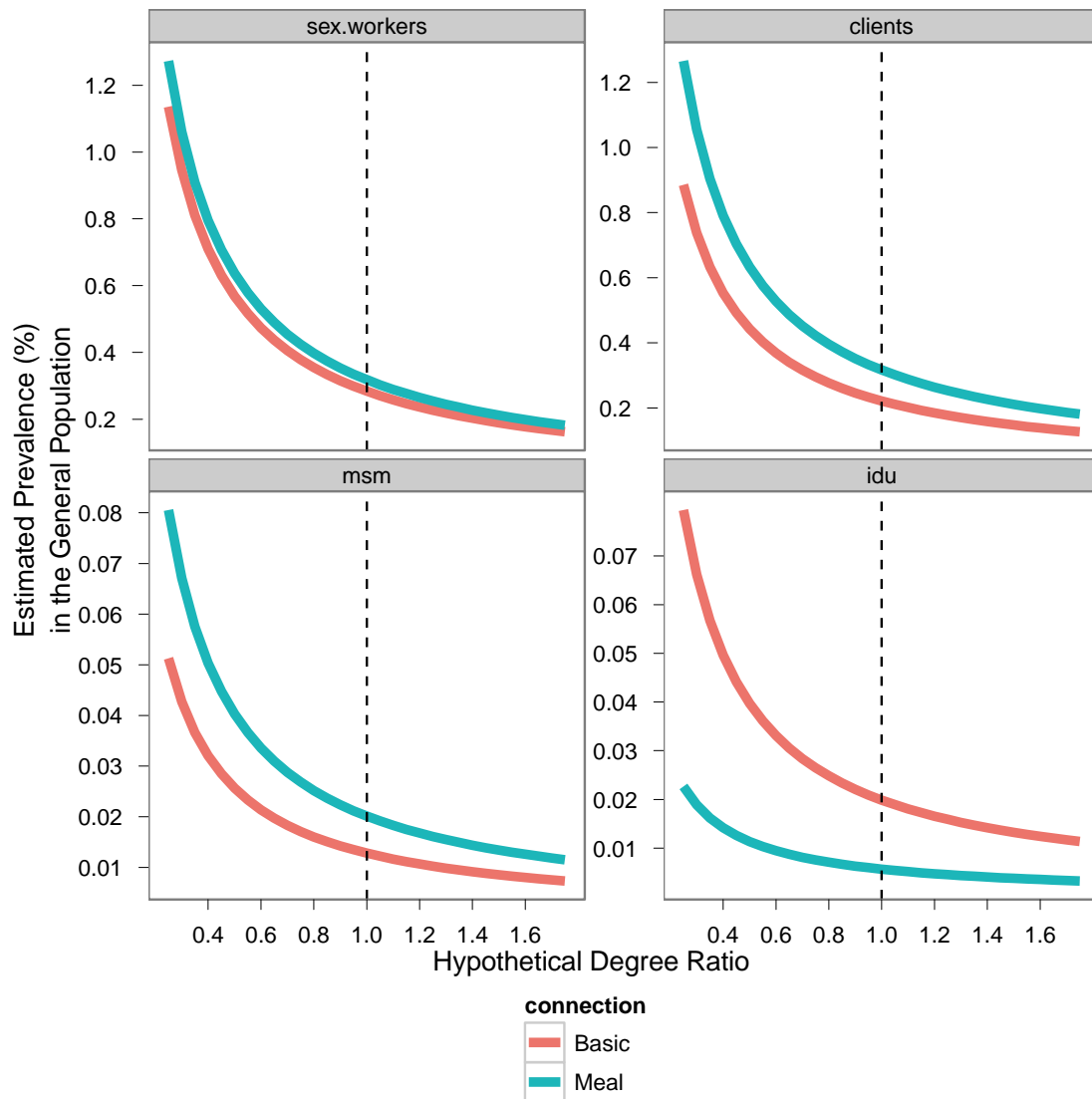
Note: The dashed vertical line indicates the estimate for a degree ratio of 1, which is what we assume. The scale on the y axis is different for each panel.

4.5   MORTALITY ESTIMATES

Measurements of adult mortality are an important indicator of population health. Ideally, complete death registration and accurate population counts would be used to compute death rates above age 15 by age, sex, and other characteristics of interest. In countries that lack high-quality death registration data, including most of Sub-Saharan Africa, adult death rates must be estimated using alternative strategies. In these settings, the network scale-up method could provide an estimate of the crude death rate, which is a measure of the overall level of mortality in the adult population. However, policymakers and scholars generally need more detailed information than the crude death rate provides; in particular, they need to know death rates by age and by sex. An extension of the network scale-up method, called the data-augmented network scale-up method (DANSUM), is currently being developed to make estimation of more detailed information about target populations possible. This technique can be applied to estimate adult death rates. In this section, we present preliminary estimates for adult death rates in Rwanda computed using this experimental technique.

In order to explore the potential that the data-augmented network scale-up method has for measuring mortality, the ESPHS study in Rwanda included a module that asked questions about how many deaths there were in respondents' networks. Then, for each death, the respondent was asked to report the decedent's age and sex. In total, respondents reported 3,853 deaths. There were very few occurrences of missing data: out of these 3,853 deaths, 3,845, or 99.8 percent of them, had both the age and sex of the decedent reported. A summary of the resulting distribution of reported deaths, by age group and sex, is shown in Figure 4.12. The top row shows deaths collected from interviews using the basic definition of a connection, while the bottom row shows deaths collected from interviews using the meal definition. The left-hand column has female deaths, while the right-hand column has male deaths. Note that the age categories in this figure are not equally sized.

The raw distribution of reported deaths is not representative of the mortality experience of the general population because deaths in people with large networks are more likely to be recorded than deaths in people with small networks. We need to account for this fact because, as Table 4.3 in section 4.2 demonstrated, average network size varies considerably by age and by sex. Furthermore, there are more Rwandans at younger ages than there are at older ages, meaning that even if death rates were exactly the same across all ages, we would still expect the number of deaths in the population to vary by age. So the raw counts of reported deaths alone are not very helpful in understanding the mortality experience of the population. Instead, we generally compute death rates, which describe the amount of mortality that takes place per 1,000 people at each age, for each sex. The data-augmented network scale-up method accounts for the age-sex distribution population and of network size, and therefore permits us to produce age- and sex-specific death rates (Feehan et al, 2011). Because we did not collect network data for children under the age of 15, in the analysis below we made the assumption that the average network size under age 15 is the same as it is in ages 15-19. Future work will explore alternative assumptions.

The estimated mortality rates for ages 15-65 produced using the preliminary data-augmented network scale-up estimator are shown in Figure 4.13. The top panel shows deaths recorded using the basic definition of a connection, while the bottom panel shows deaths recorded using the meal definition. For both panels, we see that death rates are lower at the youngest ages and higher at the oldest ages. Although there is no gold-standard estimate of adult mortality available to compare our estimates to, prior experience suggests that the death rates at the youngest ages are plausible, but that they are probably too low at the older ages. Furthermore, it is not yet known how to compute confidence bounds around the estimated death rates, so we cannot be sure how interpretable comparisons across age sex categories are. This is also a matter for future work.

Figure 4.12 **Distribution of deaths reported in respondents' networks, by age, sex, and the definition of a network connection (not weighted), ESPHS 2011**
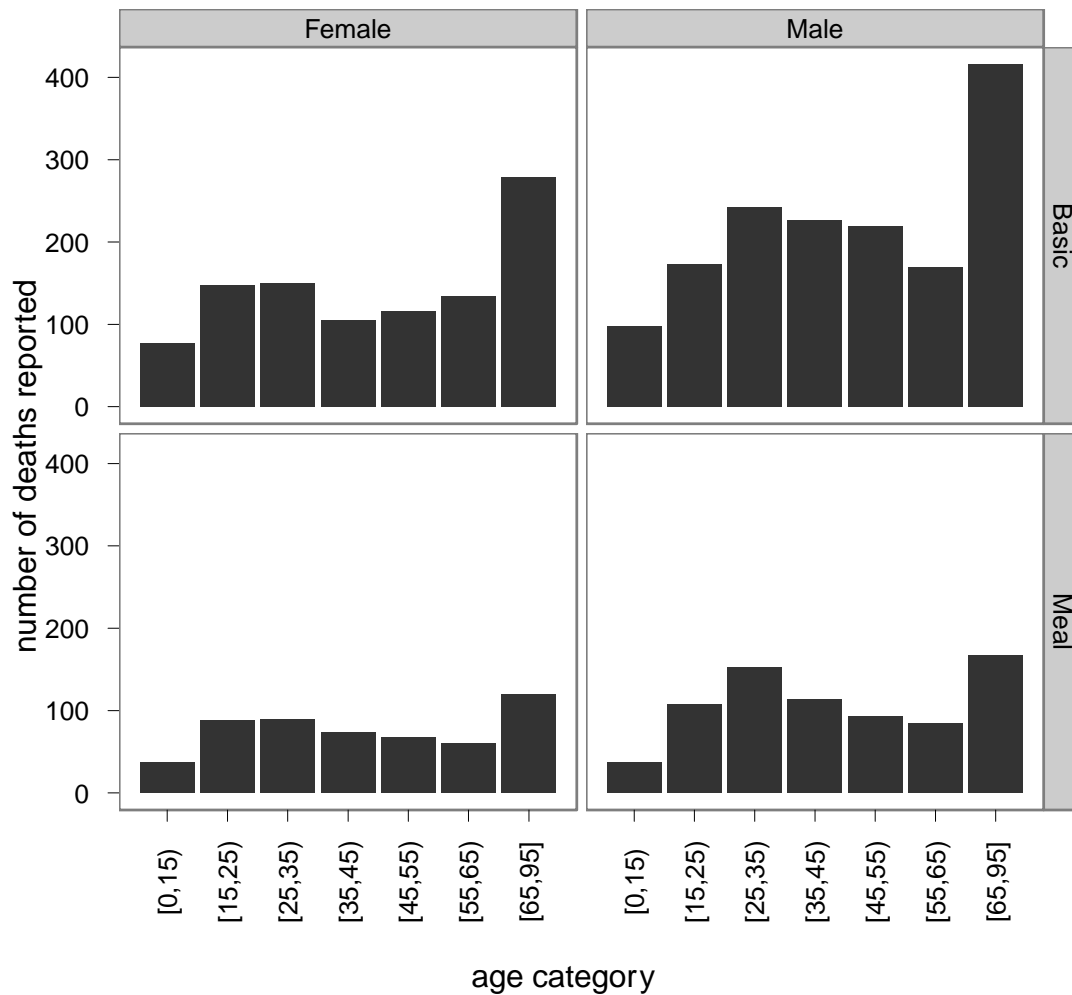
Figure 4.13 Estimated age-specific death rates for Rwandans aged 15-65, produced using the data-augmented network scale-up (DANSUM) estimator, ESPHS 2011

PROXY RESPONDENTS

<div style="text-align: right; font-size: 2em;">**5**</div>
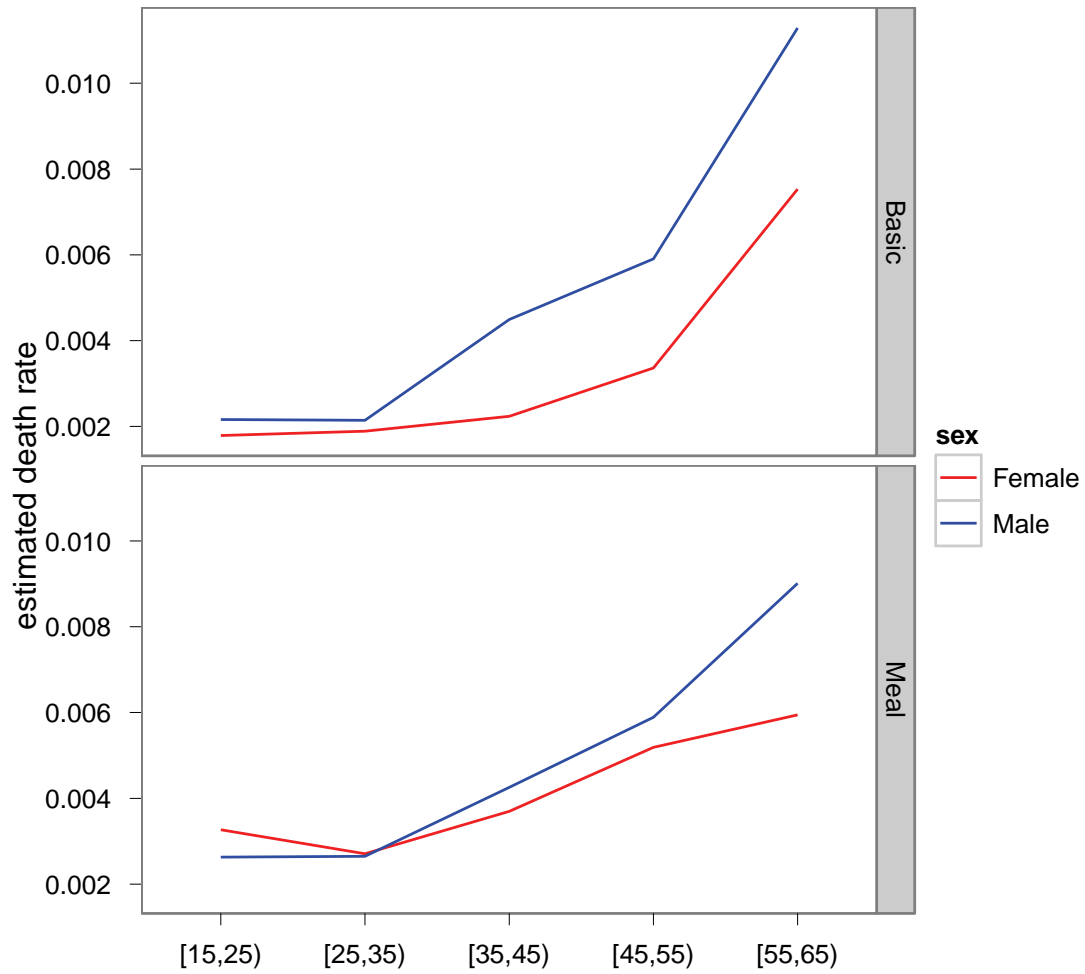
5.1   CONCEPT

A “respondent” typically answers questions about him/herself. A “proxy respondent” is a respondent answering on behalf of someone else (the “alter”). The Proxy Respondent Method (PRM), requiring much less data collection, but based on a similar premise as NSUM, involves asking the proxy respondent about a few persons (alters) randomly selected from their personal network. The assumption in this method is that as the “proxy respondents” form a representative sample (after adjusting for the survey's sampling design), the randomly selected alters form a representative sample as well. It further assumes that both proxy respondents and interviewers are more comfortable discussing stigmatizing behaviours about a non-present and anonymous (but real) third person, the “alter.”

However, PRM shares many of the same biases that NSUM potentially suffers from, notably transmission error and response bias. In addition, PRM yields much smaller alter sample sizes than NSUM, thereby making it unsuitable for small surveys. The potential advantages of PRM include that it collects individual data (as opposed to aggregate data in NSUM), which in turn allows for stratification by sex, age, geographic characteristic, etc., and the interview may be both shorter and cognitively less demanding.

5.2   METHODS

Selection of names

A representative sample of Kinyarwanda names was chosen. Kinyarwanda names are not passed down through families and are for the most part specific to each sex. There is also little association between names and religion or ethnic group. We used the National Identification Project Database, holding approximately 10 million records, as a sampling frame. First, some names were deleted based on the following criteria:

- Androgynous names (used by both men and women, 227 names);

- Names with multiple spellings or nicknames; and

- Names with a frequency of <1 percent of the most common name (stratified by sex), meaning that all male names with fewer than 885 people and all female names occurring less often than 716 times were removed.

This resulted in a final list of 631 male and 459 female names. From these two lists (names ordered by popularity), male and female names were selected systematically by choosing every 12th male and every 8th female name, resulting in a final selection of 50 male and 50 female names.

Generation of cards with names

Using the 100 names selected, 20 cards were created. Each card showed five names of the same sex, including names that were frequently found in the database and less frequently found in the database. No names were repeated. The male names were on blue cards and the female names were on red (or pink) cards. Cards were grouped into sets labelled "A" and "C". Female interviewers received five pink (female) A cards and five blue (male) A cards. Male interviewers received five pink (female) C cards and five blue (male) C cards. Thus each interviewer received a complete set of 10 cards. The names assigned to female interviewers were all distinct from those assigned to male interviewers. Therefore, no name could be used more than once in each household.

A total of 50 sets of cards were printed. After providing 32 sets to the interviewers, each supervisor received two spare sets (one A and one C) in case some cards were lost. The remaining two sets stayed with the coordinators as a reserve.

Proxy respondent interviews

To identify the alters, proxy respondents randomly selected up to two male and two female persons from their personal networks. Alters were selected by making the proxy respondent choose one of five cards, each of which showed five (all male or all female) names. The proxy respondent was asked if she/he personally knew anyone with any of five names shown on the card. If the proxy respondent knew no one, the interviewer would repeat the procedure with cards holding names of the remaining sex. If the proxy respondent knew just one alter with any of the offered names, the interview would start on this one alter. If the proxy respondent stated knowing more than one person with the selected names, the proxy respondent was asked to first think of the person the respondent knew best (excluding persons in the same household).

Once the respondent had chosen an anonymous alter, the interviewer first asked questions about this alter's demographic characteristics, followed by questions on the alter's high-risk behaviours, including injection drug use, selling or buying sex, or, if a man, having sex with other men. The responses (yes, no, don't know) were recorded. For those proxy respondents who knew more than one alter by the offered names, the interview was then repeated about the alter the proxy respondent knew second best.

The interviewer then moved on to help the proxy respondent identify alters of the remaining sex. Thus a total of up to four alters (two male, two female) could be selected by each proxy respondent.

After the interview was completed, the two cards used (one with male names and one with female names) were put aside and not used again in the same household. The next respondent interviewed by the same interviewer would choose a card from the remaining four cards. This procedure was repeated until all eligible respondents were interviewed in the same household. In the few cases in which there were more than five respondents of the same sex in the household, the survey staff could use their teammate's cards to interview the remaining respondents.

Alter eligibility

Respondents were told to only include persons between the ages of 15 and 50 years of age who live in Rwanda. They were told to exclude any person living in the same household.

Data analysis

Data analysis was weighted. The sampling weights used were the individual sampling weights for the actual survey respondents. Thus we accounted for the non-random selection of the Proxy Respondent sample that generated the alter sample.

5.3 CHARACTERISTICS OF RESPONDENTS AND ALTERS USING THE PROXY RESPONDENT METHOD

Table 5.1 shows the basic characteristics of the respondents and their alters. The 4,669 respondents identified 5,732 alters. On average, each respondent identified 1.23 alters. Approximately 33 percent of respondents did not know an alter by any of the 10 (5 male, 5 female) chosen names. There were slightly more female (56 percent) than male (46 percent) respondents. Similarly, there were fewer male (48 percent) than female (52 percent) alters. The proportion of alters aged 15-24 years (24 percent) was smaller than that among respondents (31 percent). Respondents younger than 25 years on average identified 0.94 alters each, whereas older respondents on average identified 1.36 alters. Similarly, married respondents reported more alters (1.64) than unmarried respondents (0.77). Residence and smoking status however did not show differing patterns of identifying alters, as respondents of all sub-categories on average identified more than one alter.

