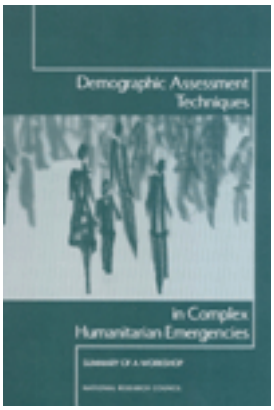

Demographic Assessment Techniques in Complex Humanitarian Emergencies: Summary of a Workshop

Holly Reed, Rapporteur, Roundtable on the Demography of Forced Migration, National Research Council

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SUMMARY OF A WORKSHOP

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Roundtable on the Demography of Forced Migration

Committee on Population

National Research Council

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ROUNDTABLE ON THE DEMOGRAPHY OF FORCED MIGRATION

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HOLLY REED, *Program Officer*

Preface

The Roundtable on the Demography of Forced Migration was established by the Committee on Population of the National Research Council in 1999. The roundtable is composed of experts from academia, government, philanthropy, and international organizations. The roundtable's purpose is to serve as an interdisciplinary, nonpartisan focal point for taking stock of what is known about demographic patterns in refugee situations, to apply this knowledge base to assist both policy makers and relief workers, and to stimulate new directions for innovation and scientific inquiry in this growing field of study. Charles B. Keely of Georgetown University serves as chair of the roundtable, and we thank him for his leadership and guidance of the group's activities.

The roundtable meets yearly and has also organized a series of workshops (held concurrently with roundtable meetings) on some of the specific aspects of the demography of refugee and refugee-like situations, including mortality patterns, demographic assessment techniques, and research ethics in complex humanitarian emergencies. For more information about the roundtable and its activities, please contact Holly Reed, program officer for the Committee on Population (202-334-3167; hreed@nas.edu).

This report to the Roundtable on the Demography of Forced Migration is a summary of one such workshop, which was held on September 20-21, 2000, under the aupices of the Committee on Population. The purpose of this meeting was to address a basic problem faced by all humanitarian

relief agencies in an emergency: how to count the numbers of displaced persons and assess their general well-being. Workshop participants examined different methods for estimating refugee populations and their mortality rates, whether mortality was due to disease and malnutrition or human rights abuses (i.e., genocide). Humanitarian relief organizations and human rights groups have developed various techniques for assessing the demographic dynamics of conflict and post-conflict situations. The workshop explored the applicability of various methods in different types of emergency settings, how to improve existing methodologies and develop new ones, and the difficulties encountered by personnel in the field, including security, logistics, and access to a population.

This project was funded by a grant from the Andrew W. Mellon Foundation. We thank Carolyn Makinson, population program officer at the Mellon Foundation, for her support and enthusiasm for the roundtable's work.

Holly Reed authored the report. Elizabeth Wallace handled the arrangements for the workshop and Ana-Maria Ignat managed the manuscript during editing and review. This work was carried out under the general direction of Barney Cohen. We also thank Christine McShane, of the reports office of the Division of Behavioral, Social Sciences, and Education, for editing the report. Any opinions, findings, conclusions or recommendations expressed in this publication are solely those of the individual workshop participants and do not necessarily reflect the view of the organization that provided support for the project, nor of the National Research Council (NRC).

This workshop summary has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the NRC's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the charge. The review comments and draft manuscript remain confidential to protect the integrity of the process.

We thank the following individuals for their participation in the review of this report: Barbara Anderson, Department of Sociology, University of Michigan; Joanne Katz, Department of International Health, Johns Hopkins School of Hygiene and Public Health; Nancy Mock, School of

Public Health and Tropical Medicine, Tulane University; and Herbert Spirer, School of International and Public Affairs, Columbia University.

Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the content of the report nor did they see the final draft of the report before its release. The review of this report was overseen by David Kertzer, Department of Anthropology, Brown University. Appointed by the National Research Council, he was responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the author and the institution.

Jane Menken, *Chair*
Committee on Population

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INTRODUCTION

The term *complex humanitarian emergency* refers to a situation in which a civilian population is displaced from their homes by war or conflict. In addition, there is often a deterioration of living conditions and sometimes a significant increase in mortality, either in the short or long term.[1]

One of the primary and earliest challenges in a complex humanitarian emergency is to obtain accurate estimates of displaced populations and their mortality rates. Although many basic guidelines exist to help field personnel in demographic assessment techniques, the quickly changing and generally unstable context of a crisis can make it difficult to implement a rapid assessment. The differing causes and demographic effects of emergencies—refugees or internally displaced persons,[2] rapid onset or slow build-up, and mortality caused primarily by disease or mortality primarily due to human rights abuses—make a one-size-fits-all approach problematic. In addition, field staff may not be knowledgeable about the latest innovations in demographic techniques, which are continually being updated and improved.

