Measuring Maternal Mortality from a Census: Potential Uses in Latin American Countries

Summary of a meeting held by
MEASURE *Evaluation* and
the Maternal and Neonatal Health Project

October 5-6, 2000
Lima, Peru

MEASURE Evaluation
Carolina Population Center
University of North Carolina at Chapel Hill
123 West Franklin Street, Suite 304
Chapel Hill, North Carolina 27516, USA

July 2001

Other Workshop Summaries by MEASURE *Evaluation*

No. 1. HIV, STDs and Infertility: Key Issues, May 1999.
No. 2 Use of Birth Registers as a Data Source for Maternal and Perinatal Health Care, May 1999
No. 3 Review of Results of the Multi-Country Field Test of Quality of Care Indicators in Clinic-Based Family Planning Programs, July 1999
No. 4 Measuring Capacity Building in Health and Population Programs, March 2000.
No. 5 Biological and Clinical Data Collection in Population Surveys in Less Developed Countries and Annotated Bibliography, March 2000.
No. 6 Strengthening Monitoring and Evaluation of National AIDS Programmes in the Context of the Expanded Response, April 2001.

The workshop summary series is made possible by support from USAID under the terms of Cooperative Agreement HRN-A-00-97-00018-00. The opinions expressed are those of the authors, and do not necessarily reflect the views of USAID.

Introduction

Maternal mortality and morbidity ranks as the largest single cause of loss of healthy life among women of reproductive age in the developing world. At the 1987 Safe Motherhood Conference in Nairobi, Kenya, attention was drawn to the fact that maternal mortality ratios in developing countries were often 100 times greater than those commonly found in developed countries. Reducing maternal mortality, especially in the developing world, is an increasingly high priority among public health professionals, programme specialists and policy makers. Over the past decade a number of international forums have declared a reduction in maternal mortality as one of their goals, including the 1990 World Summit for Children, the 1994 International Conference on Population and Development, the 1995 World Conference for Women and the 2000 Millennium Summit.

Issues in the Measurement of Maternal Mortality

Increasing global attention to maternal health has led to much greater demand for maternal mortality estimates at the national and sub-national levels. However, methodologies for measuring and monitoring maternal mortality lag far behind. In many developing countries, currently available data are simply inadequate for providing precise estimates. While civil registration systems are designed to gather the needed statistics on maternal deaths, they remain insufficient in quality of recording in the majority of developing countries and are even found to be problematic in developed countries. Sample surveys that attempt to identify maternal deaths in the household are being increasingly used, but require prohibitively large sample sizes to generate reliable estimates in the short term or at the sub-national level.

Given the shortcomings of civil registration and sample-based methodologies, it has been suggested that census measurement could be more appropriate for producing acceptably precise,

cost-effective estimates of maternal mortality and worth further exploration. In November 1998, MEASURE *Evaluation* held a workshop in Nairobi in order to evaluate the use of the census for maternal mortality measurement. Participating were census representatives from five countries previously identified as having experimented with maternal mortality data collection in a recent census - Benin, Iran, Laos, Madagascar and Zimbabwe - and from the Kenyan Central Statistical Office as well as technical advisors from the Johns Hopkins University, the London School of Economics, and the London School of Hygiene and Tropical Medicine.

A manual of guidelines for measuring maternal mortality from a census in developing countries was subsequently drafted.[1] The objectives were to document and evaluate experiences of census measurement of maternal mortality in developing countries, to encourage countries to build upon these experiences, and to compile recommendations for Statistical Offices considering using the census methodology for maternal mortality estimates.

1 Hill K., Stanton C., and Gupta N. (2001), *Measuring Maternal Mortality from a Census: Guidelines for Potential Users.* MEASURE Evaluation Manual Series, No.4. Chapel Hill, NC: Carolina Population Center, University of North Carolina.

Indicators for Measuring Maternal Mortality

The World Health Organisation defines a maternal death as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the pregnancy duration or outcome, from any non-accidental cause related to or aggravated by the pregnancy or its management. Identification of a maternal death requires information on two criteria: cause of death and timing of death relative to pregnancy, childbirth and the postpartum period.