Table 5.1 Characteristics of respondents and alters using the proxy respondent method

Distribution of respondents and alters by characteristic, ESPHS Rwanda, 2011

Background characteristic	Respondents		Alters	
	Percentage	Number	Percentage	Number
Sex				
Female	56.0	2,613	48.3	2,769
Male	44.0	2,056	51.7	2,963
Age (years)				
<25	31.3	1,461	23.8	1,363
25+	68.7	3,208	76.2	4,366
Marital status				
Married	52.2	2,437	69.8	4,000
Not married	47.8	2,231	30.1	1,726
Residence				
Kigali	11.8	550	12.4	713
Other provinces	88.2	4,119	87.5	5,013
Smoking status				
Smoking	10.7	499	14.5	833
Not smoking	89.3	4,168	85.4	4,893
Total	100.0	4,669	100.0	5,732

5.4 RECENT HIGH-RISK BEHAVIOURS

Table 5.2 shows the estimated prevalence and population sizes of adults aged 15-49 years engaging in high-risk behaviours in the last 12 months. Among female alters age 15-49, 3.5 percent were reported to be sex workers. When multiplied by the national population of women in this age range (according to the medium estimate for the 2010 projection—NISR, 2009), this percentage corresponds to 93,000 female sex workers. The percentage of male alters reported to be sex workers is 0.3, corresponding to 6,600 male sex workers. Alters were also reported to buy commercial sex as clients of sex workers: among women the prevalence of buying sex was 1.5 percent, among men this estimate was 3.0 percent, corresponding to 40,000 women and 73,000 men buying sex in the last 12 months. Estimates for men who have sex with men were much lower, with a prevalence of 0.03 percent and a size estimate of 700 (range: ≤100 – 2,400). Similarly, estimates for injection drug users were very low at 0.03 percent and 1,200 (with most or almost all likely to be male IDU).

Table 5.2 Estimated prevalence and population sizes of adults age 15-49 with high-risk behaviours in past 12 months, proxy respondent method, ESPHS Rwanda, 2011

	Sex workers			Men who have sex with men		
	95% LCL[1]	Mid	95% UCL[2]	95% LCL[1]	Mid	95% UCL[2]
	PREVALENCE (%)					
Female	2.8	3.49	4.17	-	-	-
Male	0.08	0.27	0.45	0	0.03	0.10
Total	1.48	1.82	2.17	-	-	-
	POPULATION SIZE					
Female	75,000	93,000	111,000	-	-	-
Male	1,900	6,600	10,900	≤100	700	2,400
Total	77,000	100,000	122,000	≤100	700	2,400

	Clients of sex workers			Injecting drug users		
	95% LCL[1]	Mid	95% UCL[2]	95% LCL[1]	Mid	95% UCL[2]
	PREVALENCE (%)					
Female	1.05	1.51	1.96	0	0	0
Male	2.4	3.02	3.64	0	0.05	0.14
Total	1.9	2.29	2.68	0	0.03	0.07
	POPULATION SIZE					
Female	28,000	40,000	52,000	-	-	-
Male	58,000	73,000	88,000	≤100	1,200	3,400
Total	86,000	113,000	140,000	≤100	1,200	3,400

[1] LCL: Lower confidence limit
[2] UCL: Upper confidence limit

5.5   HIGH-RISK BEHAVIOURS BY DEMOGRAPHIC CHARACTERISTICS

Tables 5.3 show the number and percentages of alters engaging in high-risk behaviours in the last 12 months, as reported by their proxy respondents. Table 5.3 displays the weighted number of alters identified as high-risk and the weighted percentages of alters engaging in high-risk behaviours in the past 12 months. Among all female alters, 3.5 percent were reported to engage in commercial sex work, as compared to 0.3 percent among male alters, suggesting that male sex work is uncommon but exists in Rwanda. This finding is supported by the observation that 1.5 percent of female alters were reported to be clients of sex workers, a sizeable, albeit lower proportion than the 3.0 percent of male alters labelled as clients of sex workers. Less than 1 in a 1,000 of alters (0.03 percent, both sexes) were identified as injection drug users, with no female IDU identified, thus yielding an estimated prevalence of IDU among male alters at 0.05 percent. A similarly low percentage (0.03 percent) was derived for men who have sex with men among male alters.

In all high-risk groups, alters 25+ years old were reported with higher (or equal) frequencies of high-risk characteristics than alters <25 years old. Similarly, alters who smoked exhibited higher frequencies of risk behaviours, whereas alters' marital or residence status were not clearly associated with the prevalence of high-risk characteristics.

Table 5.3 Number and percentage of alters with high-risk behaviour in the last 12 months, using the proxy respondent method

Number and percentage of alters with high-risk behaviour in the past 12 months, using the proxy respondent method by characteristic, ESPHS Rwanda, 2011

Background characteristic	Number of alters reported to be:				Percentage of alters reported to be:				
	Sex workers	Men who have sex with men	Clients of sex workers	Injecting drug users	Sex workers	Men who have sex with men	Clients of sex workers	Injecting drug users	Number of alters
FEMALE ALTERS									
Age									
<25	23	na	9	0	3.25	na	1.26	0.00	718
25+	72	na	33	0	3.51	na	1.59	0.00	2,049
Marital status									
Married	65	na	30	0	3.43	na	1.56	0.00	1,905
Not married	28	na	12	0	3.28	na	1.40	0.00	858
Residence									
Kigali	13	na	2	0	4.32	na	0.66	0.00	304
Other provinces	82	na	40	0	3.33	na	1.61	0.00	2,460
Smoking status									
Smoking	19	na	13	0	8.02	na	5.59	0.00	242
Not smoking	76	na	28	0	2.99	na	1.11	0.00	2,522
Total	97	na	41	0	3.49	na	1.50	0.00	2,769
MALE ALTERS									
Age									
<25	1	0	11	0	0.18	0.00	1.64	0.00	646
25+	7	1	79	2	0.29	0.04	3.40	0.07	2,317
Marital status									
Married	6	0	52	2	0.28	0.00	2.47	0.08	2,095
Not married	2	1	38	0	0.23	0.12	4.34	0.00	868
Residence									
Kigali	1	0	13	0	0.29	0.00	3.10	0.09	409
Other provinces	7	1	77	1	0.26	0.04	3.01	0.05	2,553
Smoking status									
Smoking	1	0	44	0	0.13	0.00	7.36	0.06	591
Not smoking	7	1	46	1	0.30	0.04	1.94	0.05	2,372
Total	8	1	90	2	0.27	0.03	3.02	0.05	2,963
TOTAL									
Age									
<25	24	na	20	0	1.80	na	1.44	0.00	1,363
25+	79	na	111	2	1.80	na	2.55	0.04	4,366
Marital status									
Married	71	na	81	2	1.78	na	2.04	0.04	4,000
Not married	30	na	50	0	1.75	na	2.88	0.00	1,726
Residence									
Kigali	14	na	15	0	2.01	na	2.06	0.05	713
Other provinces	89	na	117	1	1.77	na	2.32	0.03	5,013
Smoking status									
Smoking	20	na	57	0	2.43	na	6.85	0.04	833
Not smoking	83	na	74	1	1.69	na	1.52	0.03	4,893
Total	104	na	131	2	1.82	na	2.29	0.03	5,732

na = Not applicable

5.6   DEMOGRAPHIC CHARACTERISTICS OF PERSONS WITH REPORTED HIGH-RISK BEHAVIOURS IN THE PAST 12 MONTHS

Table 5.4 shows select background characteristics of alters by high-risk group status. Reflecting Rwanda's general population distribution, most sex workers were reported as being 25 years or older, married, and residing outside Kigali. Similar patterns are seen for clients of sex workers. MSM and IDU data are not shown due to the very small numbers of alters reported as such.

The majority of sex workers and clients of sex workers are married. Projecting the proportion of clients and sex workers that are married to their estimated population sizes suggests that there are 68,000 spouses that are married to sex workers, and 70,000 persons married to clients of sex workers.

Table 5.4 Characteristics of alters with high-risk behaviours in the last 12 months, proxy respondent method, ESPHS Rwanda, 2011

Number and percent distribution of alters according to high-risk behaviour in the past 12 months, using the proxy respondent method, by background characteristic, ESPHS Rwanda, 2011

Background characteristic	Sex workers						Clients of sex workers					
	Yes		No		Don't know/ Missing		Yes		No		Missing	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Age												
<25	25	23.4	1,262	23.9	77	21.6	20	15.0	1,268	24.6	76	16.9
25+	79	75.3	4,009	76.1	278	78.1	111	85.0	3,882	75.4	373	82.9
Missing	1	1.3	0	0.0	1	0.3	0	0.0	2	0.0	1	0.3
Total	104	100.0	5,271	100.0	356	100.0	131	100.0	5,152	100.0	449	100.0
Marital status												
Married	71	68.2	3,692	70.0	237	66.4	81	62.1	3,613	70.1	305	68.0
Not married	30	28.8	1,577	29.9	119	33.2	50	37.9	1,534	29.8	143	31.7
Missing	3	3.0	2	0.0	1	0.4	0	0.0	5	0.1	1	0.3
Total	104	100.0	5,271	100.0	356	100.0	131	100.0	5,152	100.0	449	100.0
Residence												
Kigali	14	13.7	631	12.1	60	16.8	15	11.2	615	11.9	82	18.4
Other provinces	89	84.8	4,630	87.8	295	82.8	116	88.8	4,532	88.0	364	81.3
Missing	2	1.5	3	0.1	1	0.4	0	0.0	4	0.1	1	0.3
Total	104	100.0	5,271	100.0	356	100.0	131	100.0	5,152	100.0	449	100.0
Smoking status												
Smoking	20	19.4	746	14.2	67	18.7	57	43.5	683	13.2	93	20.8
Not smoking	83	79.1	4,523	85.8	289	80.9	74	56.5	4,465	86.7	355	78.9
Missing	2	1.5	2	0.0	1	0.4	0	0.0	4	0.1	1	0.3
Total	104	100	5,271	100.0	356	100.0	131	100.0	5,152	100.0	449	100.0

5.7 DISCUSSION

This survey demonstrated the feasibility of creating a sample of individual alters. Basic demographic characteristics suggest that this alternative sample may have limited representativeness. This is the first time PRM was used to estimate the population sizes of key populations at higher risk of HIV infection. As hypothesized, the potential advantages and limitations of the proxy respondent method became apparent, namely the collection of individual level data which allows for the stratification and correlation of results. However, several limitations have to be noted as well.

Limitations

While the absolute numbers of alters identified as having high-risk behaviours was reasonably large for sex workers and clients of sex workers, they were very low for MSM and IDU, making estimates for the latter volatile and impeding any meaningful stratified analysis.

One assumption for the proxy respondent method was that alters would form a sample as representative as the sample of proxy respondents themselves. However, this might not have been the case as only 24 percent of alters were age 25 or older compared with 31 percent of proxy respondents, suggesting that the identified alters may not have formed a representative sample.

Approximately one third of respondents did not identify any alter from the selected names. If we compare the network size (from the network scale-up method, known populations approach) of respondents who did not identify any alter, we find that on average they had smaller network size (105) than respondents who did know at least one alter (126). Further, respondents who knew a least one high-risk alter on average had a larger network size

(173) than respondents who did not know any high-risk alters (122). This suggests that respondents with larger networks identified one or more alters, and more likely identified at least one high-risk alter, potentially resulting in an overestimate of the prevalence of a given high-risk behaviour. We also cannot rule out the possibility that the network structure of respondents who did not identify any alter may differ from those respondents who did identify at least one alter.

As with network scale-up, the proxy respondent method suffers several potential biases, most notably information transmission error and response bias. Information transmission error is due to low social visibility of high-risk individuals, i.e., not all acquaintances of a given high-risk person know about that person's high-risk behaviour. Response error is due to not revealing the high-risk status of an acquaintance (alter). Both of these biases result in underestimates, and none of the proxy respondent results is adjusted for these limitations. Therefore, as with the NSUM estimates, all proxy respondent based estimates are estimates for "socially visible" key populations.

Estimates

The largest population size estimates were yielded by sex workers and clients of sex workers. Both sex workers and clients of sex workers were comprised of men and women, suggesting that sex work (selling sex) is also practiced by men, and that some women also buy sex as clients. Further, both selling and buying sex occurs inside and outside Kigali, and is found both among married and unmarried people.

The estimated population size for female sex workers (3.5 percent, n=93,000) suggests that 1 in 30 Rwandese women aged 15-50 years may be engaged in selling sex at any time over a 12-month period. This compares to 73,000 male clients (3.0 percent), which is a smaller estimate than that of female sex workers.

The estimated population size of men who have sex with men is very low (0.03 percent, n=700). Because of the low number of alters reported as MSM, the estimate's uncertainty range is very wide (100-2,400). The low prevalence of MSM behaviour may be due to: very low information transmission (i.e., most acquaintances of men who have sex with men do not know about his behaviour); substantial response bias (reluctance to admit knowing an MSM); and/or that a large proportion of gay men do not actually have sex with men. Indeed, as mentioned in Chapter 4, a small study among MSM in Kigali suggests that their social visibility is likely below 20 percent (Feehan and Salganik, 2011).

We found equally low frequencies for proxy respondents reporting alters who inject drugs for pleasure (0.05 percent, n=1,200). As a landlocked country, one may not expect a substantial number of IDU in Rwanda. Available survey data in East Africa suggest that intravenous drug use may be concentrated in coastal cities and regions where international trade with other regions, such as South Asia, facilitates drug trafficking.

These results suggest that between 77,000 and 122,000 persons (75,000-111,000 of whom are women) sell sex and that between 86,000 and 140,000 persons (58,000-88,000 of whom are men) are buying sex. The interview question phrasing may have been broad enough to include persons paying for or selling sex that otherwise may not have been identified as having commercial sex as prostitutes or clients of prostitutes. The estimated size of women buying sex as clients (28,000-52,000) is surprisingly large as it suggests that between 1 percent and 2 percent of all adult women paid for sex in the past 12 months. These populations are accompanied by a large number of spouses that act as important bridging populations, estimated at 68,000 spouses of sex workers, and 70,000 spouses of clients of sex workers.

Not surprisingly, the estimated population sizes for MSM (<100-2,400) and IDU (<100-3,400) are much lower than those for commercial sex. The MSM estimate in particular should be seen as very conservative as the social visibility of this high-risk group may be very low, as suggested by a very small Kigali-based pilot study examining information transmission error (Feehan and Salganik, 2011). Both MSM and IDU estimates have very wide uncertainty bounds as very few alters with these behaviours were identified.

The 2010 Behavioural Surveillance Survey (BSS) of female sex workers across Rwanda found different results than the sample in the proxy respondent method (RBC, 2010). In the BSS of sex workers, 56 percent of the respondents reported that they were less than age 25 as compared to 23 percent from the proxy respondent method. Similarly, 73 percent of sex workers reported that they had never been married in the BSS while 68 percent of sex workers were found to be currently married by the proxy respondent method. These data suggest that alters identified in the proxy respondent method were different than those sampled in the BSS.

A COMPARISON OF SIZE ESTIMATES AND CONCLUSIONS

6

T he objectives of this survey were to test the feasibility of two size estimates methods (network scale-up and proxy respondent) in a household survey in Sub-Saharan Africa, and, if the methods were feasible, to create size estimates for Rwanda.

Feasibility of the survey

The first objective was met: it is feasible to collect these data in a household survey. The interviewers for the ESPHS had all worked previously on the 2010 Rwanda Demographic and Health Survey and were thus familiar with household survey techniques. They also attended a five-day training before the start of the survey. During a debriefing meeting with survey staff in November 2011, the interviewers and supervisors reported no instances where a respondent became upset by the questions or stopped the interview because of the questions about the key populations which are perceived to be sensitive. The survey staff did mention some challenges around explaining the concepts of the key populations to some older respondents who did not know such behaviours existed.

A number of variations for collecting size estimates were attempted in this survey, including two definitions of what it means "to know" someone, two approaches to estimate personal network size, and two methods to estimate the key population size. Future surveys would select one of these methods. The median time it took to complete the survey was 28 minutes (inter-quartile range 23-35 minutes). Twenty-four questions were required for the known populations approach, 28 questions were added for the summation approach, and on average 10 additional questions were asked for each alter in the proxy respondent method. The known populations approach required finding the actual size of the 22 reference populations (see Table 4.1). This proved to be fairly easy in Rwanda although some populations were dropped from the final analysis because it was not possible to validate the "true" values. The summation approach required an exercise to elicit mutually exclusive, but exhaustive categories for acquaintances that were relevant to Rwanda. This was a time consuming and imprecise process. Finally, the proxy respondent method required identifying a set of unbiased names (i.e. not favouring a specific age group or religion, etc.).

A debriefing discussion with the interviewers provided useful feedback on the method. The interviewers reported that some respondents expressed irritation at the repetitiveness of the questions; similarly the interviewers found it awkward to repeat the definitions of "to know" repeatedly. The survey collected data for all adults ages 15 years and older. The interviewers mentioned that some of the very old respondents struggled to stay focused on the survey or to provide responses. The interviewers suggested that very old people should not be included in the survey. The interviewers also mentioned that the respondents struggled to keep track of the number of acquaintances who fell into the summation categories. Remembering which acquaintances were already counted in previous categories was difficult. The interviewers reported that some respondents did not understand the concept of proxy respondent; it was not clear why they were answering questions about someone else who was not known to the interviewer.

Size estimates

There are numerous methods for estimating the size of key populations at higher risk of HIV infection. None of the methods provides an exact estimate; there is no gold standard. One option for finding the best estimate is to compare multiple estimates, consider the implicit biases in each method, and determine which range of values is likely to be closest to the truth (UNAIDS, 2010).

In this section we review existing size estimates from Rwanda for each of the four key populations. We include the estimates created during this survey from network scale-up using summation, network scale-up using known populations, and the proxy respondent method. Estimates from other studies are also included and the method to create the estimate is briefly described. Also discussed are the known biases from the other studies, and whether the estimate is expected to be an over estimate or an underestimate.

At the start of this survey there were plans to have at least one alternative size estimate for each population. These alternative size estimates would be compared with the results from the ESPHS. However, due to changes in schedules, there were only estimates available for female sex workers and clients of female sex workers. The currently available size estimates for Rwanda include:

- Capture-recapture of female sex workers in 2010 (national);

- National participatory mapping of sex workers, 2011-2012;

- Direct survey questions on clients of sex worker from Rwanda DHS 2011 (national);

- Network scale-up using known populations for all four populations;

- Network scale-up using summation for all four populations; and

- Proxy respondent for all four populations.

Population definitions

To compare size estimates from different sources it is critical that the definitions of the key populations at higher risk of HIV infection are the same. Currently, Rwanda does not have an explicit definition for each of the four populations. In Table 6.1 we describe the definitions of the population for each study. In some cases the definitions are comparable and in other cases the results should be interpreted with caution.

The definition using network scale-up asked about individuals who were currently practicing the behaviours (i.e. people who are using injecting drugs) while the proxy respondent method asked about whether the alter had the behaviour in the past 12 months. The proxy respondent method also asked whether the alter had <u>ever</u> engaged in the behaviour. Estimates of the number of people who had ever engaged in high-risk behaviours do not portray the current situation in Rwanda, which is necessary for programming and planning.