The Roundtable on the Demography of Forced Migration under the aegis of the Committee on Population of the National Research Council held a workshop to examine some of these topics. This report to the roundtable summarizes the presentations and discussion, but does not make any attempt to provide guidelines, conclusions, or recommendations for researchers or policy makers.[3] The report generally follows the order of the

presentations and discussion listed in the workshop agenda (see the appendices).

BACKGROUND

The phrase "demographic methods" refers to techniques for measuring population size, structure, distribution, characteristics, and rates. In complex humanitarian emergencies, these methods are used for the purposes of early warning, intervention planning (assistance to and protection of the population), monitoring and evaluation of these interventions, and baseline surveillance. Assessment techniques may be used at different points throughout a crisis and by international organizations, nongovernmental organizations (NGOs), government agencies, academics, or refugees themselves. There are a variety of settings and types of populations (e.g., refugee camps, self-settled refugees,[4] internally displaced persons) in which demographic assessment is needed. Therefore, the array of techniques and methods that may be used is vast. The workshop aimed to improve their application to estimate vital population parameters by reducing sampling (selection of individuals) and nonsampling (selection of information) error.

The workshop began with a presentation by W. Courtland Robinson of Johns Hopkins University about the basics of demographic assessment in emergencies. At least three major organizations have published guidelines on how to conduct initial demographic assessments: Médecins Sans Frontières (MSF), the United Nations High Commissioner for Refugees (UNHCR), and the Sphere Project.[5] Each of these sets of guidelines varies slightly, but their purpose is the same—to help field workers obtain a baseline estimate of the total population and its vital characteristics.

As Robinson explained, a variety of techniques are used individually or in combination to estimate total populations of displaced persons and their characteristics. Simple counting of individuals or shelters, administrative records, community estimations, mapping (either manually or using geographic positioning systems), aerial photography, screening of children under age five or vaccination surveys and consequent extrapolation, household surveys, and camp registrations or censuses are some of the many methods available. Rates—including mortality, fertility, and migration rates—can be estimated in these settings using the methods listed above, in combination with registration and medical records, sample surveys, and counting burial sites or bodies (for mortality rates). The rest of this report examines some of the advantages and disadvantages of a few of these meth-

ods, considers where and when they are most useful, and discusses possible refinements.

ESTIMATING POPULATION SIZE AND STRUCTURE

When data are poor and conditions are difficult, there are two principal approaches for obtaining demographic estimates. First, consistency checks are a useful tool; one can compare two data sets for the same population, compare the data for the area of interest with data from a model or a neighboring area, or examine data for internal consistency. For example, are the numbers or percentages of men and women or of different ages similar to other estimates for the population or what one would expect?

Second, indirect estimation techniques have been developed by demographers to produce estimates of a demographic parameter on the basis of information that is only indirectly related to its value. Indirect estimation is commonly used to obtain estimates of rare or difficult-to-measure demographic events, e.g., maternal mortality. Some examples include:

- using the proportion of children ever born to women aged 20-24 who have died by the date of the survey to estimate the probability of dying by age 2;
- using the incidence of orphanhood to estimate adult mortality;
- interviewing a migrant regarding the disposition of the household left behind; and
- interviewing survivors about the survivorship of their siblings.[6]

These indirect methods can be used to estimate demographic events among displaced populations or those they left behind when it is difficult to access actual data for the populations. For example, Robinson led a study in northern China that asked migrants from North Korea about mortality among the households of their relatives still in North Korea to estimate mortality due to famine.[7]

Cluster Sampling

Social scientists, epidemiologists, and statisticians alike are familiar with the principles of sampling. Sampling is selecting a subset of the population of interest in order to gain information about the entire population. A good sample will therefore be representative of the population. The design for a

sample, however, varies greatly depending on the time, money, and staff available, the logistical challenges encountered, and the intended use of the data. The greater the precision required of the estimate, generally, the larger the sample size will need to be. The most basic type of sampling is called simple random sampling. A simple random sample, a type of probability sample, is one in which each member of the population has an equal probability of selection.

