



Using Census Data to Estimate Maternal Mortality

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Millennium Development Goal # 5

- Reduce the MMRatio by 75% between 1990 and 2015
- The fact that the target is expressed in terms of MMRatio has made this measure even more important than before



Millennium Development Goal # 5

- Problems in Developing Countries:
 - Vital Registration is Incomplete
 - DHS: sample size is small
- An Innovative Solution: Population Censuses
 - Recommended by ICPD +5
 - Possibility to study differentials
 - Questions were included in a series of African, Asian and Latin America countries in recent years.



Sources of Data for MMRatio

- In developed countries:
 - Registered deaths with valid cause of death
 - Registered births
- In developing countries:
 - Both the registration of deaths and the recording of cause may be incorrect
 - Sibling histories (histories of sibling survival) with information on the timing of death relative to pregnancy
 - **Deaths in a defined reference period prior to a census with information on the timing of death relative to pregnancy**
 - Reproductive Age Mortality Surveys

Data and Their Problems



- Civil Registration :
 - Incorrect classification of cause (even in “developed” countries)
- Survival of sisters:
 - Omission of dead sisters
 - Sampling errors (maternal deaths are rare events)
- Information on recent deaths:
 - Omission of deaths
 - Errors in estimates of births
 - Sampling errors (if survey data)



Estimating Using Census: what do we need?

- Data needed:
 - Two population age and sex distribution;
 - Age and sex distribution of household deaths reported for some relative short period of time (better if for both censuses);
 - Information on whether the woman was pregnant, in childbirth or within 6 weeks of delivery at the time of death;
 - Information on births by age of mother for some relative short period of time before the censuses (together with similar information on number of children ever born).



Example of Census' Question Zimbabwe (1992)

- A) When was [name's] last live birth?
- B) Did any deaths occur in this household in the last 12 months?
 - If yes: Was the deceased male or female?
- How old was the deceased?
- For woman aged 12-49 years and deaths not caused by accident:
 - Did she die while pregnant, while giving birth, or within about 1 month after giving birth?



Data Evaluation and Adjustment

- **Check the population age and sex distribution, check the growth rates by age;**
- **What is the degree of death coverage in the population?:**
 - General Growth Balance
 - Synthetic Extinct Generation
 - Synthetic Extinct Generation Adjusted
- **What is the quality of fertility data? What is the quality of reporting?**
 - P/F Ratio (Brass in Manual X)
- **What is the quality of information on pregnancy related deaths?**
 - There are no formal methods.



General Assumptions (Mortality Coverage)

- The methods developed to assess the coverage of reporting of deaths (from civil registration or census questions) compare the distribution by age of the population (survivors) to that of the deaths
- The methods assume that the errors of reporting are distributed proportionately by age
- More important still (especially for analysis of sub-national differentials) is the assumption that the population is closed to migration
- One of the two methods (SEG) assumes that the coverage of the two censuses is constant



General Growth Balance

- In any closed population, the mortality rate is equal the fertility rate minus the growth rate.
- This relation also applies for any open-ended age interval (birthdays).
- It is possible to estimate the “birthday” and the growth rates from the population age structure.
- We then compare the observed mortality rates with the one estimate from the difference between birthday and growth rates.



General Growth Balance

- In any population, the growth rate is equal to the difference between the *entry* rate into the population and the *exit* rate from the population.
- In a *closed* population (with no net migration), *entries* are births and *exits* are deaths. Thus

$$r = b - d \quad \text{or (rearranging)} \quad b - r = d$$

- where b is the crude birth rate, r is the population growth rate, and d is the crude death rate. The difference between b and r is a *residual* estimate of the crude death rate.



Synthetic Extinct Generation

- In a population closed to migration, all the persons aged x today die in the future above age x . Thus one can estimate the population of age x today by cumulating all the deaths of the cohort in the future, although it would obviously require a long time to collect the deaths
- Demographic theory indicates that in place of the future deaths of cohort members one can use deaths in the current period instead, but adjusting them for population growth rates. The growth rates of the population adjust for the past history of the population.
- This method, developed by Bennett y Horiuchi, is called the Synthetic Extinct Generations method.



P/F Brass (Adjust Fertility)

- Used to assess the consistency of information on recent fertility with information on lifetime fertility;
- The main idea is that woman would report recent births with a completeness that is constant with age (age pattern);
- Younger woman would report their lifetime fertility accurately, providing a level to which age pattern could be scaled.



Putting Pieces Together

- PRMR is calculated as the number of pregnancy-related deaths divided by the number of live births;
- The final calculation is made by adjusting the number of deaths of woman aged 15-49 for estimated coverage, multiplying by the proportion of pregnancy-related (PDPR), and then dividing by the adjusted number of live births.