The proxy respondent method asked about high-risk behaviour questions by saying e.g., "In your opinion, has he/she ever sold sex to men?" The scale-up interview asked e.g., "How many sex workers/clients of sex workers do you know," perhaps soliciting a higher degree of certainty/knowledge about other people's high-risk behaviours than the proxy respondent method. The proxy respondent method allowed respondents to answer either yes, no, or don't know when asking about an alter's high-risk behaviour; in contrast the network scale-up method asked about the number of individuals with high-risk behaviours known to the respondent. Finally, in the network scale-up method, respondents are asked to identify the number of high-risk individuals across their entire personal

network, whereas the proxy respondents were asked about an alter's behaviours individually. These differences may have contributed to the differences in the observed population size estimates.

The capture-recapture and participatory mapping includes all women who are selling sex in venues or on the street and excludes home-based sex workers.

Overall agreement between network scale-up and proxy respondent methods for identifying members of the key populations

Table 6.1 displays the agreement among the two methods (network scale-up and proxy respondent) on whether a given respondent knows a high-risk alter. Since the network scale-up method queries the respondent about a far larger group of alters, the real interest in this comparison lies in those instances where a proxy respondent confirmed knowing a high-risk alter when the same respondent did not acknowledge knowing any high-risk individuals in the network scale-up method. Combining all high-risk groups for this comparison, 2 percent of respondents reported knowing a person with high-risk behaviours based on the proxy respondent method, but did not identify that person through the network scale-up method.

Table 6.1 Agreement between network scale-up and proxy respondent methods

Concurrence in knowing a high-risk person from the network scale up method and the proxy respondent method, ESPHS Rwanda, 2011

		Proxy Respondent Method (number and percenatge)		
		Yes	No	Total
Network Scale-Up Method (number and percentage)	Yes	81 (3.6%)	458 (20.6%)	539 (24.3%)
	No	42 (1.9%)	1,643 (73.8%)	1,685 (75.8%)
	Total	124 (5.6%)	2,100 (94.4%)	2,224 (100.0%)

Note: Cell percentages are quoted except for the row and column total percentages

Alternative size estimates

There are two previous estimates for the numer of female sex workers in Rwanda.

- The first estimate is based on a capture-recatprue study which used data from two independent data collection activities focused on sex workers to estimate the proportion of the population covered by both activities. The first activity (the capture) was the 2010 Behavioural Surveillance Survey (BSS) of female sex workers (RBC, 2010). The second activity (the recapture) was a mapping of sex workers in which the enumerators asked the sex workers if they participated in the BSS. The BSS was a memorable event, lasting over an hour, so respondents were likely to remember the activity. A simple equation of the proportion captured in both activities provides an estimate of the population size. The capture-recapture study suggests that there are 3,200 sex workers in Rwanda.

- The second size estimate is based on a participatory mapping of female sex workers in Rwanda in 2011 and 2012. The results of this study are not yet published but preliminary analysis suggests that the number of female sex workers in Rwanda is 10,000.

There is one existing estimate on the number of sex worker clients, which comes from a direct question posed to a nationally representative sample of men in the 2005 Rwanda DHS. This survey asked men whether they had paid for sex in the past 12 months and also asked whether they had ever paid for sex. The DHS survey requires that these questions only be asked when no other person is within hearing distance of the interview. Also the

interviewers are required to be of the same sex as the respondent, to avoid any awkwardness of talking about sexual behaviour. Despite this precaution, men are likely to underreport this behaviour while being interviewed in their own homes (Carael et al., 2006). The survey found that 0.83 percent of men reported having paid for sex in the 12 months prior to the survey (calculated from RDSH 2005 recode data). Assuming that this proportion has not changed between 2005 and 2011, we can multiply 0.83 percent by the male population ages 15-49 (2,500,000) to estimate that approximately 21,000 men 15-49 paid for sex in the preceding 12 months.

Limitations to the ESPHS estimates

As described in Chapter 4, the errors around the summation approach and the known population approach suggest that the known population approach provided a better estimate of the personal network size. In addition, the meal definition of "to know" is restricted to alters that the respondent is likely to know better, thus we would expect the respondent would know more about the alter's behaviours.

The proxy respondent method was tested for the first time in Rwanda. Despite a careful selection of names, only 67 percent of the respondents said that they knew someone with one of the ten randomly selected names (five from each sex). The average network size among the 67 percent who knew someone with one of the names was 20 percent larger than the average network size of the respondents that did not provide an alter. If people with larger networks are different than people with smaller networks, the information collected from the proxy respondent method will be biased. In addition if respondents with larger networks more often responded we might get an over-estimate of the key population. The method needs to be further refined and tested. The proxy respondent results from this survey thus may not be reliable.

Both the network scale-up results and the proxy respondent results are affected by information transmission error. The information transmission rate is the probability that a person is aware of the high-risk behaviours of their acquaintances. A small qualitative survey of men having sex with men in Kigali in 2011 suggested that fewer than 20 percent of their acquaintances knew they were MSM (Feehan and Salganik, 2011). Thus the population size estimates of men who have sex with men are likely to be significantly underestimated. Unfortunately, reliable rates of information transmission are not available for the key populations in Rwanda. No adjustments are made for these estimates despite recognizing that they are underestimates.

Results

Table 6.2 provides the full list of available estimates, the limitations to those estimates, and the definition of the key population used. Only ranges are provided for each of these estimates since we recognize the large uncertainty in the methods creating these estimates.

Table 6.2 Comparison of available size estimates from various sources, Rwanda

Source	Year, coverage	Estimate range	Known bias	Definition/Question
Female sex workers				
Capture-recapture - Behavioural surveillance survey	2010, national	3,200	Hidden population	Women who are engaged in either street of establishment based sex work (time location sample in the survey)
Mapping participatory	2011, national	10,000	Hidden population	Women who have sex for money, home based, street based and venue based
Network scale-up - known populations, meal	**2011, national**	**25,000 - 45,000**	**Transmission error, response bias**	**How many females do you know who are practicing prostitution?**
Network scale-up - known populations, basic	2011, national	23,000 - 39,000	Transmission error, response bias	How many females do you know who are practicing prostitution?
Network scale-up - summation, meal	2011, national	38,000 - 68,000	Transmission error, response bias	How many females do you know who are practicing prostitution?
Network scale-up - summation, basic	2011, national	35,000 - 58,000	Transmission error, response bias	How many females do you know who are practicing prostitution?
Proxy respondent - 12 months	2011, national	75,000 - 111,000	Transmission error, response bias, overrepresents high network population	In your opinion, has she sold herself to men in the past 12 months? (selling, no reference to cash, not restricted to money)
Proxy respondent - lifetime	2011, national	121,000 - 166,000	Transmission error, response bias, overrepresents high network population	In your opinion, has she ever sold herself to men? (selling, no reference to cash, not restricted to money)
MSM				
Network scale-up - known populations, meal	**2011, national**	**<100 - 4,700**	**Transmission error, response bias**	**How many men do you know who have sex with men?**
Network scale-up - known populations, basic	2011, national	800 - 2,100	Transmission error, response bias	How many men do you know who have sex with men?
Network scale-up - summation, meal	2011, national	<100 - 7,100	Transmission error, response bias	How many men do you know who have sex with men?
Network scale-up - summation, basic	2011, national	1,100 - 3,100	Transmission error, response bias	How many men do you know who have sex with men?
Proxy respondent - 12 months	2011, national	<100 - 2,400	Transmission error, response bias, overrepresents high network population	In your opinion, has he had sex with another man in the past 12 months?
Proxy respondent - lifetime	2011, national	<100 - 6,100	Transmission error, response bias, overrepresents high network population	In your opinion, has he ever had sex with another man?
IDU				
Network scale-up - known populations, meal	**2011, national**	**<100 - 1,200**	**Transmission error, response bias**	**How many people of your acquaintances inject drugs in their veins?**
Network scale-up - known populations, basic	2011, national	600 - 3,800	Transmission error, response bias	How many people of your acquaintances inject drugs in their veins?
Network scale-up - summation, meal	2011, national	100 - 1,900	Transmission error, response bias	How many people of your acquaintances inject drugs in their veins?
Network scale-up - summation, basic	2011, national	900 - 5,700	Transmission error, response bias	How many people of your acquaintances inject drugs in their veins?
Proxy respondent - 12 months	2011, national	<100 - 3,400	Transmission error, response bias, overrepresents high network population	Has he injected himself/herself with drugs (mind altering substances) in the past 12 months for pleasure?
Proxy respondent - lifetime	2011, national	<100 - 7,600	Transmission error, response bias, overrepresents high network population	Has he injected himself/herself with drugs (mind altering substances) in the past 12 months for pleasure?
Clients of sex workers				
Network scale-up - known populations, meal	**2011, national**	**25,000 - 47,000**	**Transmission error, response bias**	**How many men who buy prostitutes do you know?**
Network scale-up - known populations, basic	2011, national	15,000 - 43,000	Transmission error, response bias	How many men who buy prostitutes do you know?
Network scale-up - summation, meal	2011, national	38,000 - 72,000	Transmission error, response bias	How many men who buy prostitutes do you know?
Network scale-up - summation, basic	2011, national	22,000 - 64,000	Transmission error, response bias	How many men who buy prostitutes do you know?
Direct questions in RDHS 2005	2005, national	21,000	Transmission error, response bias	Have you paid for sex in the last 12 months?
Proxy respondent - 12 months	2011, national	58,000 - 88,000	Transmission error, response bias, overrepresents high network population	Has he bought prostitutes in the last 12 months
Proxy respondent - lifetime	2011, national	177,000	Transmission error, response bias, overrepresents high network population	Has he ever bought prostitutes/a female person?

Based on the description of the limitations of the methods, the best estimates of the sizes of key populations at higher risk of HIV infection are presented in Table 6.3. It is important to note that these are likely to be underestimates because of the information transmission rate and the response bias due to stigma surrounding these populations.

In both the proxy respondent method and the network scale-up method the estimated number of female sex workers was remarkably similar to the number of clients of sex workers. This is likely due to the information transmission rate: acquaintances of sex workers are more likely to know that they are sex workers since that knowledge is how they advertise their work. Acquaintances of clients are not likely to know that their friends pay for sex, so they would have a very low information transmission rate. The 2010 BSS among sex workers found that on average sex workers had 3-5 clients per week. This suggests a fairly low turnover of clients, and thus possibly lower numbers of clients than what would be expected from other countries (RBC, 2010). Further research into this ratio in Rwanda is needed to help explain this finding, including a better understanding of how the population interprets the definition of "prostitute".

The results suggest that injecting drug use and sex between men does exist in Rwanda. The results suggest that currently the number of people in these key populations is relatively low (less than 5,000). However, because infectiousness of HIV in these populations is so high, it is important to ensure services are provided for these populations and to monitor the sizes and HIV prevalence in these groups.

Another noteworthy finding was that men also sell sex in Rwanda and have female clients. Although the number of male sex workers and female clients were quite low, the results suggest that further research is needed among this population to determine if they are a key population at risk for HIV infection in Rwanda. Further, the majority of all sex workers and clients are married thus creating important bridging populations.

Table 6.3 Best estimates of the sizes of key populations at higher risk of HIV infection

Based on network scale up estimate using known populations approach and restricted to people the respondent shared a meal or drink with in the prior 12 months, ESPHS Rwanda 2011

Key population	Year, coverage	Estimate or range	Known bias
Female sex workers	2011, national	25,000 - 45,000	Transmission error, response bias
MSM	2011, national	<100 - 4,700	Transmission error, response bias
IDU	2011, national	<100 - 1,200	Transmission error, response bias
Clients of sex workers	2011, national	25,000 - 47,000	Transmission error, response bias

Conclusions

The results from this study are useful in that we know that it is feasible to collect these data, however they do not provide conclusive size estimates for Rwanda. The results are likely to be underestimates because we are not able to adjust for the known biases and the vast majority of those biases will result in smaller estimates instead of larger estimates.

Future studies should collect data on the information transmission error for each population. The information transmission rate can be collected using the Game of Contacts. The Game of Contacts is a technique that is added to a survey among the high-risk population that interactively compiles information on the probability that an acquaintance of a person with high-risk behaviour knows about the high-risk behaviour. For example in the pilot survey Game of Contacts, men who have sex with men were asked to list people they knew with specific names (Feehan and Salganik, 2011). The interviewer then asked the respondent to identify how many of those people knew that the respondent had sex with other men. The results of the Game of Contacts provided an estimated information transmission rate, or the probability that an MSM's acquaintance knew they were MSM. Naturally this rate is only useful if it is representative of the population. The same exercise that collects information for the transmission rate can provide data on the degree ratio (or the ratio of the network size of someone from the high-risk

group versus the general population). Without applying this adjustment factor, the results are biased. However, the Game of Contacts requires a survey of the key population, which is challenging because the populations are usually hidden.

The response bias also leads to an underestimate. However, at this time there is no way to quantify the stigma surrounding these populations. The stigma questions did show there was a very high level of stigma in Rwanda toward these populations. This differs from a pilot survey in Chiang Mai, Thailand that showed high levels of acceptance toward "men being gay, transvestite, or homosexual" and "women provideing sex for compensation." The mean scores of acceptance were 3.1 and 2.7, respectively, on a scale of 1 to 5. The mean score for acceptance for "users of any type of injecting drugs" was 1.6 (Thaikla and Aramrattana, 2010). Future surveys should include these questions along with any improvements to help quantify the results.

Known populations from the National Identification Project Database provided reliable estimates for the known populations. Data from any form of census in countries should provide similarly reliable estimates. The data for known populations from the 2005 Rwanda DHS provide less accurate estimates of known populations because of the uncertainty from the sampling error.

The more restricted definition of the personal networks, or what it means "to know" someone, appears to provide higher counts of the people with high-risk behaviours. This is probably because the more restrictive definition means the respondent is more likely to know the personal behaviours of his or her alters. However, it is important that these definitions be specific to the culture. Future surveys should use restricted definitions of "to know" such as the meal definition used in ESPHS.

National definitions of who is included in the key populations at increased risk of HIV infection could have improved the comparison of the size estimates results. We are limited in our ability to validate the results to these size estimates because of the lack of a clear definition of, for example, a sex worker or an injecting drug user.

The proxy respondent method was used for the first time in the ESPHS. The results may not be reliable due to undersampling of alters in small networks. Further, various differences in question phrasing and the way answers were solicited impede a valid side-by-side comparison with the network scale-up estimates. In future surveys, the process should ensure that each respondent provides information for the same number of alters. If the number of alters is the same for each respondent (for example 2 alters for each respondent), the sample of alters will reflect the sample of respondents. For nationally representative surveys this will result in a nationally representative sample of alters.

REFERENCES

Bernard, H.R., E.C Johnsen, P. Killworth, and S. Robinson. 1991. Estimating the size of an average personal network and of an event subpopulation: Some empirical results. *Social Science Research* 20:109-121.

Bernard, H.R., T. Hallett, A. Iovita, E.C. Johnsen, R. Lyerla, C. McCarty, M. Mahy, M.J. Salganik, T. Saliuk, O. Scutelniciuc, G.A. Shelley, P. Sirinirund, S. Weir, and D.F. Stroup. 2010. Counting hard-to-count populations: the network scale-up method for public health. *Sexually Transmitted Infections* 86: ii11-ii15.

Carael, M., E. Slaymaker, R. Lyerla, and S. Sarker. 2006. Clients of sex workers in different regions of the world: Hard to count. *Sexually Transmitted Infections* 82: iii26-iii33.

Feehan, D., and M.J. Salganik. 2011. *Final report: Game of contacts, Pilot study Kigali, Rwanda*. Office of Population Research, Princeton University.

Hemenway, D. 1997. Survey research and self-defense gun use: An explanation of extreme overestiamtes. *The Journal of Criminal Law and Criminology* 87:1430-1445.

Johnsen, E.C., H.R. Bernard, P.D. Killworth, G.A. Shelley, and C. McCarty. 1995. A social network approach to corroborating the number of AIDS/HIV+ victims in the US. *Social Networks* 17:167-187.

Killworth, P.D., C. McCarty, H.R. Bernard, G.A. Shelley, and E.C. Johnsen. 1998. Estimation of seroprevalence, rape, and homelessness in the United States using a social network approach. *Evaluation Review* 22(2):289-308.

Killworth, P.D., C. McCarty, H.R. Bernard, E.C. Johnsen, J. Domini, and G.A. Shelley. 2003. Two interpretations of reports of knowledge of subpopulation sizes. *Social Networks* 25:141-160.

McCarty, C., P.D. Killworth, H.R. Bernard, E.C. Johnsen, and G.A. Shelley. 2001. Comparing two methods for estimating network size. *Human Organization* 60(1):28-39.

McCormick, T.H., M.J. Salganik, and T. Zheng. 2010. How many people do you know? Efficiently estimating personal network size. *Journal of the American Statistical Association* 105:59-70.

Ministry of Health (MOH) [Rwanda], National Institute of Statistics of Rwanda (NISR), and ICF Macro. 2009. *Rwanda Interim Demographic and Health Survey 2007-08.* Calverton, Maryland, U.S.A.: MOH, NISR, and ICF Macro.

National Institute of Statistics of Rwanda (NISR) and ORC Macro. 2006. *Rwanda demographic and health survey 2005.* Calverton, Maryland, U.S.A.: INSR and ORC Macro.

National Institute of Statistics of Rwanda (NISR). 2009. *National population projection 2007-2022*. Kigali, Rwanda: NISR.

National Institute of Statistics of Rwanda (NISR), Ministry of Health (MOH) [Rwanda], and ICF Macro. 2011. *Rwanda demographic and health survey 2010. Preliminary report.* Calverton, Maryland, U.S.A.: INSR, MOH, and ICF Macro.

Paniotto V., T. Petrenko, and O. Kupriyanov. 2009. *Estimating the size of populations with high risk for HIV using the network scale-up method.* Kiev, Ukraine: International Institute of Sociology.

Rwanda Biomedical Center (RBC). 2010. *Behavioral and biological surveillance survey among female sex workers, Survey Report.* Kigali, Rwanda: Center for Treatment and Research on AIDS, Malaria, Tuberculosis and Other Epidemics.

Salganik, M.J. and D. Feehan. 2009. *Improvements to the network scale-up method for estimating the size of hard-to-count populations. Technical report.* Princeton, New Jersey, U.S.A.: Office of Population Research, Princeton University.

Salganik, M.J., D. Fazito, N. Bertoni, A.H. Abdo, M.B. Mello, and F.I. Bastos. 2011. Practice of epidemiology assessing network scale-up estimates for groups most at risk of HIV/AIDS: Evidence from a multiple-method study of heavy drug users in Curitiba, Brazil. *American Journal of Epidemiology* 174(10):1190-96.

Shelley, G.A., H.R. Bernard, P. Killworth, E. Johnsen, and C. McCarty. 1995. Who knows your HIV status? What HIV+ patients and their network members know about each other. *Social Networks* 17:189-217.

Shelley, G.A., P.D. Killworth, H.R. Bernard, C. McCarty, E.C. Johnsen, and R.E. Rice. 2006. Who knows your HIV status II? Information propagation within social networks of seropositive people. *Human Organization* 65(4):430-444.

Thaikla, K. and A. Aramrattana. 2010. *Household survey for size estimation of most at risk population from HIV in Chiang Mai using network scale-up method.* Chiang Mai, Thailand: Center for Substance Abuse Research, Research Institute for Health Sciences, Chiang Mai University.

UNAIDS and WHO Working Group on Global HIV/AIDS and STI Surveillance. 2010. *Guidelines on estimating the size of populations most at risk to HIV.* Geneva, Switzerland: World Health Organization.

Vandepitte, J., R. Lyerla, G. Dallabetta, F. Crabbé., M. Alary, and A. Buvé. 2006. Estimates of the number of female sex workers in different regions of the world. *Sexually Transmitted Infections* 82: iii18-iii25.