Cluster sampling is an approach in which each member of the population is assigned to a group (cluster) and then clusters are randomly selected and all members of selected clusters are included in the sample. Often combined with stratification techniques (in which case it is called multistage sampling[8]), cluster sampling is the approach most often used by epidemiologists. A statistical software package called EPI-Info (Centers for Disease Control and Prevention, Atlanta, Georgia, USA) is commonly used by field staff in emergency settings. However, in conducting statistical tests, most of the EPI-Info program assumes that it is working with simple random samples unless one specifically adds a variable to take into account the design effect of cluster sampling.[9] Although adding a variable to adjust for the design effect is a way to correct for the effects of deviation from simple random sampling schemes (the CSAMPLE module in the EPI-Info program can correct for this), many field staff are not well versed in sampling techniques and therefore unaware of the need to correct for sampling design. This often results in artificially low estimates of the true underlying variance within a population.[10] There was a lot of concern expressed at the workshop about potential misuse or misinterpretation of EPI-Info results. In addition, the standardized approach used by EPI-Info calculations for required sample size may not be appropriate for other situations (i.e., measuring human rights abuses that may be heterogeneous or rare, such as torture).

Paul Spiegel of the Centers for Disease Control and Prevention gave a presentation on the problems encountered when using cluster sampling for the estimation of populations in refugee camps or other displaced populations. Cluster sampling is appropriate for situations in which there is no readily available sampling frame[11] of individuals (such as a camp census list), but for which it is easy to obtain lists of subgroups or clusters of individuals, e.g., compounds, buildings, or tents. It is generally cheaper and quicker than nonstratified sampling.

The EPI-Info module called CSAMPLE is commonly used for immunization and nutrition surveys, based on a sample of 30 clusters, which is

the minimum number of clusters generally used for these types of surveys by field staff. In the first stage, probability proportional to size sampling (PPS)—a method that ensures that smaller clusters are not overrepresented in the sample—is used to choose clusters, but this can be problematic. First, estimated population sizes for each cluster in complex emergencies are generally not accurate. Second, displacement among subpopulations is unlikely to be proportional across a region or district because of the chaotic nature of forced migration and the nearly constant inflows and outflows of migrants in many situations. Thus the adjustment for the displacement is often imprecise. One approach to adjust for population displacement is to use the latest information available (e.g., food distribution censuses or other data) to update baseline population figures before sampling.

In the second stage, once sample clusters are chosen, households are chosen. At this stage, the sample of households may not be truly probabilistic; the sample may be biased toward households on roads or in the center of the settlement if interviewers are not careful in their household selection methods. The interviewers' judgment on sampling households may affect the validity of results. Some potential solutions to these problems are to use systematic sampling—the selection of every *n*th household from a prepared list of households in the sample clusters—or to use maps to create a sampling frame of households. The accuracy of the parameter estimate being measured can be increased by increasing the number of clusters sampled. However, this method also increases the costs and time for survey, both of which are scarce in most emergency settings.

During the final stage of the sampling process, all those in the sampled households are selected or one member of each household is selected. There was some question among the participants whether individuals or households should be counted as the unit of analysis (see below).[12] Practical considerations can create limits as well; nonresponse can make it very difficult to reach one's predetermined sample size. Nonresponse may also make statistical inference questionable.[13]

Donna Brogan of Emory University commented on some of the statistical issues surrounding the use of cluster sampling in refugee camps. First, one must decide whether the unit of analysis is the individual, the household, or the family; this in turn will guide the sampling process. Cluster sampling is often used because the World Health Organization (WHO) Programme on Immunization has popularized it (using CSAMPLE in EPI-Info for analysis), but it is not the only option, and the assumptions underlying it may not be appropriate for every circumstance. The WHO cluster

survey method assumes an equal probability selection of individuals, which may be an invalid assumption if cluster size estimates are inaccurate. In this case, weighted analyses can be done to obtain unbiased (or approximately unbiased) estimates on the basis of updated information on cluster size.[14] When cluster sampling is used, 30 is the minimum number of clusters in the sample (not 30 individuals).