A number of different indicators have been developed for the measurement of maternal mortality. The maternal mortality ratio (MMRatio), which refers to the number of maternal deaths per 100,000 live births, is designed to express obstetric risk:

$$\text{MMRatio} = \frac{\text{Number of maternal deaths}}{\text{Number of live births}} * 100{,}000$$

Second, the maternal mortality rate (MMRate) provides an indication of the risk of maternal death among women of reproductive age:

$$\text{MMRate} = \frac{\text{Number of maternal deaths}}{\text{Number of women aged 15-49}} * 1000$$

A third indicator is the proportion of adult female deaths due to maternal causes (PMFD), which can be calculated as:

$$\text{PMFD} = \frac{\text{Number of maternal deaths}}{\text{Number of deaths among women aged 15-49}}$$

Fourth, the lifetime risk of maternal death (LTR) takes into account the probability of a woman dying due to maternal causes each time she becomes pregnant over the course of her reproductive life span. It is commonly estimated as:

$$\text{LTR} = 35 * \text{MMRate}$$

Different aspects of the burden of maternal mortality are reflected in these four indicators. Measures of maternal mortality in any society should be interpreted in light of the risk per woman and per birth, and with consideration of the level of fertility and the distribution of deaths by cause.

Excerpted from a conference presentation by Cindy Stanton, 'Overview of Maternal Mortality Measures'. See also Hill K, Stanton C, and Gupta N (2001), 'Measuring Maternal Mortality from a Census: Guidelines for Potential Users.'

In order to promote dissemination of the census methodology and discussion on its potential use, a regional consultative meeting was organised by MEASURE *Evaluation* and the Maternal and Neonatal Health (MNH) Project in Lima, Peru, on October 5-6, 2000 (Appendix A). The invitees were representatives from the Ministry of Health and the Census Bureau from seven Latin American countries with upcoming censuses: Bolivia, Colombia, El Salvador, Guatemala, Honduras, Paraguay and Peru. Representatives from a number of international organisations also attended (Appendix B). The meeting objectives included: i) to disseminate information on the methodology required for maternal mortality measurement from a census; ii) to openly discuss the advantages and disadvantages of the methodology based on previous experiences in other countries; and iii) to promote discussion and collaboration between Census Bureaus and Ministries of Health on the issue of maternal mortality both within and between Latin American countries.

Using the Census to Measure Maternal Mortality

To estimate maternal mortality from census data, the questionnaire must include some basis for measuring the population size by age and sex, the number of deaths and the number of maternal deaths over a given period of reference, and the number of live births over the same period. In particular, the collection of information on deaths involves the identification of all household members who have died within a specified period by age and sex. In order to distinguish maternal from non-maternal deaths, additional questions must be asked to determine the timing of adult female deaths relative to pregnancy, childbirth and the postpartum period. Given the common data problems for measuring maternal mortality, an evaluation of the data quality is especially important. Subsequent adjustment may be recommended in cases of deficiencies to arrive at reliable estimates of the maternal mortality indicators.

Methods for Evaluating Completeness of Death and Birth Recording in a Census

An important component of producing measures of maternal mortality via the census is evaluating the quality of the reported numbers of deaths and births for data deficiencies, such as frequent omissions or date displacements.

A variety of methods exist for evaluating the completeness of death recording. Most of these methods rely on mathematical relationships between the age distribution of deaths and the age distribution of the population, and make certain simplifying assumptions about error patterns. One methodology that is simple to apply, and relatively straightforward conceptually, is the *Brass Growth Balance Equation* and extensions of it. It can be used to estimate the completeness of death recording relative to population recording, from which an adjustment factor can then be applied against reported deaths of women of reproductive age.

Methods for evaluating completeness of birth recording usually require information on women's lifetime fertility and on their recent fertility (such as the number of births in a defined time period before enumeration or the date of the most recent live birth). The reported numbers of births can be evaluated using the *Brass Parity/Fertility Ratio* technique, and subsequently adjusted if necessary.