Zheng, T.Z., M.J. Salganik, and A. Gelman. 2006. How many people do you know in prison? Estimating overdispersion in count data to estimate social structure in networks. *Journal of the American Statistical Association* 101:409-423.

SAMPLE DESIGN AND IMPLEMENTATION   *Appendix A*

A.1   SAMPLE DESIGN

The Rwanda pilot survey for "Estimating the Size of Key Populations at Higher Risk of HIV through a Household Survey" (ESPHS) is a national sample survey designed to provide information on hard-to-reach populations such as injecting drug users (IDU), sex workers, etc. A nationally representative sample of 2,125 households was selected in order to generate about 5,000 individual interviews. All household members age 15 and above, who were usual residents of the selected households or who slept in the household the night before the survey were eligible for the survey. The survey was designed to produce a representative estimate of the size of hard-to-reach populations for the country as a whole.

Sampling frame

The sampling frame used for the pilot survey was the preparatory frame for the Rwanda Population and Housing Census (RPHC) which will be conducted in 2012; it was provided by the National Institute of Statistics of Rwanda (NISR). The sampling frame is a complete list of natural villages covering the entire country. Although it is useful to work with a frame consisting of Enumeration Areas (EA) because the natural villages vary too much in size, such a frame was not available at the time of sample selection. The sampling frame from the 2002 Rwanda Population and Housing Census (RPHC 2002) was too old, especially after the reform of administrative units conducted in 2006. The old EA maps were no longer available, and therefore, the old EAs were no longer identifiable. On the other hand, since the cartographic work for the new census had not yet been completed, the new EA frame had also not been created. Therefore, at the time of sample selection, the only available sampling frame was the list of 14,837 natural villages provided by NISR. The frame file contains the administrative structure for each village and the village population. The village population was obtained from the national ID card project implemented in 2007-2008. These figures were somewhat lower than the population projection made in 2009 by NISR. While no projection by province was available, the population distribution by province was consistent with the RPHC 2002.

Rwanda's administrative units were reformed in 2006, reducing the number of provinces used in the last population census conducted in 2002 from 11 to the current 5. According to this reconfiguration, Rwanda is divided into provinces, each province is sub-divided into districts, each district into sectors, each sector into cells, and each cell into villages. There are 5 provinces, with a total number of 30 districts and 417 sectors. Table A.1 shows the distribution of the number of villages, population and proportion of

Table A.1 Distribution of population and villages, by province

Province	Number of villages	Population	Proportion
Kigali City	1,177	892,036	0.098
East	3,785	2,038,107	0.225
North	2,741	1,610,831	0.178
South	3,512	2,266,110	0.250
West	3,622	2,250,086	0.248
Rwanda	14,837	9,057,170	1.000

*Source: 2012 population census preparatory frame, Rwanda

population by province. Since the reform of administrative units, the Department of Local Government (DLG) has not yet released the urban-rural definition of the villages. Therefore, there was no urban-rural specification in the sampling frame. However, the urban-rural definition of the sampled villages can be determined after the DLG releases the definition.

Structure of the sample and the sampling procedure

The sample for the pilot survey is a stratified sample selected in two stages from the 2012 census preparatory frame. Stratification is achieved by separating out each province to form a sampling stratum. Samples are selected independently from each sampling stratum, using a two-stage selection. Implicit stratification and proportional allocation are achieved at the district level and below by sorting the sampling frame according to administrative unit at each level before sample selection and by using a probability proportional to size selection at the first stage of sampling.

In the first stage, 130 villages were selected with probability proportional to village size and with independent selection in each sampling stratum. A household listing operation was carried out in all of the selected villages at the time of the main survey. The household listing operation consisted of recording on the household listing form all residential households found in the village with the address and name of the head of household. The resulting list of households served as the sampling frame for the selection of households in the second stage. The methodology and detailed household listing procedure are addressed in the household listing manual.

At the second stage, a fixed number of 20 households were selected from each selected village in Kigali City province, while a fixed number of 15 households were selected from other areas. This strategy is based on the assumption that there is more homogeneity in the information being collected in rural areas than in large cities like Kigali City. Table A.2 shows the sample allocation of villages, households and expected number of eligible individuals by province. The sample allocation features a proportional allocation for the four geographical provinces and an oversampling for Kigali City.

Table A.2 Sample allocation of villages and households, and expected number of eligible individuals, by province

Province	Number of villages selected	Number of households selected	Expected eligible individuals
Kigali City	35	700	2,009
East	24	360	835
North	19	285	661
South	26	390	905
West	26	390	905
Rwanda	130	2,125	5,315

Selection probability and sampling weight

Due to the non-proportional allocation of the sample in various provinces and possible difference in response rates, sampling weights are required for any analysis using pilot survey data to ensure that actual results are representative of survey results at the national level. Since the pilot survey sample is a two-stage stratified cluster sample, sampling weights are calculated separately for each sampling stage and each cluster based on sampling probabilities. The following notations are used:

P_{1hi}: first-stage sampling probability of the ith village in stratum h

P_{2hi}: second -stage sampling probability within the ith village (household selection)

Let a_h be the number of villages selected in stratum h, M_{hi} the total population according to the sampling frame in the ith village, and $\sum M_{hi}$ the total population in stratum h. The probability of selecting the ith village in the pilot survey sample is calculated as follows:

$$\frac{a_h \, M_{hi}}{\sum M_{hi}}$$

Let b_{hi} be the proportion of households in the selected segment compared to the total number of households in the village i in stratum h if the village is segmented, otherwise $b_{hi} = 1$. Then the probability of selecting village i in the sample is:

$$P_{1hi} = \frac{a_h \, M_{hi}}{\sum M_{hi}} \times b_{hi}$$

A pilot survey cluster is either a village or a segment of a large village. Let L_{hi} be the number of households listed in the household listing operation in cluster i in stratum h, let g_{hi} be the number of households selected in the cluster. In the second stage, selection probability for each household in the cluster is calculated as follows:

$$P_{2hi} = \frac{g_{hi}}{L_{hi}}$$

The overall selection probability for each household in cluster i of stratum h is therefore the production of the selection probabilities for the two stages:

$$P_{hi} = P_{1hi} \times P_{2hi}$$

The design weight for each household in cluster i of stratum h is the inverse of its overall selection probability:

$$W_{hi} = 1 / P_{hi}$$

A spreadsheet containing all sampling parameters and selection probabilities is prepared to facilitate the calculation of sampling design weights. Design weights are adjusted for household non-response as well as individual non-response in order to obtain the sampling weights. The difference between household sampling weights and individual sampling weights is effected by individual non-response.

A.2 SAMPLE IMPLEMENTATION

Table A.3 presents detailed information on the results of the household and individual interviews. Household interviews were completed for 99.2 percent of the occupied households. A total of 2,629 women were found in these households, and 97.6 percent of them were successfully interviewed. The overall response rate for women was 96.8 percent. A total of 2,149 men were found in these households, and 97.8 percent of them were successfully interviewed. The overall response rate for men was 97.0 percent.

Table A.3 Sample implementation

Percent distribution of households, eligible women, and eligible men by results of the household and individual interviews, and household, eligible women, eligible men and overall women and men response rates, according to residence (unweighted), ESPHS Rwanda 2011

| Result | Residence | | |
	Kigali City	Other than Kigali City	Total
Selected households			
Completed (C)	98.1	99.3	98.9
Household present but no competent respondent at home (HP)	1.0	0.6	0.7
Refused (R)	0.3	0.1	0.1
Household absent (HA)	0.6	0.1	0.2
Total	100.0	100.0	100.0
Number of sampled households	700	1,425	2,125
Household response rate (HRR)[1]	98.7	99.4	99.2
Eligible women			
Completed (EWC)	96.8	98.1	97.6
Not at home (EWNH)	1.3	0.1	0.5
Refused (EWR)	0.2	0.1	0.1
Partly completed (EWPC)	0.1	0.1	0.1
Incapacitated (EWI)	1.5	1.7	1.6
Other (EWO)	0.1	0.0	0.0
Total	100.0	100.0	100.0
Number of women	865	1,764	2,629
Eligible women response rate (EWRR)[2]	96.8	98.1	97.6
Overall women response rate (OWRR) [3]	95.5	97.5	96.8
Eligible men			
Completed (EMC)	97.8	97.9	97.8
Not at home (EMNH)	1.1	0.7	0.9
Refused (EMR)	0.5	0.0	0.2
Incapacitated (EMI)	0.6	1.4	1.1
Total	100.0	100.0	100.0
Number of men	800	1,349	2,149
Eligible men response rate (EMRR)[4]	97.8	97.9	97.8
Overall men response rate (OMRR)[5]	96.5	97.2	97.0

[1] Using the number of households falling into specific response categories, the household response rate (HRR) is calculated as:

$$\frac{100 * C}{C + HP + R}$$

[2] The eligible women response rate (EWRR) is equivalent to the percentage of interviews completed (EWC) [3] The overall women response rate (OWRR) is calculated as:

$$OWRR = HRR * EWRR/100$$

[4] The eligible men response rate (EMRR) is equivalent to the percentage of interviews completed (EMC)
[5] The overall men response rate (OMRR) is calculated as:

$$OMRR = HRR * EMRR/100$$

ESTIMATES OF SAMPLING ERRORS *Appendix* **B**

The estimates from a sample survey are affected by two types of errors: (1) non-sampling errors, and (2) sampling errors. Non-sampling errors are the results of mistakes made in implementing data collection and data processing, such as failure to locate and interview the correct household, misunderstanding of the questions on the part of either the interviewer or the respondent, and data entry errors. Although numerous efforts were made to minimize this type of error during the implementation of the Rwanda ESPHS 2011, non-sampling errors are impossible to avoid and difficult to evaluate statistically.

Sampling errors, on the other hand, can be evaluated statistically. The sample of respondents selected in the ESPHS 2011 is only one of many samples that could have been selected from the same population, using the same design and identical size. Each of these samples would yield results that differ somewhat from the results of the actual sample selected. Sampling errors are a measure of the variability between all possible samples. Although the degree of variability is not known exactly, it can be estimated from the survey results.

A sampling error is usually measured in terms of the *standard error* for a particular statistic (mean, percentage, etc.), which is the square root of the variance. The standard error can be used to calculate confidence intervals within which the true value for the population can reasonably be assumed to fall. For example, for any given statistic calculated from a sample survey, the value of that statistic will fall within a range of plus or minus two times the standard error of that statistic in 95 percent of all possible samples of identical size and design.

If the sample of respondents had been selected as a simple random sample, it would have been possible to use straightforward formulas for calculating sampling errors. However, the ESPHS 2011 sample is the result of a multi-stage stratified design, and, consequently, it was necessary to use more complex formulae. The computer software used to calculate sampling errors for the ESPHS 2011 is a SAS program. This program uses the Taylor linearization method for variance estimation for survey estimates that are means or proportions.

The Taylor linearization method treats any percentage or average as a ratio estimate, $r = y/x$, where y represents the total sample value for variable y, and x represents the total number of cases in the group or subgroup under consideration. The variance of r is computed using the formula given below, with the standard error being the square root of the variance:

$$SE^2(r) = var(r) = \frac{1}{x^2} \sum_{h=1}^{H} \left[(1 - f_h) \frac{m_h}{m_h - 1} \left(\sum_{i=1}^{m_h} z_{hi}^2 - \frac{z_h^2}{m_h} \right) \right]$$

in which

$$z_{hi} = y_{hi} - rx_{hi} \text{, and } z_h = y_h - rx_h$$

where h represents the stratum which varies from 1 to H,

         m_h is the total number of clusters selected in the hth stratum,

         y_{hi} is the sum of the weighted values of variable y in the ith cluster in the hth stratum,

x_{hi} is the sum of the weighted number of cases in the ith cluster in the hth stratum, and

f_h is the sampling fraction of PSU in the hth stratum

In addition to the standard error, the program computes the design effect (DEFT) for each estimate, which is defined as the ratio between the standard error using the given sample design and the standard error that would result if a simple random sample had been used. A DEFT value of 1.0 indicates that the sample design is as efficient as a simple random sample, while a value greater than 1.0 indicates the increase in the sampling error due to the use of a more complex and less statistically efficient design, such as multistage and cluster selection. The program also computes the relative standard error and the confidence limits for the estimates.

Sampling errors for the ESPHS 2011 are calculated for selected variables. The results are presented in this appendix for the country as a whole, by sex of alters, and by sex of respondents. For each variable, the type of statistic (mean or proportion) and the base population are given in Table B.1. Table B.2 presents the value of the statistic (R), its standard error (SE), the number of unweighted (N-UNWE) and weighted (N-WEIG) cases, the design effect (DEFT), the relative standard error (SE/R), and the 95 percent confidence limits (R±2SE), for each variable.

Table B.1 List of selected variables for sampling errors, ESPHS Rwanda, 2011

Variable	Estimation	Base population

<center>ALL RESPOMDENTS</center>

Variable	Estimation	Base population
Kigali residence	Proportion	All respondents
Currently married or living together	Proportion	All respondents
Knows about condoms as mean of HIV prevention	Proportion	All respondents
Konws about limitimg partners as mean of HIV prevention	Proportion	All respondents
Accepting attitudes towards people with HIV	Proportion	All respondents who have heard of AIDS
Average number of sex workers known (standard)	Average	All respondents (standard)
Average number of MSM known (standard)	Average	All respondents (standard)
Average number of inject drug users known (standard)	Average	All respondents (standard)
Average number of clients of sex workers known (standard)	Average	All respondents (standard)
Average number of deaths known (standard)	Average	All respondents (standard)
Average number of sex workers known (meal)	Average	All respondents (meal)
Average number of MSM known (meal)	Average	All respondents (meal)
Average number of inject drug users known (meal)	Average	All respondents (meal)
Average number of clients of sex workers known (meal)	Average	All respondents (meal)
Average number of deaths known (meal)	Average	All respondents (meal)
Network size (summation method, standard)	Average	All respondents (standard)
Network size (summation method, meal)	Average	All respondents (meal)
Percent of sex workers among male alters	Proportion	Male alters
Percent of MSM among male alters	Proportion	Male alters
Percent of injecting drug users among male alters	Proportion	Male alters
Percent of clients of sex workers among male alters	Proportion	Male alters
Percent of sex workers among female alters	Proportion	Female alters
Percent of injecting drug users among female alters	Proportion	Female alters
Percent of clients of sex workers among female alters	Proportion	Female alters
Percent of sex workers among male and female alters	Proportion	All alters
Percent of MSM among male and female alters	Proportion	All alters
Percent of injecting drug users among male and female alters	Proportion	All alters
Percent of clients of sex workers among male and female alters	Proportion	All alters

<center>MALE RESPOMDENTS</center>

Variable	Estimation	Base population
Kigali residence	Proportion	Male respondents
Currently married or living together	Proportion	Male respondents
Knows about condoms as mean of HIV prevention	Proportion	Male respondents
Konws about limitimg partners as mean of HIV prevention	Proportion	Male respondents
Accepting attitudes towards people with HIV	Proportion	Male respondents who have heard of AIDS
Average number of sex workers known (standard)	Average	Male respondents (standard)
Average number of MSM known (standard)	Average	Male respondents (standard)
Average number of inject drug users known (standard)	Average	Male respondents (standard)
Average number of clients of sex workers known (standard)	Average	Male respondents (standard)
Average number of sex workers known (meal)	Average	Male respondents (meal)
Average number of MSM known (meal)	Average	Male respondents (meal)
Average number of inject drug users known (meal)	Average	Male respondents (meal)
Average number of clients of sex workers known (meal)	Average	Male respondents (meal)
Network size (summation method, standard)	Average	Male respondents (standard)
Network size (summation method, meal)	Average	Male respondents (meal)

<center>FEMALE RESPOMDENTS</center>

Variable	Estimation	Base population
Kigali residence	Proportion	Female respondents
Currently married or living together	Proportion	Female respondents
Knows about condoms as mean of HIV prevention	Proportion	Female respondents
Konws about limitimg partners as mean of HIV prevention	Proportion	Female respondents
Accepting attitudes towards people with HIV	Proportion	Female respondents who have heard of AIDS
Average number of sex workers known (standard)	Average	Female respondents (standard)
Average number of MSM known (standard)	Average	Female respondents (standard)
Average number of inject drug users known (standard)	Average	Female respondents (standard)
Average number of clients of sex workers known (standard)	Average	Female respondents (standard)
Average number of sex workers known (meal)	Average	Female respondents (meal)
Average number of MSM known (meal)	Average	Female respondents (meal)
Average number of inject drug users known (meal)	Average	Female respondents (meal)
Average number of clients of sex workers known (meal)	Average	Female respondents (meal)
Network size (summation method, standard)	Average	Female respondents (standard)
Network size (summation method, meal)	Average	Female respondents (meal)