Sampling methods ultimately depend on the event to be measured and the criteria that are valued most by the researcher, such as costs, time, and sampling error. Unfortunately, the WHO cluster survey method, which was originally developed to measure vaccination levels in a stable population, has been used indiscriminately in situations involving forced migration. Different techniques and types of samples need to be considered in crisis situations, so it is important that field staff understand the limitations and potential weaknesses of the various methodologies.[15]

Spatial Sampling

Spatial sampling—which is a variant of cluster sampling and is also known as area probability sampling—is the use of geographic area and population density to estimate population size or proportions, often using handheld global positioning systems (GPS) units or geographical information systems (GIS).[16] This method can be used when maps and censuses of the geographic area under study do not exist. Vincent Brown of Epicentre/MSF in Paris, introduced a method of sampling that is frequently used in very acute emergency situations. The quadrate method—as Brown called it—counts the population in small square blocks of equal areas. Blocks are randomly chosen within the refugee camp (or other defined area). The average sample data is then extrapolated to the level of the total camp population.

The first stage is to draw a map of the camp with a compass, measuring all sides of the camp by foot or with a vehicle odometer. The angles between each side are measured and then a map with a square grid superimposed on top is constructed. The second stage is to select a random sample of blocks (again, usually 30) and collect population data for all of the households in each block. The average population per block is calculated and extrapolated to obtain the total. There are many potential challenges with this method, including choosing the size of the blocks, the number of blocks to sample, and taking differing population densities into account. According to Brown, at the field level, these decisions have been based mainly on

common sense. Although this approach is an important tool that can be used systematically at the beginning of a crisis, further research is needed to improve the statistical validity of the method.[17]

Denis Coulombier of the Institut de Veille Sanitaire (the French National Institute for Public Health Surveillance) compared a method known as T-square estimation with the quadrate method. Although the quadrate method is the typical method used for estimating populations in disasters or forced migrations, the T-square method—a method that is often used in agronomy—is a potential alternative. It involves sampling a number of random points, measuring the distance between each point and the nearest household or family unit and then measuring the distance between that household and the next closest one. In this way, one can estimate population density. Coulombier and colleagues tested this method at a festival in France and the results were very comparable with results obtained using the quadrate method and using exhaustive entry registration. The table below compares the advantages and disadvantages of the two methods.

Participants were optimistic about the potential of using the T-square method in future situations. At the very least, it could be used as a rapid, low-cost estimation technique in the early stages of a crisis, and it is a good alternative to relying on politically biased estimates from governments or other groups. It also may be the least intrusive method of estimating a population, which could be helpful in particularly sensitive situations. Further testing is planned at voluntary mass gatherings.

Quadrate Method	T-Square Method
• Small square sizes can achieve a design effect of one or less	• Does not produce confidence intervals
• Relatively accurate	• Relatively accurate
• Resource intensive and relatively slow	• Rapid (can be done in one-third of the time of the quadrate method) and uses relatively few resources
• Visualization of squares is easy	• Difficult to select true random points
• Potential for omission or duplication	• Potential for measurement errors
• Spatial distribution is homogeneous between squares (but spatial heterogeneity can be accounted for by using 25-meter squares)	• Spatial distribution is aggregated between shelters

Qualitative Techniques

Although qualitative methods are not the first to come to mind when thinking about how to estimate populations in emergency settings, they can offer some important insights for researchers throughout the various phases of a crisis. William Weiss of Johns Hopkins University gave a brief presentation on how qualitative techniques can assist those who are attempting to estimate forced migrant populations and their characteristics.

A qualitative method is a dynamic process that involves purposive or random sampling and generally small samples.[18] Key characteristics are triangulation, flexibility, iterativeness, and open-ended inquiry.[19] Qualitative research can help researchers reduce non sampling bias by using team members with different perspectives and by crosschecking sources.

Weiss argued that qualitative methods can give insights into such processes as food sharing, shelter building and sharing, credit transactions, and the use of health care services. They also allow refugees to be a part of the planning and problem-solving process. There are a variety of techniques that can be quite useful in emergency settings and refugee camps. For example, participatory mapping is a technique that has been used for assessment among refugees in Kenya. Houses are drawn on a map and then refugees are interviewed to learn more information about each household, such as the age and gender of the household members. A walkabout is a simple observation method in which researchers walk around a camp to observe the layout and amenities; it can be used to confirm maps and create checklists of program needs. Creating a timeline of refugees' migration history can give insight into their personal history and health status, and can also later be used to draw insights about events and their consequences.