Advantages of the Census to Estimate MMRatio and MMRate

- No sampling errors (though there may still be small number problems)
- Ability to estimate differentials by socio-economic, geographic variables
- Well-developed formal evaluation methods



Disadvantages of the Census to Estimate MMRatio and MMRate

- Generally only held every 10 years at best (periodicity)
- The basic data always need evaluation, and frequently need adjustment
- The evaluation and adjustment methods depend on adjustments
- The estimates (after adjustment) are for the intercensal period (long reference period)



An example from Latin America

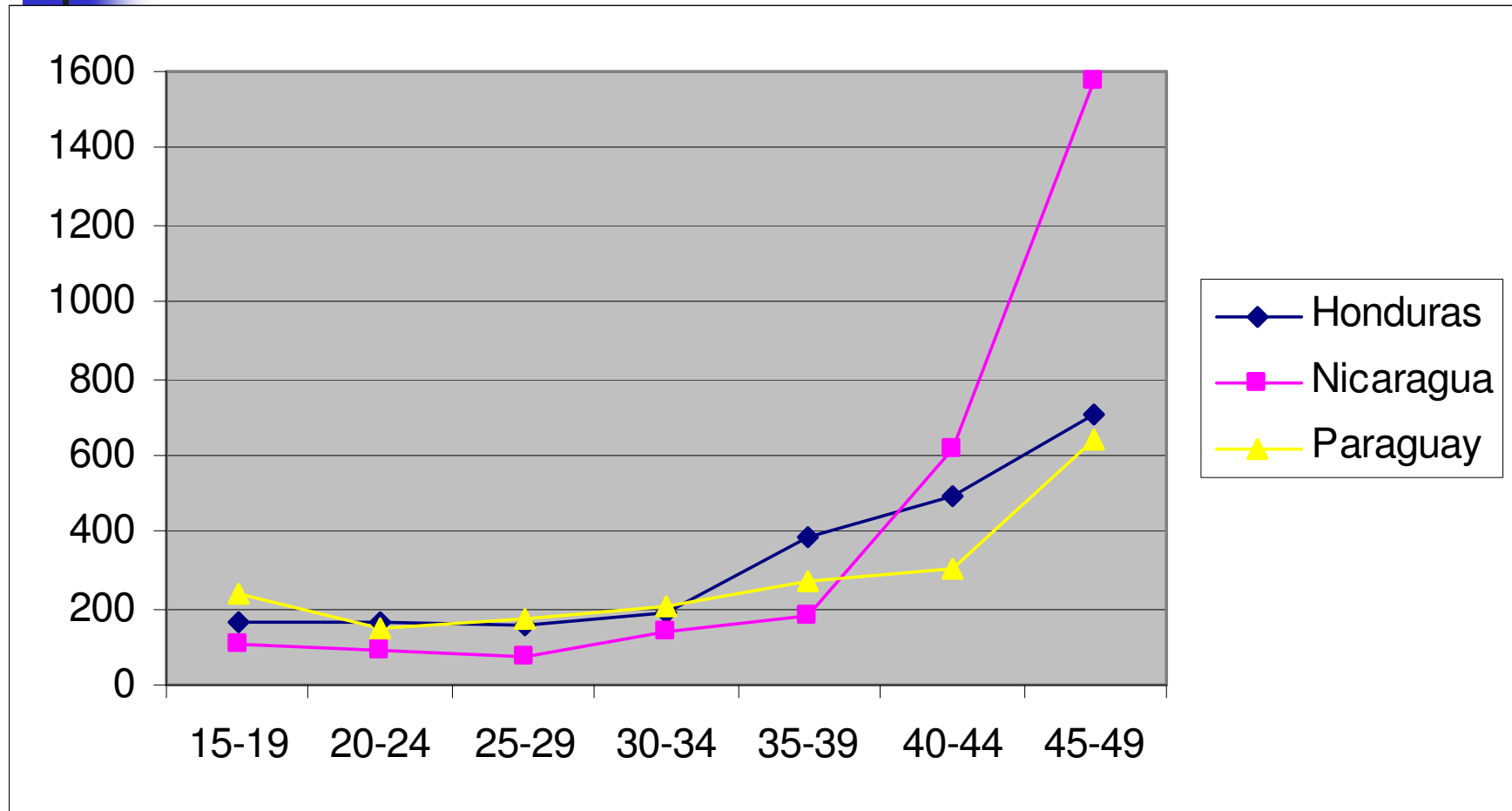
- Results from a Workshop on adult and maternal mortality organized in November/2006;
- Data from three Latin America countries: Honduras, Nicaragua and Paraguay.
- Objectives: evaluate the performance of the methodology and to serve as a model training exercise.



Results

Data or Indicator	Countries		
	Honduras	Nicaragua	Paraguay
Deaths Reported	1753	2645	2677
Adjustment Factor	1.56	0.606	0.746
PDPR	0.104	0.085	0.107
Maternal Deaths	284	136	214
Reported Births	170389	123168	116841
Adjustment Factor	0.996	0.97	1.03
Estimated PRMR	168	95	178

Maternal Mortality Ratio, by age





Some Issues in Latin America

- Relation between pregnancy-related mortality and maternal mortality;
- Timeliness of the estimates;
- Plausability of the various adjustments made to the data



Conclusions

- We were able to obtain reasonable MMRatio estimates using census data.
- We also obtained estimates for adult mortality for both males and females.
- Shows that it is important to evaluate data
 - We have a range of estimates, some countries have better coverage than others.
- We did not study differentials, but this is an interesting possibility.



Thank You

The End.