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N-UNWE)	Number of cases Weighted (N-WEIG)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Upper R-2SE	Confidence limits Lower R+2SE
ALL RESPONDENTS								
Kigali residence	0.118	0.008	4669	4669	1.641	0.066	0.102	0.133
Currently married or living together	0.547	0.013	4669	4669	1.718	0.023	0.522	0.572
Knows about condoms as mean of HIV prevention	0.914	0.006	4669	4669	1.373	0.006	0.902	0.925
Konws about limitimg partners as mean of HIV prevention	0.862	0.008	4669	4669	1.648	0.010	0.846	0.879
Accepting attitudes towards people with HIV	0.634	0.012	4665	4665	1.656	0.018	0.610	0.657
Average number of sex workers known (standard)	0.717	0.066	2273	2236	1.299	0.092	0.585	0.848
Average number of MSM known (standard)	0.032	0.007	2273	2236	0.890	0.205	0.019	0.045
Average number of inject drug users known (standard)	0.050	0.017	2273	2236	1.256	0.346	0.015	0.084
Average number of clients of sex workers known (standard)	0.659	0.141	2273	2236	1.576	0.213	0.378	0.940
Average number of deaths known (standard)	1.098	0.048	2273	2236	1.662	0.044	1.002	1.195
Average number of sex workers known (meal)	0.345	0.036	2396	2433	1.213	0.105	0.273	0.418
Average number of MSM known (meal)	0.022	0.011	2396	2433	1.123	0.499	0.000	0.044
Average number of inject drug users known (meal)	0.006	0.003	2396	2433	0.931	0.437	0.001	0.012
Average number of clients of sex workers known (meal)	0.355	0.042	2396	2433	1.110	0.118	0.272	0.439
Average number of deaths known (meal)	0.515	0.033	2396	2433	1.592	0.064	0.450	0.581
Network size (summation method, standard)	168.7	5.974	2273	2236	1.857	0.035	156.7	180.6
Network size (summation method, meal)	71.2	2.791	2396	2433	1.704	0.039	65.6	76.8
Percent of sex workers among male alters	0.0027	0.001	3062	2963	1.092	0.382	0.0006	0.0047
Percent of MSM among male alters	0.0012	0.001	3062	2963	0.903	0.469	0.0001	0.0024
Percent of injecting drug users among male alters	0.0014	0.001	3062	2963	1.345	0.654	0.0000	0.0032
Percent of clients of sex workers among male alters	0.0466	0.005	3062	2963	1.158	0.105	0.0368	0.0563
Percent of sex workers among female alters	0.0540	0.006	2762	2769	1.274	0.105	0.0426	0.0653
Percent of injecting drug users among female alters	0.0001	0.000	2762	2769	0.442	1.002	0.0000	0.0002
Percent of clients of sex workers among female alters	0.0239	0.004	2762	2769	1.259	0.160	0.0162	0.0315
Percent of sex workers among male and female alters	0.0275	0.003	5824	5732	1.264	0.103	0.0218	0.0331
Percent of injecting drug users among male and female alters	0.0008	0.000	5824	5732	1.309	0.627	0.0000	0.0017
Percent of clients of sex workers among male and female alters	0.0356	0.004	5824	5732	1.287	0.099	0.0285	0.0426
MALE RESPONDENTS								
Kigali residence	0.129	0.010	2102	2056	1.352	0.077	0.110	0.149
Currently married or living together	0.584	0.015	2102	2056	1.407	0.026	0.554	0.614
Knows about condoms as mean of HIV prevention	0.949	0.006	2102	2056	1.222	0.006	0.937	0.961
Konws about limitimg partners as mean of HIV prevention	0.892	0.009	2102	2056	1.344	0.010	0.874	0.910
Accepting attitudes towards people with HIV	0.691	0.014	2099	2053	1.380	0.020	0.663	0.719
Average number of sex workers known (standard)	0.918	0.099	1019	975	1.044	0.107	0.721	1.115
Average number of MSM known (standard)	0.051	0.013	1019	975	0.837	0.252	0.025	0.076
Average number of inject drug users known (standard)	0.010	0.005	1019	975	0.586	0.456	0.001	0.020
Average number of clients of sex workers known (standard)	0.997	0.276	1019	975	1.478	0.277	0.444	1.550
Average number of sex workers known (meal)	0.456	0.067	1083	1080	1.222	0.148	0.321	0.590
Average number of MSM known (meal)	0.024	0.010	1083	1080	1.236	0.401	0.005	0.043
Average number of inject drug users known (meal)	0.014	0.006	1083	1080	0.931	0.439	0.002	0.026
Average number of clients of sex workers known (meal)	0.697	0.083	1083	1080	1.046	0.119	0.531	0.862
Network size (summation method, standard)	223.2	9.806	1019	975	1.663	0.044	203.6	242.8
Network size (summation method, meal)	94.6	4.683	1083	1080	1.562	0.050	85.2	103.9
FEMALE RESPONDENTS								
Kigali residence	0.109	0.007	2567	2613	1.161	0.066	0.094	0.123
Currently married or living together	0.518	0.013	2567	2613	1.345	0.026	0.491	0.544
Knows about condoms as mean of HIV prevention	0.886	0.009	2567	2613	1.439	0.010	0.868	0.904
Konws about limitimg partners as mean of HIV prevention	0.839	0.012	2567	2613	1.679	0.015	0.814	0.863
Accepting attitudes towards people with HIV	0.589	0.014	2566	2612	1.470	0.024	0.560	0.618
Average number of sex workers known (standard)	0.561	0.065	1254	1261	1.271	0.116	0.431	0.691
Average number of MSM known (standard)	0.018	0.005	1254	1261	1.002	0.309	0.007	0.029
Average number of inject drug users known (standard)	0.080	0.030	1254	1261	1.286	0.380	0.019	0.141
Average number of clients of sex workers known (standard)	0.397	0.074	1254	1261	1.255	0.187	0.249	0.545
Average number of sex workers known (meal)	0.257	0.036	1313	1352	1.186	0.140	0.185	0.329
Average number of MSM known (meal)	0.020	0.018	1313	1352	1.074	0.874	0.000	0.055
Average number of inject drug users known (meal)	0.000	0.000	1313	1352	0.500	0.999	0.000	0.001
Average number of clients of sex workers known (meal)	0.083	0.024	1313	1352	1.201	0.296	0.034	0.132
Network size (summation method, standard)	126.5	4.709	1254	1261	1.646	0.037	117.1	135.9
Network size (summation method, meal)	52.5	2.118	1313	1352	1.398	0.040	48.3	56.8

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QUESTIONNAIRES

School of Public Health   **CNLS**

IDENTIFICATION	
PLACE NAME _____	
NAME OF HOUSEHOLD HEAD _____	
CLUSTER NUMBER	
HOUSEHOLD STRUCTURE NUMBER	
HOUSEHOLD NUMBER	

HOUSEHOLD SELECTED FOR: BASIC DEFINITION OF "TO KNOW" = 1 (USE BLUE INDIVIDUAL QUESTIONNAIRE)
MEAL DEFINITION OF "TO KNOW" = 2 (USE GREEN INDIVIDUAL QUESTIONNAIRE)

INTERVIEWER VISITS				
	1	2	3	FINAL VISIT
DATE	_____	_____	_____	DAY
				MONTH
				YEAR 2 0 1 1
INTERVIEWER'S NAME	_____	_____	_____	INT. NUMBER
RESULT*	_____	_____	_____	RESULT
NEXT VISIT: DATE	_____	_____	▓▓▓▓▓	TOTAL NUMBER OF VISITS
TIME	_____	_____	▓▓▓▓▓	

*RESULT CODES:
1   COMPLETED
2   NO HOUSEHOLD MEMBER AT HOME OR NO COMPETENT RESPONDENT
     AT HOME AT TIME OF VISIT
3   ENTIRE HOUSEHOLD ABSENT FOR EXTENDED PERIOD OF TIME
4   POSTPONED
5   REFUSED
9   OTHER _____
                    (SPECIFY)

TOTAL PERSONS IN HOUSEHOLD

TOTAL ELIGIBLE WOMEN

TOTAL ELIGIBLE MEN

LINE NO. OF RESPONDENT TO HOUSEHOLD QUESTIONNAIRE

SUPERVISOR _____	KEYED BY

INTRODUCTION AND CONSENT

Hello. My name is _____. I am working with the School of Public Health of Rwanda. We are conducting a survey about health all over Rwanda. The information we collect will help the government to plan health services. Your household was selected by chance for the survey. I would like to ask you some questions about your household. The questions usually take about 10 to 15 minutes. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. You don't have to be in the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time.
In case you need more information about the survey, you may contact the person listed on this card.

GIVE CARD WITH CONTACT INFORMATION

Do you have any questions?
May I begin the interview now?

SIGNATURE OF INTERVIEWER: _____   DATE: _____

RESPONDENT AGREES TO BE INTERVIEWED . . . 1   RESPONDENT DOES NOT AGREE TO BE INTERVIEWED . . . 2 → END

HOUSEHOLD SCHEDULE

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	IF AGE 15 OR OLDER MARITAL STATUS	ELIGIBILITY	
1	2	3	4	5	6	7	8	9	10
	Please give me the names of the persons who usually live in your household and guests of the household who stayed here last night, starting with the head of the household. AFTER LISTING THE NAMES AND RECORDING THE RELATIONSHIP AND SEX FOR EACH PERSON, ASK QUESTIONS 2A-2C TO BE SURE THAT THE LISTING IS COMPLETE. THEN ASK APPROPRIATE QUESTIONS IN COLUMNS 5-10 FOR EACH PERSON.	What is the relationship of (NAME) to the head of the household? SEE CODES BELOW.	Is (NAME) male or female?	Does (NAME) usually live here?	Did (NAME) stay here last night?	How old is (NAME)? IF 95 OR MORE, RECORD 95'.	What is (NAME)'s current marital status? 1 = MARRIED OR LIVING TOGETHER 2 = DIVORCED/ SEPARATED 3 = WIDOWED 4 = NEVER-MARRIED AND NEVER LIVED TOGETHER	CIRCLE LINE NUMBER OF ALL WOMEN AGE 15 +	CIRCLE LINE NUMBER OF ALL MEN AGE 15 +
			M F	Y N	Y N	IN YEARS			
01		☐ ☐	1 2	1 2	1 2	☐ ☐	☐	01	01
02		☐ ☐	1 2	1 2	1 2	☐ ☐	☐	02	02
03		☐ ☐	1 2	1 2	1 2	☐ ☐	☐	03	03
04		☐ ☐	1 2	1 2	1 2	☐ ☐	☐	04	04
05		☐ ☐	1 2	1 2	1 2	☐ ☐	☐	05	05
06		☐ ☐	1 2	1 2	1 2	☐ ☐	☐	06	06
07		☐ ☐	1 2	1 2	1 2	☐ ☐	☐	07	07
08		☐ ☐	1 2	1 2	1 2	☐ ☐	☐	08	08
09		☐ ☐	1 2	1 2	1 2	☐ ☐	☐	09	09
10		☐ ☐	1 2	1 2	1 2	☐ ☐	☐	10	10

CODES FOR Q. 3: RELATIONSHIP TO HEAD OF HOUSEHOLD

01 = HEAD
02 = WIFE OR HUSBAND
03 = SON OR DAUGHTER
04 = SON-IN-LAW OR DAUGHTER-IN-LAW
05 = GRANDCHILD
06 = PARENT
07 = PARENT-IN-LAW

08 = BROTHER OR SISTER
09 = OTHER RELATIVE
10 = ADOPTED/FOSTER/ STEPCHILD
11 = NOT RELATED
12 = DOMESTIC WORKER
98 = DON'T KNOW

HOUSEHOLD SCHEDULE

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	IF AGE 15 OR OLDER MARITAL STATUS	ELIGIBILITY	
1	2	3	4	5	6	7	8	9	10
	Please give me the names of the persons who usually live in your household and guests of the household who stayed here last night, starting with the head of the household. AFTER LISTING THE NAMES AND RECORDING THE RELATIONSHIP AND SEX FOR EACH PERSON, ASK QUESTIONS 2A-2C TO BE SURE THAT THE LISTING IS COMPLETE. THEN ASK APPROPRIATE QUESTIONS IN COLUMNS 5-10 FOR EACH PERSON.	What is the relationship of (NAME) to the head of the household? SEE CODES BELOW.	Is (NAME) male or female?	Does (NAME) usually live here?	Did (NAME) stay here last night?	How old is (NAME)? IF 95 OR MORE, RECORD 95'.	What is (NAME)'s current marital status? 1 = MARRIED OR LIVING TOGETHER 2 = DIVORCED/ SEPARATED 3 = WIDOWED 4 = NEVER-MARRIED AND NEVER LIVED TOGETHER	CIRCLE LINE NUMBER OF ALL WOMEN AGE 15 +	CIRCLE LINE NUMBER OF ALL MEN AGE 15 +
1	2	3	4	5	6	7	8	9	10
			M 1 F 2	Y 1 N 2	Y 1 N 2	IN YEARS			
11			1 2	1 2	1 2			11	11
12			1 2	1 2	1 2			12	12
13			1 2	1 2	1 2			13	13
14			1 2	1 2	1 2			14	14
15			1 2	1 2	1 2			15	15
16			1 2	1 2	1 2			16	16
17			1 2	1 2	1 2			17	17
18			1 2	1 2	1 2			18	18
19			1 2	1 2	1 2			19	19
20			1 2	1 2	1 2			20	20

TICK HERE IF CONTINUATION SHEET USED ☐

2A) Just to make sure that I have a complete listing. Are there any other persons such as small children or infants that we have not listed?   YES ☐ → ADD TO TABLE   NO ☐

2B) Are there any other people who may not be members of your family, such as domestic servants, lodgers, or friends who usually live here?   YES ☐ → ADD TO TABLE   NO ☐

2C) Are there any guests or temporary visitors staying here, or anyone else who stayed here last night, who have not been listed?   YES ☐ → ADD TO TABLE   NO ☐

HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

102	What is the main source of drinking water for members of your household?	PIPED WATER
		   PIPED INTO DWELLING 11
		   PIPED TO YARD/PLOT 12
		   PUBLIC TAP/STANDPIPE 13
		TUBE WELL OR BOREHOLE 21
		DUG WELL
		   PROTECTED WELL 31
		   UNPROTECTED WELL 32
		WATER FROM SPRING
		   PROTECTED SPRING 41
		   UNPROTECTED SPRING 42
		RAINWATER 51
		TANKER TRUCK 61
		CART WITH SMALL TANK 71
		SURFACE WATER (RIVER/DAM/
		   LAKE/POND/STREAM/CANAL/
		   IRRIGATION CHANNEL) 81
		BOTTLED WATER 91
		
		OTHER _____ 96
		         (SPECIFY)
			⟶ 107
			
			⟶ 107

103	Where is that water source located?	IN OWN DWELLING .... 1 IN OWN YARD/PLOT .... 2 ELSEWHERE 3	

107	What kind of toilet facility do members of your household usually use?	FLUSH OR POUR FLUSH TOILET
		   FLUSH TO PIPED SEWER
		     SYSTEM 11
		   FLUSH TO SEPTIC TANK 12
		   FLUSH TO PIT LATRINE 13
		   FLUSH TO SOMEWHERE ELSE 14
		   FLUSH, DON'T KNOW WHERE 15
		PIT LATRINE
		   VENTILATED IMPROVED
		     PIT LATRINE 21
		   PIT LATRINE WITH SLAB 22
		   PIT LATRINE WITHOUT SLAB/
		     OPEN PIT 23
		COMPOSTING TOILET 31
		BUCKET TOILET 41
		HANGING TOILET/HANGING
		   LATRINE 51
		NO FACILITY/BUSH/FIELD 61
		
		OTHER _____ 96
		         (SPECIFY)
			⟶ 110

108	Do you share this toilet facility with other households?	YES .... 1 NO 2	
110	Does your household have: Electricity? A radio? A television? A mobile telephone? A non-mobile telephone? A refrigerator? A computer?	YES NO ELECTRICITY .... 1 2 RADIO .... 1 2 TELEVISION .... 1 2 MOBILE TELEPHONE ...... 1 2 NON-MOBILE TELEPHONE ... 1 2 REFRIGERATOR .... 1 2 COMPUTER 1 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
114	MAIN MATERIAL OF THE FLOOR. RECORD OBSERVATION.	NATURAL FLOOR 　EARTH/SAND　. . . . . 11 　DUNG . . . . 12 RUDIMENTARY FLOOR 　WOOD PLANKS　. . . . . 21 　PALM/BAMBOO　. . . . . 22 FINISHED FLOOR 　PARQUET OR POLISHED 　　WOOD　. . . . . 31 　VINYL OR ASPHALT STRIPS　. . . . . . . 32 　CERAMIC TILES　. . . . . 33 　CEMENT　. . . . . 34 　CARPET . . . . 35 OTHER _____ 96 　　　　　　(SPECIFY)	
115	MAIN MATERIAL OF THE ROOF. RECORD OBSERVATION.	NATURAL ROOFING 　NO ROOF　. . . . . 11 　THATCH/PALM LEAF/LEAF　. . . . . 12 　SOD　. . . . . 13 RUDIMENTARY ROOFING 　RUSTIC MAT/PLASTIC　. . . . . 21 　PALM/BAMBOO　. . . . . 22 　WOOD PLANKS . . . . 23 　CARDBOARD　. 24 FINISHED ROOFING 　METAL/IRON SHEET　. . . . . 31 　WOOD　. . . . . 32 　CALAMINE/CEMENT FIBER　. . . . . 33 　CERAMIC TILES . . . . 34 　CEMENT . . . . 35 　ROOFING SHINGLES . . . . 36 OTHER _____ 96 　　　　　　(SPECIFY)	
116	MAIN MATERIAL OF THE EXTERIOR WALLS. RECORD OBSERVATION.	NATURAL WALLS 　NO WALLS . . . . 11 　CANE/PALM/TRUNKS　. . . . . 12 　DIRT　. . . . . 13 RUDIMENTARY WALLS 　BAMBOO WITH MUD　. . . . . 21 　STONE WITH MUD　. . . . . 22 　UNCOVERED ADOBE　. . . . . 23 　PLYWOOD　. . . . . 24 　CARDBOARD　. 25 　REUSED WOOD　. . . . . 26 FINISHED WALLS 　CEMENT　. . . . . 31 　STONE WITH LIME/CEMENT . . . . 32 　BRICKS . . . . 33 　CEMENT BLOCKS . . . . 34 　COVERED ADOBE　. . . . . 35 　WOOD PLANKS/SHINGLES　. . . . . 36 OTHER _____ 96 　　　　　　(SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
117	How many rooms in this household are used for sleeping?	ROOMS .... ☐☐	
118	Does any member of this household own: A watch? A bicycle? A motorcycle or motor scooter? An animal-drawn cart? A car or truck? A boat without a motor? A boat with a motor?	YES NO WATCH .... 1 2 BICYCLE .... 1 2 MOTORCYCLE/SCOOTER ... 1 2 ANIMAL-DRAWN CART ...... 1 2 CAR/TRUCK .... 1 2 BOAT WITHOUT MOTOR ... 1 2 BOAT WITH MOTOR 1 2	
119	Does any member of this household own any agricultural land?	YES .... 1 NO 2	→ 121
120	How many hectares of agricultural land do members of this household own? IF 95 OR MORE, CIRCLE '950'	HECTARES ☐☐.☐ 95 OR MORE HECTARES .... 95.0 DON'T KNOW 99.8	
121	Does this household own any livestock, herds, other farm animals, or poultry?	YES .... 1 NO 2	→ 123
122	How many of the following animals does this household own? IF NONE, ENTER '00'. IF 95 OR MORE, ENTER '95'. IF UNKNOWN, ENTER '98'. Cows (traditional)? Milk cows (modern)? Bulls? Goats? Sheep? Chickens? Pigs? Rabbits? Horses, donkeys, or mules?	COWS .... ☐☐ MILK COWS .... ☐☐ BULLS .... ☐☐ GOATS .... ☐☐ SHEEP .... ☐☐ CHICKENS .... ☐☐ PIGS .... ☐☐ RABBITS .... ☐☐ HORSES/DONKEYS/MULES ...... ☐☐	
123	Does any member of this household have a bank account?	YES .... 1 NO 2	

RWANDA SIZE ESTIMATES SURVEY

INDIVIDUAL QUESTIONNAIRE

School of Public Health   **CNLS**

THIS HOUSEHOLD WAS SELECTED FOR THE BASIC DEFINITION OF "TO KNOW".	1

IDENTIFICATION

PLACE NAME _____

NAME OF HOUSEHOLD HEAD _____

CLUSTER NUMBER ....

STRUCTURE NUMBER ....

HOUSEHOLD NUMBER ....

NAME AND LINE NUMBER OF RESPONDENT _____

SEX OF RESPONDENT (1 = MALE; 2= FEMALE)

INTERVIEWER VISITS

	1	2	3	FINAL VISIT
DATE	_____	_____	_____	DAY
				MONTH
				YEAR 2 0 1 1
INTERVIEWER'S NAME	_____	_____	_____	INT. NUMBER
RESULT*	_____	_____	_____	RESULT
NEXT VISIT: DATE	_____	_____		TOTAL NUMBER OF VISITS
TIME	_____	_____		

*RESULT CODES:
   1   COMPLETED   4   REFUSED
   2   NOT AT HOME   5   PARTLY COMPLETED   7   OTHER _____
   3   POSTPONED   6   INCAPACITATED   (SPECIFY)

LANGUAGE OF INTERVIEW:	TRANSLATOR USED?
KINYARWANDA 1	YES 1
OTHER _____ 6 SPECIFY	NO 2

SUPERVISOR _____		KEYED BY	

001	CHECK HOUSEHOLD QUESTIONNAIRE, QUESTION 7 (AGE)	
	15-17 ☐ 18+ ☐ ────────────────────────►	005

002	CHECK HOUSEHOLD QUESTIONNAIRE, QUESTION 8 (MARITAL STATUS)	
	CODE '4' ☐ OTHER ☐ ──────────────────► (NEVER IN UNION)	005

| 003 | RECORD LINE NUMBER OF PARENT/OTHER ADULT RESPONSIBLE FOR ADOLESCENT. RECORD '00' IF NOT LISTED. | LINE NUMBER OF PARENT OR OTHER RESPONSIBLE ADULT ☐☐ | |

004 - INFORMED CONSENT (PARENT/RESPONSIBLE ADULT)

Hello. My name is _____. I am working with the School of Public Health of Rwanda. We are conducting a survey about health all over Rwanda. The information we collect will help the government to plan health services. Your household was selected by chance for the survey. We also want to do a short interview with (NAME OF THE ADOLESCENT). The questions usually take about 30 to 40 minutes. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. (NAME OF THE ADOLESCENT) is free to refuse any question and can stop the interview at any time. It is your choice to let (NAME OF THE ADOLESCENT) take part or not. We hope you allow (NAME OF THE ADOLESCENT) to join since his/her views are important.