Commenting on the potential uses of qualitative methods in emergencies, Giovanna Merli of the University of Wisconsin, Madison, argued that they should not be thought of as separate from quantitative methods, because the two are complementary. In fact, the various methods can be seen as part of a continuum. Different methods can be used in tandem to validate findings, elucidate processes, and refine other methods. Merli noted that many issues could be addressed using qualitative methods, including vulnerability, poverty, population processes, resource distribution, reasons for migration, and—especially—security. Some demographers—typically thought of as quantitative researchers—are now developing mixed-method approaches that use both quantitative and qualitative methods. Researchers must be careful when using qualitative participatory methods, however, to

make sure that they truly understand the underlying demographic and social processes they are trying to measure. They should also be fluent in the language of the displaced and understand the political and social contexts of the population.[20]

In sum, the best sampling or estimation method for a given situation is context-specific. Several participants suggested that it would be helpful to have a manual that gives some guidance on the different methods and approaches and their use in different phases of and in different types of complex humanitarian emergencies. It could serve as a common reference point for researchers and field staff involved in these situations.

ESTIMATING MORTALITY RATES

Many of the techniques described above also can be used to estimate various demographic rates. In a crisis, one of the most important is the mortality rate. Epidemiologists conventionally use the crude mortality rate (CMR)—the number of deaths per 10,000 persons per day—as a rough indicator of a population's overall health condition in an emergency situation. (Demographers use the crude death rate (CDR)—the number of deaths per 1,000 persons per year—but these are interchangeable and convertible from one base to another.[21])

Assessing excess mortality, which is mortality above the normal mortality rate, is a primary goal during the beginning stages of a crisis. This measure gives aid workers an idea of the magnitude of the crisis. However, if a country has been politically unstable and impoverished for many years, data on "normal" mortality conditions may be difficult to obtain or unreliable.

Estimating Mortality Due to Disease and Malnutrition

Les Roberts of Johns Hopkins University described mortality surveys conducted in eastern Democratic Republic of Congo (DRC) using spatial sampling techniques.[22] Two different methods were used, grid-based (quadrate) sampling and multistage cluster sampling. A very brief survey was used to try to determine mortality rates during a recent period of violence and displacement. The researchers encountered a variety of problems, including a large percentage of vacant residences (people had fled since the war began or whole households had been killed or died) and a number of security issues and geographical barriers.

Using a handheld global positioning system unit, the team selected clusters of households from clinic catchment areas (the areas that individual clinics are supposed to serve). Rural areas tended to be oversampled, so weighting was used to compensate, although comparing the weighted and unweighted results showed no difference in mortality rates. The team concluded that in eastern Congo there was no correlation between population density and mortality, and therefore most mortality was likely caused by violence, rather than communicable diseases, which spread more quickly among denser populations. Most mortality was due to the disintegration of the social fabric, which led to physical insecurity and ultimately deaths from violence. However, the small number of children in the population relative to a "normal" sub-Saharan African population was also a clear indicator of poor health conditions.

Roberts found that spatial sampling techniques tended to bias the sample toward large households or families, in comparison with cluster sampling methods, because large households are more likely to be captured since they physically take up more room than do smaller households. Nevertheless, the technique was sensitive enough to reveal that mortality during the period of study had tripled over the baseline mortality rate for the population under study (as measured at the beginning of the study). Urban displaced populations had higher mortality than rural displaced populations, perhaps because of urban-centered violence.

This study showed the change in mortality over time by comparing estimates at the end of the study to those at the beginning of the study (1999-2001). Commenting on Roberts' presentation, Fritz Scheuren of the Urban Institute noted that it is important to distinguish between people who refuse to participate in a survey and those who cannot be reached and to use repeated measures to check the accuracy of estimates. One problem with mortality surveys is that respondents often have trouble with recall and may tend to displace deaths or situate them in the recall interval when they actually occurred in other periods not covered by the survey. This may be especially problematic if respondents are suffering from trauma. Overall, however, Scheuren felt that the survey was excellent considering the grueling circumstances in which it was conducted.[23]

In a small group discussion, participants discussed the advantages and disadvantages of various sampling methods for estimating mortality rates. The group agreed that epidemiologists could benefit substantially from consultations with sample survey statisticians, rather than using standardized methods in every crisis. There should be more data management in the

field, and surveillance techniques need to be adapted for use in open populations (e.g., self-settled refugees). If time and resources make it feasible, an event history should be collected from each person in a survey, using a memorable point in the past as a starting point (such as a national or religious holiday).[24] Indirect methods are helpful for reducing bias, but they have so far been underused in emergency settings. Although there are two different types of data needs in crises—immediate and historical—a hybrid type of estimation method can address both needs.