While no formal techniques are known for evaluating the classification of adult female deaths as pregnancy-related, repeating the collection of information related to maternal mortality in successive censuses is likely to lead to improvements in the estimation and evaluation procedures.

Excerpted from a conference presentation by Ken Hill, 'Using the Census for Measuring Maternal Mortality'. See also Hill K., Stanton C., and Gupta N. (2001), 'Measuring Maternal Mortality from a Census: Guidelines for Potential Users.'

Perspectives on Census Measurement of Maternal Mortality in Latin American Countries

While a number of countries in Latin America have used the census as a source of data on child mortality, and to a lesser extent adult mortality, measures of maternal mortality have been mostly derived from civil registration systems, health facility records, or demographic and health surveys.

During the meeting, participants generally agreed that the census offers a number of advantages with regard to the collection of information for measuring maternal mortality. The census already exists in every country. Its coverage allows for more detailed analyses at the sub-national level or by socio-demographic characteristics of the household, for greater targeting of programme interventions. Cost-effectiveness may be better compared to sample surveys. In countries where information on recent household deaths is being collected anyway, the extra effort of collecting information on deaths among women of reproductive age would be modest, since relatively few households will report such cases.

In addition, census data can be internally evaluated for the completeness of death and birth recording. This could provide a valuable mechanism for validating information compiled from other registration systems. Given the importance of reducing maternal mortality in international programmatic concerns, the collection of reliable information on maternal mortality could pique sizeable interest among donor agencies and other interested parties.

At the same time, the census has some limitations. The implementation of a national population census is already a complex operation with many competing interests, and the collection of information for maternal mortality measurement would require additional resources for questionnaire design, fieldwork training, and data processing and analysis. This could be particularly demanding in countries where census enumerators do not necessarily have higher levels of education

(sometimes youths or volunteers). The additional fieldwork requirements may also be burdensome in countries where the census count is designed to be completed in one or two days. Long intervals between censuses (usually a decade or more) could be a political obstacle to using this source in some cases. The need for pilot studies to test the validity of questionnaire wording, especially in different indigenous languages, was also raised. Moreover in some cultures, sensitivities to asking retrospective questions on maternal deaths could be an obstacle to collecting such information.

Next Steps

The inclusion of questions in the census for maternal mortality measurement could be seen as an opportunity for wider use of this instrument as a source for mortality estimates in general, for improving co-operation between the public health and data collection agencies within countries, and for generating interest in the census as a valuable tool for better informed policy and programme decision-making. Each country must come to its own decision on potential use. Given the advantages, a number of participants (from Bolivia and Peru in particular) expressed interest during the meeting in investigating next steps for implementation of the methodology for measuring maternal mortality in their upcoming national census. For others, the question would have to be first raised with the census technical or advisory committee (Colombia, Guatemala, Honduras, Paraguay) and possibly subject to a pilot study (El Salvador).

Appendix A: Meeting Agenda

"Measuring Maternal Mortality from a Census:
Potential Uses in Latin American Countries"
Lima, Peru
October 5-6, 2000

MEASURE Evaluation
Maternal & Neonatal Health

AGENDA

Day 1: October 5

9:00-9:30 Introduction and Welcome

9:30-10:30 Towards Safe Motherhood in Latin America

- A panel presentation with representatives of national Health Ministries on the policies and programmes currently in place for promoting Safe Motherhood

10:45-11:30 Overview of Maternal Mortality Measures

- Global overview of methods for estimating maternal mortality

11:30-12:30 National Measures of Maternal Mortality

- A panel presentation with each country's Census Bureau representative on the data collection and analysis procedures being used for measuring maternal mortality at the national and sub-national levels

12:30-1:30 Lunch

1:30-3:00 Using the Census for Measuring Maternal Mortality

- Detailed technical presentation on the census methodology, including data collection, data evaluation and adjustment, and tabulation procedures