In case you need more information about the survey, you may contact the person listed on the card that has already been given to your household.
Do you have any questions? May I begin the interview now?

SIGNATURE OF INTERVIEWER: _____ DATE: _____

PARENT/OTHER RESPONSIBLE ADULT AGREES . . . 1   PARENT/OTHER RESPONSIBLE ADULT DOES NOT AGREE. 2 ─► END

005 - INFORMED CONSENT (RESPONDENT)

Hello. My name is _____. I am working with the School of Public Health of Rwanda. We are conducting a survey about health all over Rwanda. The information we collect will help the government to plan health services. Your household was selected by chance for the survey. The questions usually take about 30 to 40 minutes. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. You are free to refuse any question and you can stop the interview at any time. It is your choice to take part or not. We hope you will join since your views are important.

In case you need more information about the survey, you may contact the person listed on the card that has already been given to your household.
Do you have any questions? May I begin the interview now?

SIGNATURE OF INTERVIEWER: _____ DATE: _____

RESPONDENT AGREES TO BE INTERVIEWED . . . 1   RESPONDENT DOES NOT AGREE TO BE INTERVIEWED . . . 2 ─► END

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
101	RECORD THE TIME.	HOUR . . . . MINUTES	
102	In what month and year were you born?	MONTH . . . . DON'T KNOW MONTH . . . . 98 YEAR . . . . DON'T KNOW YEAR 9998	
103	How old were you at your last birthday? COMPARE AND CORRECT 102 AND/OR 103 IF INCONSISTENT. IF 95 OR MORE, RECORD '95'	AGE IN COMPLETED YEARS	
104	Have you ever attended school?	YES . . . . 1 NO 2	→ 110
105	What is the highest level of school you attended: primary, post-primary, secondary, or higher?	PRIMARY . . . . 1 POST-PRIMARY/VOCATIONAL . . . . . 2 SECONDARY . . . . 3 TERTIARY . . . . 4 PRE-PRIMARY 6	
106	What is the highest (grade/form/year) you completed at that level? IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	GRADE/FORM/YEAR	
110	Do you read a newspaper or magazine at least once a week, less than once a week or not at all?	AT LEAST ONCE A WEEK . . . . 1 LESS THAN ONCE A WEEK . . . . 2 NOT AT ALL 3	
111	Do you listen to the radio at least once a week, less than once a week or not at all?	AT LEAST ONCE A WEEK . . . . 1 LESS THAN ONCE A WEEK . . . . 2 NOT AT ALL 3	
112	Do you watch television at least once a week, less than once a week or not at all?	AT LEAST ONCE A WEEK . . . . 1 LESS THAN ONCE A WEEK . . . . 2 NOT AT ALL 3	
113	What is your religion?	CATHOLIC . . . . 1 PROTESTANT . . . . 2 ADVENTIST . . . . 3 MUSLIM . . . . 4 TRADITIONAL . . . . 5 OTHER _____ 6 SPECIFY NO RELIGION 7	
115	In the last 12 months, how many times have you been away from home for one or more nights? IF 95 OR MORE, RECORD "95"	NUMBER OF TIMES . . . . NONE 00	→ 117

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
116	In the last 12 months, have you been away from home for more than one month at a time?	YES . . . . 1 NO 2	
117	CHECK COVER OF QUESTIONNAIRER: SEX OF RESPONDENT: FEMALE ☐ MALE ☐		→ 120
118	CHECK 103: AGE 15-49 ☐ 50 OR + ☐		→ 120
119	Have you had a birth in the last 12 months?	YES . . . . 1 NO 2	
120	CHECK COVER OF QUESTIONNAIRER: SEX OF RESPONDENT: MALE — Are you currently married or living together with a woman as if married? FEMALE — Are you currently married or living together with a man as if married?	YES, CURRENTLY MARRIED . . . . 1 YES, LIVING WITH A MAN/WOMAN . 2 NO, NOT IN UNION 3	→ 123
121	MALE — Have you ever been married or lived together with a woman as if married? FEMALE — Have you ever been married or lived together with a man as if married?	YES, FORMERLY MARRIED . . . . 1 YES, LIVED WITH A MAN/WOMAN . 2 NO 3	→ 123
122	MALE — What is your marital status now: are you widowed, divorced, or separated? FEMALE — What is your marital status now: are you widowed, divorced, or separated?	WIDOWED . . . . 1 DIVORCED . . . . 2 SEPARATED 3	
123	Do you currently smoke cigarettes?	YES . . . . 1 NO 2	
124	Now I would like to talk about something else. Have you ever heard of an illness called AIDS?	YES . . . . 1 NO 2	→ 200
125	Can people reduce their chance of getting the AIDS virus by having just one uninfected sex partner who has no other sex partners?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
126	Can people get the AIDS virus from mosquito bites?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
127	Can people reduce their chance of getting the AIDS virus by using a condom every time they have sex?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
128	Can people get the AIDS virus by sharing food with a person who has AIDS?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
129	Can people get the AIDS virus because of witchcraft or other supernatural means?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
130	Is it possible for a healthy-looking person to have the AIDS virus?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
132	Can the virus that causes AIDS be transmitted from a mother to her baby: During pregnancy? During delivery? By breastfeeding?	YES NO DK DURING PREG. . . . . . 1 2 8 DURING DELIVERY . . . 1 2 8 BREASTFEEDING . . . 1 2 8	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
133	Can people become infected with HIV by sitting next to someone who has the AIDS virus?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
134	I don't want to know the results, but have you ever been tested to see if you have the AIDS virus?	YES . . . . 1 NO 2	
135	Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the AIDS virus?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
136	If a member of your family got infected with the AIDS virus, would you want it to remain a secret or not?	YES, REMAIN A SECRET . . . . 1 NO . . . . 2 DK/NOT SURE/DEPENDS 8	
137	If a member of your family became sick with AIDS, would you be willing to care for her or him in your own household?	YES . . . . 1 NO . . . . 2 DK/NOT SURE/DEPENDS 8	
138	In your opinion, if a female teacher has the AIDS virus but is not sick, should she be allowed to continue teaching in the school?	SHOULD BE ALLOWED . . . . 1 SHOULD NOT BE ALLOWED . . . . 2 DK/NOT SURE/DEPENDS 8	
139	Do you personally know someone who has or is suspected to have the AIDS virus?	YES . . . . 1 NO 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
200	Now I am going to ask you some questions about people that you know. These questions will help us count the number of people who may be in need of certain health services These people should be: - people you know by sight AND name, and who also know you by sight and name. In other words, you should not consider famous people that you know about, but who do not know about you. - people you have had some contact with -– either in person, over the phone, or on the computer -– in the past 12 months. - people of all ages who live in Rwanda.		
201	How many men do you know whose wife has died and they have not remarried? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MEN WHOSE WIFE HAS DIED	
202	How many people do you know who are currently nurses or doctors? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF NURSES/DOCTORS	
203	How many people do you know who are currently <u>male</u> community health workers in 2010? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MALE COM. HEALTH WORKERS . . .	
204	How many people do you know who are currently primary or secondary teachers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF TEACHERS	
205	How many women do you know who currently smoke a pipe or cigarettes? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF WOMEN WHO SMOKE	
206	How many men do you know who are currently catholic priests? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF PRIEST	
207	How many people do you know who are currently civil servants? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF CIVIL SERVANTS	
208	How many women do you know who gave birth in the last 12 months? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF WOMEN WHO GAVE BIRTH	
209	How many people do you know who are Muslims? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MUSLIMS	
210	How many people do you know who are currently incarcerated? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF PEOPLE INCARCERATED	
211	How many people do you know who were Gacaca judges in 2010? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF GACACA JUDGES	
212	How many men do you know who are divorced or separated and not remarried? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MEN DIVORCED/SEPARATED . . .	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
213	How many people do you know who are being treated for TB? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF PEOPLE TREATED FOR TB	
	Just as a reminder I am only interested in people that you know, that is: - People you know by sight AND name, and who also know you by sight and name. - You had some contact with them—either in person, over the phone, or computer—in the past 12 months. - People of all ages who live in Rwanda.		
214	How many people do you know are named NSENGIMANA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF NSENGIMANA	
215	How many people do you know are named MUREKATETE? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MUREKATETE	
216	How many people do you know are named TWAHIRWA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF TWAHIRWA	
217	How many people do you know are named MUKANDEKEZI? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MUKANDEKEZI	
218	How many people do you know are named NSABIMANA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF NSABIMANA	
219	How many people do you know are named MUKAMANA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MUKAMANA	
220	How many people do you know are named NDAYAMBAJE? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF NDAYAMBAJE	
221	How many people do you know are named NYIRANEZA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF NYIRANEZA	
222	How many people do you know are named BIZIMANA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF BIZIMANA	
223	How many people do you know are named NYIRAHABIMANA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF NYIRAHABIMANA	
224	How many people do you know are named NDAGIJIMANA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF NDAGIJIMANA	
225	How many people do you know are named MUKANDAYISENGA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MUKANDAYISENGA	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES		SKIP
226	Now I would like to ask you a few questions about people who have died. Similar to the previous questions only tell me about people you knew personally: - People you knew by sight AND name, and who also knew you by sight and name. - You had some contact with them—-either in person, over the phone, or computer—-in the 12 months before they died. - These should be people of all ages living in Rwanda. How many people do you know who have died in the past 12 months?	NUMBER OF DEATHS . . . . ☐☐ NONE 00		→ 301
227	I would like to ask a couple of questions about each of these people who died. To keep track of the different people we are discussing, could you tell me the first name of each person you know who died in the past 12 months? RECORD THE FIRST NAME OF EACH PERSON WHO HAS DIED AND ASK Q.228 AND 229 IF AGE IS NOT KNOWN, GET THE BEST POSSIBLE ESTIMATE IF AGE 95 OR MORE, RECORD '95'	228 Was (NAME) male or female?	229 How old was (NAME)?	
	NAME 1 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 2 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 3 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 4 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 5 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 6 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 7 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 8 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 9 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 10 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 11 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 12 _____	MALE . . . . 1 FEMALE 2	☐☐	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

301	Now I am going to ask you some additional questions about people that you know. In the previous section you could count the same person in sevral answers, in tthis section the same person should not be counted in more than one answer.
	
	I remind you that people we are talking about
	  - Should be people you know by sight AND name, and who also know you by sight and name.
	  - You had some contact with them—either in person, over the phone, or computer—in the past 12 months.
	
	  - People of all ages who live in Rwanda.		

302	How many people do you know among your immediate family? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER CLOSE FAMILY	
303	How many people do you know from your larger family? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER EXTENDED FAMILY	
304	How many people do you know among your in-law family? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER INLAWS	
305	How many people do know among your best friends? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER CLOSE FRIENDS	
306	How many people do you know among your simple or ordinary friends? I remind you that, if you have already counted a person, this person should not be counted again. IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER ORDINARY FRIENDS	
307	How many people do you know among those you play sports together (sports club)? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER SPORTS MATES	
308	How many people do you know among those who have the same problems as you? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER SHARED HARDSHIP	
309	How many people do you know that you meet at church? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER CHURCH MEMBERS	
310	How many people do you know among your neighbors? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER NEIGHBORS	
311	How many people do you know among those with whom you do umuganda (general works)? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER COMMUNAL WORK	
312	How many people do you know that you met at parties or weddings? I remind you that, if you have already counted a person, this person should not be counted again. IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER WEDDINGS	
313	How amany people do you know from sharing taxis or bus? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER CARPOOL	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
314	How many people do you know among your coworkers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER COWORKERS/COLLE/ . . . . ☐☐	
315	How many people do you know who were former coworkers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER EX – COWORKERS . . . . ☐☐	
316	How many people do you know among training providers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER TRAINERS/TEACHERS . . . . ☐☐	
317	How many people do you know from trainings? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER TRAININGS/WORKSHOPS . . . ☐☐	
318	How many people do you know among those you join at non-family meetings? I remind you that, if you have already counted a person, this person should not be counted again. IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER NON-FAMILY MEETINGS . . . ☐☐	
319	How many people do you know among your classmates? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER SCHOOL MATES . . . . ☐☐	
320	How many people do you know among your former teachers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER FORMER TEACHERS . . . . ☐☐	
321	How many people do you know among your medical providers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER MEDICAL WORKERS . . . . ☐☐	
322	How many people do you know among service providers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER SERVICE PROVIDERS . . . . ☐☐	
323	How many people do you know who are among your benefactors? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER PEOPLE WHO AID YOU . . . ☐☐	
324	How many people do you know among those you assist or help? I remind you that, if you have already counted a person, this person should not be counted again. IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER PEOPLE YOU AID . . . . ☐☐	
325	How many people do you know among those at the market (people you meet there or a trader)? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER MARKET ACQUAINTANCES . ☐☐	
326	How many people do you know among your favorite sellers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER BUSINESS PEOPLE . . . . ☐☐	
327	How many people do you know from among your cooperatives? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER COOPERATIVES . . . . ☐☐	
328	How many people do you know among police or soldiers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER ARMY AND POLICE . . . . ☐☐	
329	How many people do you know among your leaders (village leaders, chuch leaders, work leaders)? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER LEADERS . . . . ☐☐	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
401	Again, I am just asking about people that you know. I remind you that we are talking about - people you know by sight AND name, and who also know you by sight and name. In other words, you should not consider famous people that you know about, but who do not know about you. - people you have had some contact with –- either in person, over the phone, or on the computer — in the past 12 months. - people of all ages who live in Rwanda.		
402	How many female sex workers do you know? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF SEX WORKERS .... ☐☐	
403	Normally men have sex with women, but there are other men who have sex with men. How many men do you know who have sex with other men? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MSM .... ☐☐	
404	There are people who use narcotics and there are also other people who use the injectable narcotics. How many people do you know who use injectable narcotics? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF DRUG USERS .... ☐☐	
405	How many clients of female sex workes do you know? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF CLIENTS OF SEX WORKER .... ☐☐	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
501	Thank you for your answers so far. Now I will ask you a few additional questions about people you know. I only want to talk about a few people. To choose which people we talk about, you will choose one card which have names on it. Then I will ask you if you personally know anyone who has one of these names. When you think about people with these names, only consider people who are between 15 and 50 years old, who live in Rwanda, but do not consider anyone living in this household. I do not want to know who these people are. Because we only use common names I will not know who these people are and I will not try to contact them. We will keep all your answers confidential. Do you have any questions? Are you ready?		
502	PRESENT THE CARDS WITH WOMEN'S NAMES TO RESPONDENT AND ASK HIM/HER TO CHOOSE ONE CARD. READ THE FIVE NAMES TO RESPONDENT AND ASK: Do you know personally any woman with one of these names?	YES . . . . 1 NO 2	→ 509
502A	Do you know personally one woman or more than one woman with one of these names?	ONLY ONE WOMAN . . . . 1 MORE THAN ONE WOMAN 2	→ 505
503	I will now ask you about the woman you know. Is she younger than 25 years? Does she live in Kigali? Is she married or living together with a man as if married? Does she currently smoke a pipe or cigarettes?	YES NO YOUNGER THAN 25 YEARS . 1 . . . 2 LIVE IN KIGALI . . . . 1 . . . 2 MARRIED . . . . 1 . . . 2 SMOKER . . . . 1 . . . 2	

504	In your opinion,
	
	- Has she ever bought sex from men?
	    IF 'YES', ASK: Has she bought sex from men in the past 12 months?
	- Has she ever sold sex to men?
	    IF 'YES', ASK: Has she sold sex to men in the past 12 months?
	- Has she ever injected drugs for pleasure?
	    IF 'YES', ASK: Has she injected drugs for pleasure in the past 12 months?
		YES NO DK
		BUY SEX FROM MEN . . . . . 1 2 . . 8
		  BUY SEX IN
		  PAST 12 MONTHS . . . 1 2 . . 8
		SELL SEX TO MEN . . . . 1 2 . . 8
		  SELL SEX IN
		  PAST 12 MONTHS . . . 1 2 . . 8
		INJECT DRUGS . . . . 1 2 . . 8
		  INJECT DRUGS IN
		  PAST 12 MONTHS . . . 1 2 . . 8
			→ 509

505	Among the women you know with these names, I will now ask you about the one you know the best. Is she younger than 25 years? Does she live in Kigali? Is she married or living together with a man as if married? Does she currently smoke a pipe or cigarettes?	YES NO YOUNGER THAN 25 YEARS . 1 . . . 2 LIVE IN KIGALI . . . . 1 . . . 2 MARRIED . . . . 1 . . . 2 SMOKER . . . . 1 . . . 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
506	In your opinion, - Has she ever bought sex from men? 　　IF 'YES', ASK: Has she bought sex from men in the past 12 months? - Has she ever sold sex to men? 　　IF 'YES', ASK: Has she sold sex to men in the past 12 months? - Has she ever injected drugs for pleasure? 　　IF 'YES', ASK: Has she injected drugs for pleasure in the past 12 months?	YES NO DK BUY SEX FROM MEN . . . . .　1　2 . . 8 　BUY SEX IN 　PAST 12 MONTHS　　. . .　1　2 . . 8 SELL SEX TO MEN . . . .　1　2 . . 8 　SELL SEX IN 　PAST 12 MONTHS　　. . .　1　2 . . 8 INJECT DRUGS　. . . . .　1　2 . . 8 　INJECT DRUGS IN 　PAST 12 MONTHS　　. . .　1　2 . . 8	
507	Among the women you know with these names, I will now ask you about the woman you know second best. 　Is she younger than 25 years? 　Does she live in Kigali? 　Is she married or living together with a man as if married? 　Does she currently smoke a pipe or cigarettes?	YES NO YOUNGER THAN 25 YEARS . 1 . . . 2 LIVE IN KIGALI　. . . . . 1 . . . 2 MARRIED　. . . . . 1 . . . 2 SMOKER　. . . . . 1 . . . 2	
508	In your opinion, - Has she ever bought sex from men? 　　IF 'YES', ASK: Has she bought sex from men in the past 12 months? - Has she ever sold sex to men? 　　IF 'YES', ASK: Has she sold sex to men in the past 12 months? - Has she ever injected drugs for pleasure? 　　IF 'YES', ASK: Has she injected drugs for pleasure in the past 12 months?	YES NO DK BUY SEX FROM MEN . . . . .　1　2 . . 8 　BUY SEX IN 　PAST 12 MONTHS　　. . .　1　2 . . 8 SELL SEX TO MEN . . . .　1　2 . . 8 　SELL SEX IN 　PAST 12 MONTHS　　. . .　1　2 . . 8 INJECT DRUGS　. . . . .　1　2 . . 8 　INJECT DRUGS IN 　PAST 12 MONTHS　　. . .　1　2 . . 8	
509	PRESENT THE CARDS WITH MEN'S NAMES TO RESPONDENT AND ASK HIM/HER TO CHOOSE ONE CARD. READ THE FIVE NAMES TO RESPONDENT AND ASK: Do you know personally any man with one of these names?	YES . . . . 1 NO　. 2	 → 600
509A	Do you know personally one man or more than one man with one of these names?	ONLY ONE MAN　　. . . . . 1 MORE THAN ONE MAN　. 2	 → 512
510	I will now ask you about the man you know. 　Is he younger than 25 years? 　Does he live in Kigali? 　Is he married or living together with a man as if married? 　Does he currently smoke a pipe or cigarettes?	YES NO YOUNGER THAN 25 YEARS . 1 . . . 2 LIVE IN KIGALI　. . . . . 1 . . . 2 MARRIED　. . . . . 1 . . . 2 SMOKER　. . . . . 1 . . . 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