Statisticians pointed out that some epidemiologists currently do not keep track of those in the sample who are not reached (noncontacts), but simply keep sampling in order to reach a quota of households. The noncontact rate should actually be estimated in advance and used to calculate the total sample size needed, with no substitutions allowed for noncontacts. This approach obviously creates practical problems because the staff needed to carry out surveys with large sample sizes in the field is lacking. Yet reporting the noncontact, nonresponse, and vacancy rates when a study is published would help to deflect some criticisms of the methodology and hence, of the estimates themselves.

Estimating Mortality Due to Human Rights Abuses

Human rights abuses—violations of international standards of human rights, such as kidnapping, rape, torture, and genocide—are traditionally documented through testimonies and clinical or forensic evidence. Now these methods are also being used in combination with epidemiological and demographic methods. Cluster sampling is not appropriate for measuring mortality in cases of human rights abuses because they are not random events. Some nonprobability sampling techniques that might work in these situations include: network sampling, in which more than one individual can report on another individual in the survey, multiplicity or "snowball" sampling, which uses a process of chain referral by members of the population of interest, and adaptive sampling, which is a technique often used for studying disease patterns among wildlife in which if a diseased animal is discovered, then additional animals are sampled in the same area.

Some types of probability sampling may still be useful for measuring human rights abuses, but it depends on how much knowledge a researcher has about the probability of the events he or she is trying to measure. Finally, those who perpetrate human rights abuses sometimes record demographic data that can later be used by human rights investigators and crimi-

nal tribunals or truth commissions. Collecting and working with this type of data may be more akin to working with administrative data for historical demographic research. Obviously, as with any political data, the reliability of such lists is somewhat suspect. Researchers have to take the source of the data into account, especially when the source is the group that perpetrated the abuses or those who oppose that group. They both might have reasons for falsifying data. Depending on the ultimate use of the data, precision and reliability may be more or less important: for example, data precision is generally very important in legal cases, such as human rights tribunals.

Patrick Ball of the American Association for the Advancement of Science presented some of his work on measuring human rights abuses in a variety of settings. One effective method is called capture-recapture, in which one member of the sample is selected, "returned" to the population, and if the same person is selected again, she or he is "tagged." Originally developed for use in counting populations of animals or fish, for human rights research the method uses administrative data that were kept by the perpetrators. Because more than one witness may report a killing, some killings may go unreported, and there are often several sources of testimonies, multiple lists of killings are often available and must be used to estimate the actual number of murders. According to the theory behind the capture-recapture method, the level of overlap, or the number of killings reported to two independent lists, makes it possible for investigators to estimate the number of killings that occurred in the total population including those killings that were not recorded in either list. The method was used in Guatemala following the civil war in that country (1954-1996). Total killings were calculated by region, ethnicity, period, and perpetrator. The study estimated that approximately 200,000 people were murdered during the conflict.[25]

Ball and his colleagues also conducted a study during the recent war in Kosovo (1999) using lists from three different organizations. They found that killings and migration during the conflict were highly correlated. The total estimates of deaths corresponded to estimates from other sources, so these findings appeared to be valid.[26] There are limitations to this method, however. It requires three large lists for comparison and there is a "heterogeneous catch ability": in other words, the lists must be randomly ordered or the validity of the method cannot be ensured. The advantages of this method are that in most of these situations lists are easy to find and hence estimating the magnitude of mortality is relatively easy.

Noting the huge value of the work in Guatemala, William Seltzer of

Fordham University observed that it was so well done that even the Guatemalan army did not argue with the results. Capture-recapture methodology should be compared with typical demographic analyses (such as cluster sampling techniques, etc.), and postenumeration surveys can also be used to check the validity of estimates.[27] Capture-recapture is a standard technique among wildlife researchers, but it has been adapted for special application in this instance, so there are some additional problems with the technique. As Seltzer noted, sometimes it can be difficult to match records from the different lists if names are spelled differently or especially if several people have the same name. Some reports of abuses may be outside of the period of interest because of recall biases—for example, if those who reported the abuse remembered the wrong date. In addition, certain classes of events are unlikely to be "captured;" therefore, it is important to stratify the lists (perhaps by date or location) and use different types of estimation within different strata.