- Experiences in census measurement of maternal mortality from five developing countries: assessment of results and recommendations
- Experiences in measurement of adult mortality in selected Latin American countries

3:15-4:30 Perspectives on Using the Census Methodology

- Breakout session for discussions among Census Bureau representatives on the feasibility and procedures of implementing the methodology, and among Health Ministry representatives on facilitating data collection and analysing potential uses

4:30-5:30 Day 1 Wrap-up

- Brief presentations on the issues discussed and decisions made during the breakout session

Day 2: October 6

9:00-9:30 Implementing the Census Methodology for Maternal Mortality Measurement

- Recommendations for data dissemination and use

9:30-10:30 Next Steps: Collaboration between Census Bureaus and Health Ministries

- Breakout session for each country's representatives to discuss their specific perspectives on the advantages and disadvantages of the census approach for measuring maternal mortality and, if appropriate, identify immediate steps required for implementation in the next census

10:45-12:30 Meeting Wrap-up and Evaluation

- Brief presentations on the issues discussed and decisions made during the breakout session
- Identification of persons/institutions potentially interested in implementing data collection and /dissemination of maternal mortality measures in the near future among Latin American countries

Appendix B: List of Participants

"Measuring Maternal Mortality from a Census:
Potential Uses in Latin American Countries"
Lima, Peru
October 5-6, 2000

MEASURE Evaluation
Maternal & Neonatal Health

LIST OF PARTICIPANTS

Luis Pereira Stambuk	Instituto Nacional de Estadística (INE)	Bolivia
Jaime Tellería Guzmán	Ministerio de Salud	Bolivia
Leonel Castillo	Departamento Nacional de Estadística	Colombia
Saúl García Carballo	Dirección General de Estadística y Censos (DIGESTYC)	El Salvador
Jorge Andrés Morán Colato	Ministerio de Salud Pública y Asistencia Social	El Salvador
Edgar Hidalgo Hernandez	Instituto Nacional de Estadística (INE)	Guatemala
Eduardo Espinosa	Ministerio de Salud y Asistencia Social	Guatemala
Rubén Hernández Cruz	Dirección General de Estadística y Censos	Honduras
Ivo Flores Flores	Secretaría de Salud	Honduras
Myriam Dávalos	Dirección General de Estadística, Encuestas y Censos (DGEEC)	Paraguay
Angela Graciela Baez	Ministerio de Salud Pública y Bienestar Social	Paraguay
Gloria Loza Martinez	Instituto Nacional de Estadística e Informática (INEI)	Perú
Ramon de la Cruz Yupanqui	Instituto Nacional de Estadística e Informática (INEI)	Perú

Nazario Carrasco Izquierdo	Ministerio de Salud	Perú
Elias Lozano Salazar	Ministerio de Salud	Perú
Juan Seclen	Ministerio de Salud	Perú
Arodys Robles	Centro Latinamericano y Caribeño de Demografía (CELADE)	Chile
Monir Islam	World Health Organisation (WHO)	Switzerland
Diego Palacios	Fondo de Población de las Naciones Unidas (UNFPA)/Perú	Perú
Richard Martin	USAID/Perú	Perú
Maria Angelica Borneck	USAID/Perú	Perú
Guillermo Vallenas Ochoa	Universidad Nacional Mayor de San Marcos	Perú
Kenneth Hill	Johns Hopkins School of Public Health	USA
Eduardo Arriaga	Consultant	USA
Cindy Stanton	Maternal and Neonatal Health Project/JHPIEGO	USA
Edgar Necochea	Maternal and Neonatal Health Project/JHPIEGO	USA
Marcos Paz Ballivián	Proyecto Salud Materna Neonatal/JHPIEGO	Bolivia
Gustavo Adolfo Barrios	Proyecto Salud Materna Neonatal/JHPIEGO	Guatemala
Miguel Angel Espinoza Barco	JHPIEGO	Perú
Luis Tavara	JHPIEGO	Perú
Neeru Gupta	MEASURE *Evaluation*	USA