511	In your opinion,
	
	- Has he ever had sex with other men?
	  IF 'YES', ASK: Has he had sex with other men in the past 12 months?
	- Has he ever bought sex from women?
	  IF 'YES', ASK: Has he bought sex from women in the past 12 months?
	- Has he ever sold sex to other people?
	  IF 'YES', ASK: Has he sold sex to other people in the past 12 months?
	- Has he ever injected drugs for pleasure?
	  IF 'YES', ASK: Has he injected drugs for pleasure in the past 12 months?
		YES NO DK
		SEX WITH OTHER MEN ... 1 .. 2 .. 8
		  SEX WITH MEN IN
		  PAST 12 MONTHS ... 1 2 .. 8
		BUY SEX FROM WOMEN . 1 2 .. 8
		  BUY SEX IN
		  PAST 12 MONTHS ... 1 2 .. 8
		SELL SEX TO OTHER ... 1 2 .. 8
		  SELL SEX IN
		  PAST 12 MONTHS ... 1 2 .. 8
		INJECT DRUGS .... 1 2 .. 8
		  INJECT DRUGS IN
		  PAST 12 MONTHS ... 1 2 .. 8
			→ 600

512	Among the men you know with those names, I will now ask you about the one you know the best. Is he younger than 25 years? Does he live in Kigali? Is he married or living together with a woman as if married? Does he currently smoke a pipe or cigarettes?	YES NO YOUNGER THAN 25 YEARS . 1 ... 2 LIVE IN KIGALI .... 1 ... 2 MARRIED .... 1 ... 2 SMOKER .... 1 ... 2	

513	In your opinion,
	
	- Has he ever had sex with other men?
	  IF 'YES', ASK: Has he had sex with other men in the past 12 months?
	- Has he ever bought sex from women?
	  IF 'YES', ASK: Has he bought sex from women in the past 12 months?
	- Has he ever sold sex to other people?
	  IF 'YES', ASK: Has he sold sex to other people in the past 12 months?
	- Has he ever injected drugs for pleasure?
	  IF 'YES', ASK: Has he injected drugs for pleasure in the past 12 months?
		YES NO DK
		SEX WITH OTHER MEN ... 1 .. 2 .. 8
		  SEX WITH MEN IN
		  PAST 12 MONTHS ... 1 2 .. 8
		BUY SEX FROM WOMEN . 1 2 .. 8
		  BUY SEX IN
		  PAST 12 MONTHS ... 1 2 .. 8
		SELL SEX TO OTHER ... 1 2 .. 8
		  SELL SEX IN
		  PAST 12 MONTHS ... 1 2 .. 8
		INJECT DRUGS .... 1 2 .. 8
		  INJECT DRUGS IN
		  PAST 12 MONTHS ... 1 2 .. 8	

514	Among the men you know with those names, I will now ask you about the man you know second best. Is he younger than 25 years? Does he live in Kigali? Is he married or living together with a woman as if married? Does he currently smoke a pipe or cigarettes?	YES NO YOUNGER THAN 25 YEARS . 1 ... 2 LIVE IN KIGALI .... 1 ... 2 MARRIED .... 1 ... 2 SMOKER .... 1 ... 2	

515	In your opinion,
	
	- Has he ever had sex with other men?
	  IF 'YES', ASK: Has he had sex with other men in the past 12 months?
	- Has he ever bought sex from women?
	  IF 'YES', ASK: Has he bought sex from women in the past 12 months?
	- Has he ever sold sex to other people?
	  IF 'YES', ASK: Has he sold sex to other people in the past 12 months?
	- Has he ever injected drugs for pleasure?
	  IF 'YES', ASK: Has he injected drugs for pleasure in the past 12 months?
		YES NO DK
		SEX WITH OTHER MEN ... 1 .. 2 .. 8
		  SEX WITH MEN IN
		  PAST 12 MONTHS ... 1 2 .. 8
		BUY SEX FROM WOMEN . 1 2 .. 8
		  BUY SEX IN
		  PAST 12 MONTHS ... 1 2 .. 8
		SELL SEX TO OTHER ... 1 2 .. 8
		  SELL SEX IN
		  PAST 12 MONTHS ... 1 2 .. 8
		INJECT DRUGS .... 1 2 .. 8
		  INJECT DRUGS IN
		  PAST 12 MONTHS ... 1 2 .. 8	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
600	Now, I would like to ask the last few questions about your community.		
601	In your opinion how do people in your community feel about being a doctior or nurse: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
602	In your opinion how do people in your community feel about being a civil servant: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
603	In your opinion how do people in your community feel about people who are incarcerated: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
604	In your opinion how do people in your community feel about people who inject drugs for pleasure: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
605	In your opinion how do people in your community feel about men who have sex with other men: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
606	In your opinion how do people in your community feel about men who pay for sex: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
607	In your opinion how do people in your community feel about women who sell sex: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
607A	CHECK Q.124 'YES' ☐ 'NO' ☐ HAS HEARD OF AIDS ↓ HAS NEVER HEARD OF AIDS		→ 616
608	In your opinion, are people hesitant to take an HIV test due to fear of people's reaction if the test result is positive for HIV?	YES . . . . 1 NO . . . . 2 DK/NOT SURE 8	
609	Do people talk badly about people living with or thought to be living with HIV to others?	YES . . . . 1 NO . . . . 2 IT DEPENDS . . . . 3 DK/NOT SURE 8	
610	Do people living with or thought to be living with HIV lose respect or standing?	YES . . . . 1 NO . . . . 2 IT DEPENDS . . . . 3 DK/NOT SURE 8	
611	Do you fear that you could contract HIV if you come into contact with the saliva of a person living with HIV?	YES . . . . 1 NO . . . . 2 IT DEPENDS . . . . 3 DK/NOT SURE 8	
612	Do you fear that you could contract HIV if you come into contact with the sweat of a person living with HIV?	YES . . . . 1 NO . . . . 2 IT DEPENDS . . . . 3 DK/NOT SURE 8	
613	Do you agree or disagree with the following statement: In general, people living with HIV are ashamed of themselves because they have HIV.	AGREE . . . . 1 DISAGREE . . . . 2 DK/NO OPINION 8	
614	Do you agree or disagree with the following statement: I would be ashamed if someone in my family had HIV	AGREE . . . . 1 DISAGREE . . . . 2 DK/NO OPINION 8	
615	Do you think children living with HIV should be allowed to attend school with children who are HIV negative?	YES . . . . 1 NO . . . . 2 IT DEPENDS . . . . 3 DK/NOT SURE 8	
616	RECORD THE TIME. HOUR . . . . ☐☐ MINUTES . . . . ☐☐		

<u>INTERVIEWER'S OBSERVATIONS</u>

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT RESPONDENT:

_____

_____

_____

_____

_____

COMMENTS ON SPECIFIC QUESTIONS:

_____

_____

_____

_____

_____

ANY OTHER COMMENTS:

_____

_____

_____

_____

_____

<u>SUPERVISOR'S OBSERVATIONS</u>

_____

_____

_____

_____

_____

_____

NAME OF SUPERVISOR: _____   DATE: _____

School of Public Health   **CNLS**

THIS HOUSEHOLD WAS SELECTED FOR THE "MEAL" DEFINITION OF "TO KNOW".	2

IDENTIFICATION

PLACE NAME _____

NAME OF HOUSEHOLD HEAD _____

CLUSTER NUMBER   ....

STRUCTURE NUMBER ....

HOUSEHOLD NUMBER ....

NAME AND LINE NUMBER OF RESPONDENT_____

SEX OF RESPONDENT (1 = MALE; 2= FEMALE)

INTERVIEWER VISITS

	1	2	3	FINAL VISIT
DATE	_____	_____	_____	DAY
				MONTH
				YEAR 2 0 1 1
INTERVIEWER'S NAME	_____	_____	_____	INT. NUMBER
RESULT*	_____	_____	_____	RESULT
NEXT VISIT: DATE	_____	_____		TOTAL NUMBER OF VISITS
TIME	_____	_____		

*RESULT CODES:
    1   COMPLETED   4   REFUSED
    2   NOT AT HOME   5   PARTLY COMPLETED   7   OTHER _____
    3   POSTPONED   6   INCAPACITATED   (SPECIFY)

LANGUAGE OF INTERVIEW:	TRANSLATOR USED?
KINYARWANDA 1	YES 1
OTHER _____ 6	NO 2
SPECIFY	

SUPERVISOR _____	KEYED BY

001	CHECK HOUSEHOLD QUESTIONNAIRE, QUESTION 7 (AGE)	
	15-17 ☐↓ 18+ ☐────────────────────→	005

002	CHECK HOUSEHOLD QUESTIONNAIRE, QUESTION 8 (MARITAL STATUS)	
	CODE '4' ☐↓ OTHER ☐──────────────────→ (NEVER IN UNION)	005

003	RECORD LINE NUMBER OF PARENT/OTHER ADULT RESPONSIBLE FOR ADOLESCENT. RECORD '00' IF NOT LISTED.	LINE NUMBER OF PARENT OR OTHER RESPONSIBLE ADULT ☐☐	

004 - INFORMED CONSENT (PARENT/RESPONSIBLE ADULT)

Hello. My name is _____. I am working with the School of Public Health of Rwanda. We are conducting a survey about health all over Rwanda. The information we collect will help the government to plan health services. Your household was selected by chance for the survey. We also want to do a short interview with (NAME OF THE ADOLESCENT). The questions usually take about 30 to 40 minutes. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. (NAME OF THE ADOLESCENT) is free to refuse any question and can stop the interview at any time. It is your choice to let (NAME OF THE ADOLESCENT) take part or not. We hope you allow (NAME OF THE ADOLESCENT) to join since his/her views are important.

In case you need more information about the survey, you may contact the person listed on the card that has already been given to your household.
Do you have any questions? May I begin the interview now?

SIGNATURE OF INTERVIEWER: _____   DATE: _____

PARENT/OTHER RESPONSIBLE ADULT AGREES... 1   PARENT/OTHER RESPONSIBLE ADULT DOES NOT AGREE. 2→ END
↓

005 - INFORMED CONSENT (RESPONDENT)

Hello. My name is _____. I am working with the School of Public Health of Rwanda. We are conducting a survey about health all over Rwanda. The information we collect will help the government to plan health services. Your household was selected by chance for the survey. The questions usually take about 30 to 40 minutes. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. You are free to refuse any question and you can stop the interview at any time. It is your choice to take part or not. We hope you will join since your views are important.

In case you need more information about the survey, you may contact the person listed on the card that has already been given to your household.
Do you have any questions? May I begin the interview now?

SIGNATURE OF INTERVIEWER: _____   DATE: _____

RESPONDENT AGREES TO BE INTERVIEWED ... 1   RESPONDENT DOES NOT AGREE TO BE INTERVIEWE... 2→ END
↓

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
101	RECORD THE TIME.	HOUR . . . . MINUTES	
102	In what month and year were you born?	MONTH . . . . DON'T KNOW MONTH . . . . 98 YEAR . . . . DON'T KNOW YEAR 9998	
103	How old were you at your last birthday? COMPARE AND CORRECT 102 AND/OR 103 IF INCONSISTENT. IF 95 OR MORE, RECORD '95'	AGE IN COMPLETED YEARS	
104	Have you ever attended school?	YES . . . . 1 NO 2	→ 110
105	What is the highest level of school you attended: primary, post-primary, secondary, or higher?	PRIMARY . . . . 1 POST-PRIMARY/VOCATIONAL . . . . . 2 SECONDARY . . . . 3 TERTIARY . . . . 4 PRE-PRIMARY 6	
106	What is the highest (grade/form/year) you completed at that level? IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	GRADE/FORM/YEAR	
110	Do you read a newspaper or magazine at least once a week, less than once a week or not at all?	AT LEAST ONCE A WEEK . . . . 1 LESS THAN ONCE A WEEK . . . . 2 NOT AT ALL 3	
111	Do you listen to the radio at least once a week, less than once a week or not at all?	AT LEAST ONCE A WEEK . . . . 1 LESS THAN ONCE A WEEK . . . . 2 NOT AT ALL 3	
112	Do you watch television at least once a week, less than once a week or not at all?	AT LEAST ONCE A WEEK . . . . 1 LESS THAN ONCE A WEEK . . . . 2 NOT AT ALL 3	
113	What is your religion?	CATHOLIC . . . . 1 PROTESTANT . . . . 2 ADVENTIST . . . . 3 MUSLIM . . . . 4 TRADITIONAL . . . . 5 OTHER _____ 6 　　　　　　　　　SPECIFY NO RELIGION 7	
115	In the last 12 months, how many times have you been away from home for one or more nights? IF 95 OR MORE, RECORD "95"	NUMBER OF TIMES . . . . NONE 00	→ 117

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
116	In the last 12 months, have you been away from home for more than one month at a time?	YES . . . . 1 NO 2	
117	CHECK COVER OF QUESTIONNAIRER: SEX OF RESPONDENT: FEMALE ☐ MALE ☐		→ 120
118	CHECK 103: AGE 15-49 ☐ 50 OR + ☐		→ 120
119	Have you had a birth in the last 12 months?	YES . . . . 1 NO 2	
120	CHECK COVER OF QUESTIONNAIRER: SEX OF RESPONDENT: MALE / FEMALE Are you currently married or living together with a woman as if married? / Are you currently married or living together with a man as if married?	YES, CURRENTLY MARRIED . . . . 1 YES, LIVING WITH A MAN/WOMAN . 2 NO, NOT IN UNION 3	→ 123
121	Have you ever been married or lived together with a woman as if married? / Have you ever been married or lived together with a man as if married?	YES, FORMERLY MARRIED . . . . 1 YES, LIVED WITH A MAN/WOMAN . 2 NO 3	→ 123
122	What is your marital status now: are you widowed, divorced, or separated? / What is your marital status now: are you widowed, divorced, or separated?	WIDOWED . . . . 1 DIVORCED . . . . 2 SEPARATED 3	
123	Do you currently smoke cigarettes?	YES . . . . 1 NO 2	
124	Now I would like to talk about something else. Have you ever heard of an illness called AIDS?	YES . . . . 1 NO 2	→ 200
125	Can people reduce their chance of getting the AIDS virus by having just one uninfected sex partner who has no other sex partners?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
126	Can people get the AIDS virus from mosquito bites?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
127	Can people reduce their chance of getting the AIDS virus by using a condom every time they have sex?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
128	Can people get the AIDS virus by sharing food with a person who has AIDS?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
129	Can people get the AIDS virus because of witchcraft or other supernatural means?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
130	Is it possible for a healthy-looking person to have the AIDS virus?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
132	Can the virus that causes AIDS be transmitted from a mother to her baby: During pregnancy? During delivery? By breastfeeding?	YES NO DK DURING PREG. . . . . . 1 2 8 DURING DELIVERY . . . 1 2 8 BREASTFEEDING . . . 1 2 8	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
133	Can people become infected with HIV by sitting next to someone who has the AIDS virus?	YES .... 1 NO .... 2 DON'T KNOW 8	
134	I don't want to know the results, but have you ever been tested to see if you have the AIDS virus?	YES .... 1 NO 2	
135	Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the AIDS virus?	YES .... 1 NO .... 2 DON'T KNOW 8	
136	If a member of your family got infected with the AIDS virus, would you want it to remain a secret or not?	YES, REMAIN A SECRET .... 1 NO .... 2 DK/NOT SURE/DEPENDS 8	
137	If a member of your family became sick with AIDS, would you be willing to care for her or him in your own household?	YES .... 1 NO .... 2 DK/NOT SURE/DEPENDS 8	
138	In your opinion, if a female teacher has the AIDS virus but is not sick, should she be allowed to continue teaching in the school?	SHOULD BE ALLOWED .... 1 SHOULD NOT BE ALLOWED .... 2 DK/NOT SURE/DEPENDS 8	
139	Do you personally know someone who has or is suspected to have the AIDS virus?	YES .... 1 NO 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
200	Now I am going to ask you some questions about people that you know. These questions will help us count the number of people who may be in need of certain health services These people should be: - people you know by sight AND name, and who also know you by sight and name. In other words, you should not consider famous people that you know about, but who do not know about you. - people you have shared a meal or drink with in the past 12 months. These could be family members, friends, co-workers, or neighbors. You should include meals or drinks taken at any location, such as at home, at work, or in a restaurant. - people of all ages who live in Rwanda.		
201	How many men have you shared a meal or drink with whose wife has died and they have not remarried? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MEN WHOSE WIFE HAS DIED	
202	How many people have you shared a meal or drink with who are currently nurses or doctors? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF NURSES/DOCTORS	
203	How many people have you shared a meal or drink with who are currently male community health workers in 2010? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MALE COM. HEALTH WORKERS . . .	
204	How many people have you shared a meal or drink with who are currently primary or secondary teachers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF TEACHERS	
205	How many women have you shared a meal or drink with who currently smoke a pipe or cigarettes? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF WOMEN WHO SMOKE	
206	How many men have you shared a meal or drink with who are currently catholic priests? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF PRIEST	
207	How many people have you shared a meal or drink with who are currently civil servants? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF CIVIL SERVANTS	
208	How many women have you shared a meal or drink with who gave birth in the last 12 months? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF WOMEN WHO GAVE BIRTH	
209	How many people have you shared a meal or drink with who are Muslims? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MUSLIMS	
210	How many people have you shared a meal or drink with who are currently incarcerated? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF PEOPLE INCARCERATED	
211	How many people have you shared a meal or drink with who were Gacaca judges in 2010? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF GACACA JUDGES	
212	How many men have you shared a meal or drink with who are divorced or separated and not remarried? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MEN DIVORCED/SEPARATED . . .	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
213	How many people have you shared a meal or drink with who are being treated for TB? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF PEOPLE TREATED FOR TB	

	Just as a reminder I am only interested in
	  - people you shared a meal or drink with in the past 12 months
	  - People of all ages who live in Rwanda.		