A small group discussed different approaches for collecting data on human rights abuses. In order to prevent bias, they suggested surveying many houses to validate reports of an event (this is called many-to-one reporting) and using indirect methods. Education and training in human rights are vital for humanitarian aid workers so that they can recognize human rights abuses, report them properly, and learn how to collect data on them. Human rights data are not just important for historical analysis, but could be used in real time to prevent genocide or other abuses.

SUMMARY AND FINAL DISCUSSION

The discussion at the workshop touched on just a few of the issues surrounding demographic estimation in complex humanitarian emergencies. In the past, there has been a dearth of research aiming to evaluate the use of various demographic methods in different types of emergencies. However, there are many issues that can be explored relatively easily, as long as methods are properly documented. Many of the workshop participants, in conjunction with their own institutes and universities, are pursuing further research on these topics, and new techniques will continue to develop over time. In the meantime, participants agreed that statisticians who work on sample surveys in stable settings could serve as valuable resources to those in the field doing rapid estimation surveys. Although several basic manuals already exist on estimation techniques for field workers,[28] further elaboration of these methods and guidance on which method is best in a

particular setting are important, needed resources. In addition, training on how to implement various methods for field workers is vital.

The human rights research field and the humanitarian relief field also have much to learn from one another. Human rights research techniques may be adaptable to crisis settings, and rapid estimation techniques may be useful for documenting human rights abuses in the early stages of an emergency. A recent conference in Mérida, Mexico, examined these issues, and the human rights community continues to work actively in this area of research.[29]

This workshop was the beginning of a dialogue between many different groups—humanitarian aid workers, epidemiologists, human rights researchers, demographers, sample survey statisticians, policy makers, and anthropologists. Further discussion can only help to increase their knowledge of these methods which may help to improve their response to emergencies and ultimately to their understanding of the root causes and consequences of crises.

NOTES

1 This definition of complex humanitarian emergency is adapted from Keely et al. 2001.

2 Refugees are persons displaced from one country into another, while internally displaced persons (IDPs) are displaced within their own country.

3 This report is technical in nature and due to space constraints, many technical concepts are not fully explained. Some key terms and ideas are briefly defined—mainly in endnotes—and references are provided in some cases, but for more detailed information about sampling methodology, the reader should refer to key texts, such as Kish 1965 and Henry 1990.

4 Self-settled refugees are persons who are displaced but not residing in separate organized camps, but rather living with the general population in the area.

5 See Médecins Sans Frontières 1997, United Nations High Commissioner for Refugees 1994, and Sphere Project 2000.

6 For more detailed descriptions of indirect estimation techniques, see United Nations 1983.

7 See Robinson et al. 1999.

8 Multistage sampling is a technique whereby clusters are selected as in cluster sampling and then sample members are selected from the cluster members using simple random sampling. More than one stage of clustering may be used.

9 Design effect is a measure of the contribution of the sampling design of the survey to the variance of the estimates. Thus, in this case it refers to the increased uncertainty of estimates obtained from samples selected using cluster sampling in comparison with simple random sampling. See Henry 1990:107-109 for a more detailed explanation.

10 A confidence interval is a range of estimated values within which the true value of the population parameter (e.g., population size, mortality rate) can be expected to be located with a certain probability (i.e., degree of confidence). If one does not include a variable to account for the design effect when cluster sampling is used, then confidence intervals may be artificially small. See Henry 1990:118-123 for further information.

11 A sampling frame is the list from which the sample will be selected and ideally should consist of every member of the population of interest. If there are differences between the population and the sampling frame, they will constitute a form of nonsampling bias.

12 The unit of analysis is the entity being analyzed by a study and for which data are collected (e.g., individual person, household, school district).

13 Nonresponse is the lack of valid responses from some members of the sample and it can occur when a respondent refuses to participate in the survey or refuses to answer a specific question. This is to be distinguished from noncontact, which occurs when the respondent cannot be reached, and vacancy, which occurs when a dwelling is empty. All of these constitute part of nonsampling bias or error.

14 Weighting biased estimates is a technique that can be used during analysis to correct for sampling error. A weight is a numerical factor reflecting the sample design that is applied to the estimates.

15 For examples of cluster surveys as they have been used in emergency settings, see Binkin et al. 1995, Boss et al. 1994, Malilay et al. 1995, and Spiegel and Salama 2000.

