Reviewer’s report

Title: The impact of economic downturn on maternal and infant mortality: lessons from history

Version: 1 Date: 3 May 2010

Reviewer: BARTHELEYM Kuate-Defo

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The goal of this paper was to investigate the impact of economic recessions and economic growth on maternal and infant outcomes during the 20th century. The authors did a formidable job gathering time series data for 14 countries, from a variety of historical sources with varying degrees of quality. The analyses are conducted using methodologically sound approaches, and the paper reads very well.

This type of study is timely and many important findings are retrieved from the analyses conducted, even if the conclusions remain tentative. I commend the authors for their work and consider that this paper is publishable if the issues raised below are adequately addressed:

1. Granted that the best data is used by the authors, the robustness of the results of this study is influenced by its ability to: (1) dissociate clearly the different periods of economic recessions and economic growth (loosely captured by GDP per capita) for each and all countries under study, and the extent to which these periods were the same and had the same time-frame for all countries – what do we know and what can we learn?; (2) establish the time-sequence between these periods and economic shocks and the expected (vs. observed/recorded) changes in maternal and child mortality levels; (3) address the role of the different health care systems, health care reforms and welfare policies, health insurance schemes (e.g., universal coverage in Canada unlike the USA) and maternal and child health programs at mitigating some/most income-related effects on these changes over time; 4) minimize the simultaneity biases inherent in the exposure/outcomes variables commonplace in the type of data analyzed; 5) discuss squarely the sources of heterogeneity affecting the measurements of variables in this study, and provide some lower and upper bounds of the estimated parameters under alternative specifications of the models (e.g., with unobserved fixed effects).

2. Discuss the role of a third influential variable (e.g., fertility-related variables –available with mortality indicators in most data sources available to the authors – affecting (or linked to) mortality and GDP per capita).

3. There are many confusions throughout the manuscript regarding the years forming the various periods used for analyses and the results reported in the text and tables: a) in the “Abstract”, one reads in the second line of the results, “... for
early periods (1936 to 1965)…”, in the “Methods”, one reads on line 8 from the bottom, “… more consistent after 1935 and this year is, therefore, used as the starting point for the analysis…”, AND in table 1, one reads 1935 to 1950 whereas table 2 has 1936 to 1950; b) on page 7, one reads on paragraph 2, last two lines, “… with strongest correlation in the 1966 to 1980 period for MMR and 1980 and later for IMR” whereas on page 9, lines 3-4 from the top, one reads, “… was divided into fifteen year time periods: 1935 to 1950, 1951 to 1965, 1966 to 1980 and 1981 and later” AND in table 2, the periods are 1966 to 1980 and 1980 and later. The years and periods used in the analyses given the data at hand should be consistent with specifications reported in the study and the ensuing results and their interpretations.

4. The counterfactual survivor experience should be addressed. Under changing economic conditions (income, GDP per capita, etc.), because the estimated number of events will differ from the observed number of events, this will necessarily affect the composition of the risk set (for mothers and children) with the passage of time differently than what would occur under the observed pattern of events, and this will occur differently in different countries for the 14 countries selected for analyses. Therefore, one may adjust the subsequent number at risk according to the expected number of events occurring at time T. To adjust the size of the risk set at points in time later than t we must account for the number of censored observations that would have occurred, given the expected number of events (i.e., the counterfactual number of censored observations in the interval that has been adjusted upwards for risk factors and downward for protective factors.).

5. Once the issues above are accurately dealt with, it would be useful to have well-defined temporal and geographic differences expected in maternal and child mortality that are derived from a before-and-after approach to minimize error by confounding.

6. The use of a lag of five years in all models and the reason given for doing so (p. 8) is not convincing, especially if one expects some economic, behavioral or biological justification to this specification used: are there long-term effects of economic shocks on maternal and child mortality, are there critical time-windows between economic downturns/growth and reproductive/health outcomes, etc.?

Minor points

1. I would avoid the word “impact” throughout the paper and replace it by “association”: there is no room for a causal inference to be made based on the data analyzed.


3. On several parts of the manuscript, it is mentioned that several/various sources were used to extract the data: what are they and what are their relative
strengths and weaknesses?

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.