214	How many people have you shared a meal or drink with are named NSENGIMANA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF NSENGIMANA	
215	How many people have you shared a meal or drink with are named MUREKATETE? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF MUREKATETE	
216	How many people have you shared a meal or drink with are named TWAHIRWA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF TWAHIRWA	
217	How many people have you shared a meal or drink with are named MUKANDEKEZI? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF MUKANDEKEZI	
218	How many people have you shared a meal or drink with are named NSABIMANA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF NSABIMANA	
219	How many people have you shared a meal or drink with are named MUKAMANA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF MUKAMANA	
220	How many people have you shared a meal or drink with are named NDAYAMBAJE? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF NDAYAMBAJE	
221	How many people have you shared a meal or drink with are named NYIRANEZA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF NYIRANEZA	
222	How many people have you shared a meal or drink with are named BIZIMANA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF BIZIMANA	
223	How many people have you shared a meal or drink with are named NYIRAHABIMANA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF NYIRAHABIMANA	
224	How many people have you shared a meal or drink with are named NDAGIJIMANA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF NDAGIJIMANA	
225	How many people have you shared a meal or drink with are named MUKANDAYISENGA? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER OF MUKANDAYISENGA	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES		SKIP

226	Now I would like to ask you a few questions about people who have died.
	Similar to the previous questions only tell me about
	  - people you shared a meal or drink with in the past 12 months before they died.
	  - These should be people of all ages living in Rwanda.
	
	How many people have you shared a meal or drink with who have died in the past 12 months?
		NUMBER OF DEATHS. . . . . . . ☐☐
		
		NONE 00
				→ 301

227	I would like to ask a couple of questions about each of these people who died. To keep track of the different people we are discussing, could you tell me the first name of each person you know who died in the past 12 months? RECORD THE FIRST NAME OF EACH PERSON WHO HAS DIED AND ASK Q.228 AND 229 IF AGE IS NOT KNOWN, GET THE BEST POSSIBLE ESTIMATE IF AGE 95 OR MORE, RECORD '95'	228 Was (NAME) male or female?	229 How old was (NAME)?	
	NAME 1 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 2 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 3 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 4 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 5 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 6 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 7 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 8 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 9 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 10 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 11 _____	MALE . . . . 1 FEMALE 2	☐☐	
	NAME 12 _____	MALE . . . . 1 FEMALE 2	☐☐	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
301	Now I am going to ask you some additional questions about people that you know. In the previous section you could count the same person in sevral answers, in tthis section the same person should not be counted in more than one answer. I remind you that people we are talking about - people you know by sight AND name, and who also know you by sight and name. In other words, you should not consider famous people that you know about, but who do not know about you. - Should be people you have shared a meal or drink with in the past 12 months. These could be family members, friends, co-workers, or neighbors. You should include meals eaten at any location, such as at home, at work, or in a restaurant. - People of all ages who live in Rwanda.		
302	How many people have you shared a meal or drink with among your immediate family? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER CLOSE FAMILY .... ☐☐	
303	How many people have you shared a meal or drink with from your larger family? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER EXTENDED FAMILY .... ☐☐	
304	How many people have you shared a meal or drink with among your in-law family? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER INLAWS .... ☐☐	
305	How many people have you shared a meal or drink with among your best friends? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER CLOSE FRIENDS .... ☐☐	
306	How many people have you shared a meal or drink with wamong your simple or ordinary friends? I remind you that, if you have already counted a person, this person should not be counted again. IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER ORDINARY FRIENDS .... ☐☐	
307	How many people have you shared a meal or drink with among those you play sports together (sports club)? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER SPORTS MATES .... ☐☐	
308	How many people have you shared a meal or drink with among those who have the same problems as you? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER SHARED HARDSHIP .... ☐☐	
309	How many people have you shared a meal or drink with that you meet at church? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER CHURCH MEMBERS .... ☐☐	
310	How many people have you shared a meal or drink with among your neighbors? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER NEIGHBORS .... ☐☐	
311	How many people have you shared a meal or drink with among those with whom you do umuganda (general works)? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER COMMUNAL WORK .... ☐☐	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
312	How many people have you shared a meal or drink with that you met at parties or weddings? I remind you that, if you have already counted a person, this person should not be counted again. IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER WEDDINGS	
313	How amany people have you shared a meal or drink with from sharing taxis or bus? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER CARPOOL	
314	How many people have you shared a meal or drink with among your coworkers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER COWORKERS/COLLEAGUES	
	I remind you we are only talking about people you have shared a meal or drink with in the previous 12 months, and people of all ages who live in Rwanda		
315	How many people have you shared a meal or drink with who were former coworkers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER EX – COWORKERS	
316	How many people have you shared a meal or drink with among trainnig providers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER TRAINERS/TEACHER	
317	How many people have you shared a meal or drink with from trainings? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER TRAININGS/WORKSH	
318	How many people have you shared a meal or drink with among those you join at non-family meetings? I remind you that, if you have already counted a person, this person should not be counted again. IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER NON-FAMILY MEETINGS	
319	How many people have you shared a meal or drink with among your classmates? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER SCHOOL MATES	
320	How many people have you shared a meal or drink with among your former teachers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER FORMER TEACHERS	
321	How many people have you shared a meal or drink with among your medical providers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER MEDICAL WORKERS	
322	How many people have you shared a meal or drink with among service providers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER SERVICE PROVIDER	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
323	How many people have you shared a meal or drink with who are among your benefactors? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER PEOPLE WHO AID YOU ☐☐	
324	How many people have you shared a meal or drink with among those you assist or help? I remind you that, if you have already counted a person, this person should not be counted again. IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER PEOPLE YOU AID .... ☐☐	
325	How many people have you shared a meal or drink with among those at the market (people you meet there or a trader)? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER MARKET ACQUAINTANCES . ☐☐	
326	How many people have you shared a meal or drink with among your favorite sellers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER BUSINESS PEOPLE .... ☐☐	
327	How many people have you shared a meal or drink with from among your cooperatives? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER COOPERATIVES .... ☐☐	
328	How many people have you shared a meal or drink with among police or soldiers? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER ARMY AND POLICE .... ☐☐	
329	How many people have you shared a meal or drink with among your leaders (village leaders, chuch leaders, work leaders)? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95'	NUMBER LEADERS .... ☐☐	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
401	Again, I am just asking about - people you know by sight AND name, and who also know you by sight and name. In other words, you should not consider famous people that you know about, but who do not know about you. - people you have shared a meal or drink with in the past 12 months. These could be family members, friends, co-workers, or neighbors. You should include meals or drinks taken at any location, such as at home, at work, or in a restaurant. - people of all ages who live in Rwanda.		
402	How many female sex workers have you shared a meal or drink ? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF SEX WORKERS .... ☐☐	
403	Normally men have sex with women, but there are other men who have sex with men. How many men have you shared a meal or drink have sex with other men? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF MSM .... ☐☐	
404	There are people who use narcotics and there are also other people who use the injectable narcotics. How many people have you shared a meal or drink use injectable narcotics? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF DRUG USERS .... ☐☐	
405	How many clients of female sex workes have you shared a meal or drink ? IF DOES NOT KNOW ANY, RECORD '00' IF KNOWS 95 OR MORE, RECORD '95	NUMBER OF CLIENTS OF SEX WORKER .... ☐☐	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
501	Thank you for your answers so far. Now I will ask you a few additional questions about people you know. I only want to talk about a few people. To choose which people we talk about, you will choose one card which have names on it. Then I will ask you if you personally know anyone who has one of these names. When you think about people with these names, only consider people who are between 15 and 50 years old, who live in Rwanda, but do not consider anyone living in this household. I do not want to know who these people are. Because we only use common names I will not know who these people are and I will not try to contact them. We will keep all your answers confidential. Do you have any questions? Are you ready?		
502	PRESENT THE CARDS WITH MEN' S NAMES TO RESPONDENT AND ASK HIM/HER TO CHOOSE ONE CARD. READ THE FIVE NAMES TO RESPONDENT AND ASK: Do you know personally any man with one of these names?	YES . . . . 1 NO 2	 → 509
502A	Do you know personally one man or more than one man with one of these names?	ONLY ONE MAN . . . . 1 MORE THAN ONE MAN 2	 → 505
503	I will now ask you about the man you know. Is he younger than 25 years? Does he live in Kigali? Is he married or living together with a woman as if married? Does he currently smoke a pipe or cigarettes?	YES NO YOUNGER THAN 25 YEARS . 1 . . . 2 LIVE IN KIGALI . . . . 1 . . . 2 MARRIED . . . . 1 . . . 2 SMOKER . . . . 1 . . . 2	

504	In your opinion,
	
	- Has he ever had sex with other men?
	    IF 'ÝES', ASK: Has he had sex with other men in the past
	             12 months?
	- Has he ever bought sex from women?
	    IF 'ÝES', ASK: Has he bought sex from women in the past
	             12 months?
	- Has he ever sold sex to other people?
	    IF 'ÝES', ASK: Has he sold sex to other people in the past
	             12 months?
	- Has he ever injected drugs for pleasure?
	    IF 'ÝES', ASK: Has he injected drugs for pleasure in the
	           past 12 months?
		YES NO DK
		SEX WITH OTHER MEN . . . 1 . . 2 . . 8
		  SEX WITH MEN IN
		  PAST 12 MONTHS . . . 1 2 . . 8
		BUY SEX FROM WOMEN . 1 2 . . 8
		  BUY SEX IN
		  PAST 12 MONTHS . . . 1 2 . . 8
		SELL SEX TO OTHER . . . 1 2 . . 8
		  SELL SEX IN
		  PAST 12 MONTHS . . . 1 2 . . 8
		INJECT DRUGS . . . . 1 2 . . 8
		  INJECT DRUGS IN
		  PAST 12 MONTHS . . . 1 2 . . 8
			
			→ 509

505	Among the men you know with those names, I will now ask you about the one you know the best. Is he younger than 25 years? Does he live in Kigali? Is he married or living together with a woman as if married? Does he currently smoke a pipe or cigarettes?	YES NO YOUNGER THAN 25 YEARS . 1 . . . 2 LIVE IN KIGALI . . . . 1 . . . 2 MARRIED . . . . 1 . . . 2 SMOKER . . . . 1 . . . 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

506	In your opinion,
	
	- Has he ever had sex with other men?
	    IF 'ÝES', ASK: Has he had sex with other men in the past 12 months?
	- Has he ever bought sex from women?
	    IF 'ÝES', ASK: Has he bought sex from women in the past 12 months?
	- Has he ever sold sex to other people?
	    IF 'ÝES', ASK: Has he sold sex to other people in the past 12 months?
	- Has he ever injected drugs for pleasure?
	    IF 'ÝES', ASK: Has he injected drugs for pleasure in the past 12 months?
		YES NO DK
		
		SEX WITH OTHER MEN ... 1 .. 2 .. 8
		  SEX WITH MEN IN
		  PAST 12 MONTHS ... 1 2 .. 8
		BUY SEX FROM WOMEN . 1 2 .. 8
		  BUY SEX IN
		  PAST 12 MONTHS ... 1 2 .. 8
		SELL SEX TO OTHER ... 1 2 .. 8
		  SELL SEX IN
		  PAST 12 MONTHS ... 1 2 .. 8
		INJECT DRUGS .... 1 2 .. 8
		  INJECT DRUGS IN
		  PAST 12 MONTHS ... 1 2 .. 8	

507	Among the men you know with those names, I will now ask you about the man you know second best.
	
	    Is he younger than 25 years?
	    Does he live in Kigali?
	    Is he married or living together with a woman as if married?
	    Does he currently smoke a pipe or cigarettes?
		YES NO
		
		YOUNGER THAN 25 YEARS . 1 ... 2
		LIVE IN KIGALI .... 1 ... 2
		MARRIED .... 1 ... 2
		SMOKER .... 1 ... 2	

508	In your opinion,
	
	- Has he ever had sex with other men?
	    IF 'ÝES', ASK: Has he had sex with other men in the past 12 months?
	- Has he ever bought sex from women?
	    IF 'ÝES', ASK: Has he bought sex from women in the past 12 months?
	- Has he ever sold sex to other people?
	    IF 'ÝES', ASK: Has he sold sex to other people in the past 12 months?
	- Has he ever injected drugs for pleasure?
	    IF 'ÝES', ASK: Has he injected drugs for pleasure in the past 12 months?
		YES NO DK
		
		SEX WITH OTHER MEN ... 1 .. 2 .. 8
		  SEX WITH MEN IN
		  PAST 12 MONTHS ... 1 2 .. 8
		BUY SEX FROM WOMEN . 1 2 .. 8
		  BUY SEX IN
		  PAST 12 MONTHS ... 1 2 .. 8
		SELL SEX TO OTHER ... 1 2 .. 8
		  SELL SEX IN
		  PAST 12 MONTHS ... 1 2 .. 8
		INJECT DRUGS .... 1 2 .. 8
		  INJECT DRUGS IN
		  PAST 12 MONTHS ... 1 2 .. 8	

509	PRESENT THE CARDS WITH WOMEN'S NAMES TO RESPONDENT AND ASK HIM/HER TO CHOOSE ONE CARD. READ THE FIVE NAMES TO RESPONDENT AND ASK: Do you know personally any woman with one of these names?	YES .... 1 NO 2	→ 600
509A	Do you know personally one woman or more than one woman with one of these names?	ONLY ONE MAN .... 1 MORE THAN ONE MAN 2	→ 512

510	I will now ask you about the woman you know.
	
	    Is she younger than 25 years?
	    Does she live in Kigali?
	    Is she married or living together with a man as if married?
	    Does She currently smoke a pipe or cigarettes?
		YES NO
		YOUNGER THAN 25 YEARS . 1 ... 2
		LIVE IN KIGALI .... 1 ... 2
		MARRIED .... 1 ... 2
		SMOKER .... 1 ... 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

511	In your opinion,
	
	- Has she ever bought sex from men?
	   IF 'ÝES', ASK: Has she bought sex from men in the past 12 months?
	- Has she ever sold sex to men?
	   IF 'ÝES', ASK: Has she sold sex to men in the past 12 months?
	- Has she ever injected drugs for pleasure?
	   IF 'ÝES', ASK: Has she injected drugs for pleasure in the past 12 months?
		YES NO DK
		BUY SEX FROM MEN . . . . . 1 2 . . 8
		  BUY SEX IN
		  PAST 12 MONTHS . . . 1 2 . . 8
		SELL SEX TO MEN . . . . 1 2 . . 8
		  SELL SEX IN
		  PAST 12 MONTHS . . . 1 2 . . 8
		INJECT DRUGS . . . . 1 2 . . 8
		  INJECT DRUGS IN
		  PAST 12 MONTHS . . . 1 2 . . 8
			→ 600

512	Among the women you know with these names, I will now ask you about the one you know the best. Is she younger than 25 years? Does she live in Kigali? Is she married or living together with a man as if married? Does She currently smoke a pipe or cigarettes?	YES NO YOUNGER THAN 25 YEARS . 1 . . . 2 LIVE IN KIGALI . . . . 1 . . . 2 MARRIED . . . . 1 . . . 2 SMOKER . . . . 1 . . . 2	

513	In your opinion,
	
	- Has she ever bought sex from men?
	   IF 'ÝES', ASK: Has she bought sex from men in the past 12 months?
	- Has she ever sold sex to men?
	   IF 'ÝES', ASK: Has she sold sex to men in the past 12 months?
	- Has she ever injected drugs for pleasure?
	   IF 'ÝES', ASK: Has she injected drugs for pleasure in the past 12 months?
		YES NO DK
		BUY SEX FROM MEN . . . . . 1 2 . . 8
		  BUY SEX IN
		  PAST 12 MONTHS . . . 1 2 . . 8
		SELL SEX TO MEN . . . . 1 2 . . 8
		  SELL SEX IN
		  PAST 12 MONTHS . . . 1 2 . . 8
		INJECT DRUGS . . . . 1 2 . . 8
		  INJECT DRUGS IN
		  PAST 12 MONTHS . . . 1 2 . . 8	

514	Among the women you know with these names, I will now ask you about the woman you know second best. Is she younger than 25 years? Does she live in Kigali? Is she married or living together with a man as if married? Does She currently smoke a pipe or cigarettes?	YES NO YOUNGER THAN 25 YEARS . 1 . . . 2 LIVE IN KIGALI . . . . 1 . . . 2 MARRIED . . . . 1 . . . 2 SMOKER . . . . 1 . . . 2	

515	In your opinion,
	
	- Has she ever bought sex from men?
	   IF 'ÝES', ASK: Has she bought sex from men in the past 12 months?
	- Has she ever sold sex to men?
	   IF 'ÝES', ASK: Has she sold sex to men in the past 12 months?
	- Has she ever injected drugs for pleasure?
	   IF 'ÝES', ASK: Has she injected drugs for pleasure in the past 12 months?
		YES NO DK
		BUY SEX FROM MEN . . . . . 1 2 . . 8
		  BUY SEX IN
		  PAST 12 MONTHS . . . 1 2 . . 8
		SELL SEX TO MEN . . . . 1 2 . . 8
		  SELL SEX IN
		  PAST 12 MONTHS . . . 1 2 . . 8
		INJECT DRUGS . . . . 1 2 . . 8
		  INJECT DRUGS IN
		  PAST 12 MONTHS . . . 1 2 . . 8	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
600	Now, I would like to ask the last few questions about your community.		
601	In your opinion how do people in your community feel about being a doctior or nurse: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
602	In your opinion how do people in your community feel about being a civil servant: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
603	In your opinion how do people in your community feel about people who are incarcerated: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
604	In your opinion how do people in your community feel about people who inject drugs for pleasure: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
605	In your opinion how do people in your community feel about men who have sex with other men: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
606	In your opinion how do people in your community feel about men who pay for sex: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
607	In your opinion how do people in your community feel about women who sell sex: not ashamed at all, somewhat ashamed or very ashamed?	NOT ASHAMED AT ALL . . . . 1 SOMEWHAT ASHAMED . . . . 2 VERY ASHAMED 3	
607A	CHECK Q.124 'YES' ☐ 'NO' ☐ HAS HEARD OF AIDS HAS NEVER HEARD OF AIDS		→ 615
608	In your opinion, are people hesitant to take an HIV test due to fear of people's reaction if the test result is positive for HIV?	YES . . . . 1 NO . . . . 2 DK/NOT SURE 8	
609	Do people talk badly about people living with or thought to be living with HIV to others?	YES . . . . 1 NO . . . . 2 IT DEPENDS . . . . 3 DK/NOT SURE 8	
610	Do people living with or thought to be living with HIV lose respect or standing?	YES . . . . 1 NO . . . . 2 IT DEPENDS . . . . 3 DK/NOT SURE 8	
611	Do you fear that you could contract HIV if you come into contact with the saliva of a person living with HIV?	YES . . . . 1 NO . . . . 2 IT DEPENDS . . . . 3 DK/NOT SURE 8	
612	Do you fear that you could contract HIV if you come into contact with the sweat of a person living with HIV?	YES . . . . 1 NO . . . . 2 IT DEPENDS . . . . 3 DK/NOT SURE 8	
613	Do you agree or disagree with the following statement: In general, people living with HIV are ashamed of themselves because they have HIV	AGREE . . . . 1 DISAGREE . . . . 2 DK/NO OPINION 8	
614	Do you agree or disagree with the following statement: I would be ashamed if someone in my family had HIV	AGREE . . . . 1 DISAGREE . . . . 2 DK/NO OPINION 8	
615	Do you think children living with HIV should be allowed to attend school with children who are HIV negative?	YES . . . . 1 NO . . . . 2 IT DEPENDS . . . . 3 DK/NOT SURE 8	
616	RECORD THE TIME.	HOUR . . . . ☐☐ MINUTES . . . . ☐☐	

<u>INTERVIEWER'S OBSERVATIONS</u>

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT RESPONDENT:

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COMMENTS ON SPECIFIC QUESTIONS:

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ANY OTHER COMMENTS:

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<u>SUPERVISOR'S OBSERVATIONS</u>

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NAME OF SUPERVISOR: _____   DATE: _____