16 The global positioning system (GPS) is a system of satellites that provide precise location information that can be accessed using handheld electronic units. Geographical information systems (GIS) are computerized systems to store, record, analyze, and produce maps based on spatial data.

17 See Brown et al. 2001 for a complete description of the quadrate method.

18 Purposive sampling is another term for nonprobability sampling. Nonprobability sampling methods are frequently used to sample for rare populations or events. These methods involve subjective judgment on the part of the researcher to select the sample in order to achieve the objectives of the research. Unlike probability samples, each member of a nonprobability sample does not have an equal chance of being selected.

19 Triangulation refers to a process of comparing data from several different sources to obtain a more precise result.

20 Two useful publications offer further guidance on using qualitative techniques. Catholic Relief Services has published a manual entitled *Rapid Rural Appraisal and Participatory Rural Appraisal Manual* for estimating livelihoods and food security in rural areas, particularly when there is upheaval (http://www.catholicrelief.org/what/overseas/rra_manual.cfm). Also, the Johns Hopkins School of Public Health's Center for Refugee and Disaster Studies has a publication entitled *Rapid Assessment Procedures (RAP): A Guide to Understanding the Perceived Needs of Refugees and Internally Displaced Populations* (http://www.jhsph.edu/refugee/rap_desc.html).

21 For a full explanation of the difference between the CMR and the CDR, see National Research Council 2001:8.

22 For a full report of this study, see Roberts et al. 2001.

23 Due to the ongoing violence and insecurity in the Democratic Republic of Congo,

researchers were extremely limited in where they could travel, and the surveys were conducted under very dangerous conditions.

24 An event history is a timeline of personal life events often used in demographic research to study changes over time; migration histories and fertility histories are common examples.

25 For further discussion of the capture-recapture method, see Ball et al. 1999.

26 Ball's work was submitted as evidence by the prosecution against former Yugoslav president Slobodan Milosevic at the International Criminal Tribunal for the Former Yugoslavia (ICTY). See Ball 2000 and Asher et al. 2002 for more information on the study.

27 Postenumeration surveys are conducted after a survey to determine any biases in the sample.

28 For example, Médecins Sans Frontières 1997 and Perrin 1996.

29 The International Seminar on Statistics and Indicators in Human Rights was held in Mérida, Mexico, April 3-5, 2002.

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Appendix

Workshop Agenda and Participants
September 20-21, 2000

AGENDA

September 20

Welcome, Introductions, and Background to the Meeting
Holly Reed, National Research Council

Introduction to the National Academies
Faith Mitchell, National Research Council

Goals for the Workshop
Charles Keely, Georgetown University (C*hair)*

Presentation: Overview of Demographic Methods in Complex Emergencies
W. Courtland Robinson, Johns Hopkins University
Paul Spiegel, Centers for Disease Control and Prevention

Presentation: Applied Methods—Cluster Sampling
Paul Spiegel, Centers for Disease Control and Prevention

Presentation: Human Rights Measurement Issues
Lynn Amowitz, Physicians for Human Rights

Comments: Donna Brogan, Emory University

Discussion

Presentation: Applied Methods—Spatial Sampling
Vincent Brown, Epicentre/MSF

Comments – Recommendations and Alternative Methods
Denis Coulombier, Institut de Veille Sanitaire (National Institute for Public Health Surveillance), France

Presentation: Applied Methods—Qualitative Techniques
William Weiss, Johns Hopkins University

Comments: M. Giovanna Merli, University of Wisconsin

Discussion: Estimating Population Size and Structure

Working Groups: Estimating Rates
- Group 1: Mortality/Sampling
- Group 2: Mortality/Indirect Estimation Techniques

Presentations by Working Groups and Discussion

September 21

Review of previous day
Charles Keely, Georgetown University

Presentation: Applied Methods and Mortality Measurement
Les Roberts, Johns Hopkins University

Comments: Fritz Scheuren, The Urban Institute

Presentation: Methods for Measuring Mortality Due to Human Rights Abuses
Patrick Ball, American Association for the Advancement of Science

Comments: William Seltzer, Fordham University

Discussion

Working Groups: Estimating Rates
- Group 1: Morbidity and Mortality of Human Rights Abuses as Related to Genocide and Crimes Against Humanity
- Group 2: Morbidity and Mortality in Complex Emergencies Related to Disease and Malnutrition

Presentations by Working Groups and Discussion

Discussion: Directions for Future Research

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