A New Data Driven Approach to Analyzing the Impact of Social Policies on Health on a Global Scale

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The **UN Development Goals** represent global commitments to achieve significant and defined progress in global health.

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<td><strong>MDG4.</strong> Reduce child mortality—Reduce under-five mortality by two-thirds</td>
<td><strong>SDG 3.2.</strong> Lower neonatal mortality to less than 12/1000 births and under-five deaths to less than 25/1000 live births</td>
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<td><strong>MDG5.</strong> Improve maternal health—Reduce the maternal mortality ratio by three-quarters</td>
<td><strong>SDG 3.1.</strong> Reduce global maternal mortality ratio to less than 70/100,000 live births</td>
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<td><strong>MDG6.</strong> Combat HIV/AIDS, malaria &amp; other diseases—have halted and begin to reverse the spread</td>
<td><strong>SDG 3.3.</strong> End epidemics of AIDS, TB, malaria and other communicable diseases</td>
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Yet the distribution of infant deaths is most unequal, both between countries and within them. Fig. 2.1 shows variation between countries in infant mortality from just over 20/1000 live births in Colombia to just over 120 in Mozambique. And it shows dramatic inequities within countries – an infant’s chances of survival are closely related to her mother’s education. In Bolivia, babies born to women with no education have infant mortality greater than 100 per 1000 live births; the infant mortality rate of babies born to mothers with at least secondary education is under 40/1000. All countries included in Fig. 2.1 show the survival disadvantage of children born to women with no education. If it is considered too unrealistic to contemplate an infant mortality rate of 2 per 1000 live births in low-income countries, we must at least acknowledge the scale of improvement in infant survival apparently offered by educating girls and women.

Health inequality in all countries

“There are no conditions of life to which a man cannot get accustomed, especially if he sees them accepted by everyone around him.” (Tolstoy, 1877)

We have become all too accustomed to premature death and disease and to the conditions that give rise to them. But much of the global burden of disease and premature death is avoidable, and therefore unacceptable. It is inequitable. Health equity has two important strands: improving average health of countries and abolishing avoidable inequalities in health within countries. In both cases – average health of countries and distribution within countries – the aim should be to bring the health of those worse off up to the level of the best. If the infant mortality rate in Iceland (WHO, 2007c) were applied to the whole world, only two babies would die in every 1000 born alive. There would be 6.6 million fewer infant deaths in the world each year.

Figure 2.1: Inequity in infant mortality rates between countries and within countries by mother’s education.


A role for social determinants?
A thought experiment.

Let’s assume that the education-based gradients in infant mortality reflect a causal effect and you were charged with eliminating these inequalities... what would you do?

A thought experiment.

How should we intervene to reduce educational-based inequalities in infant mortality?

A. Increase secondary or higher education by making it free
B. Increase secondary education by making it compulsory
C. Increase secondary education by increasing school quality
D. Build more secondary schools
A thought experiment.

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E. Increase access to maternal care among less-educated women
F. Increase immunization among kids of less-educated mothers
G. Increase access to family planning
H. Increase access to household resources among less-educated mothers
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G. Increase access to family planning
H. Increase access to household resources among less-educated mothers
I. All of the above?
J. Some of the above
K. None of the above?
....in a feast of descriptive studies of socio-economic causes of ill health we still face a famine of evaluative intervention studies (Bonneaux, 2008)
WHAT IS MACHEQUITY?

The overall objective of the Maternal and Child Health Equity (MACHEquity) research program is to examine how social policies focused on reducing poverty, income and gender inequality have an impact on the burden of disease among children and women under the age of 50.

Partnering with international NGOs and dedicated to the training and mentoring of the next generation of researchers in the field, MACHEquity joins information from household surveys with global policy data and utilizes innovative methods to investigate associations between social policies, social determinants, and health outcomes prioritized by the United Nations Millennium Development Goals.
strategic questions
+ data
+ empirical methods

consequentialist evidence
strategic questions + data + empirical methods → consequentialist evidence

- Discussions between academics and knowledge users to identify relevant research questions that can be answered
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  - Breastfeeding breaks at work (1995-current)
Were breastfeeding breaks guaranteed at work?

1995

2014
strategic questions + data + empirical methods → consequentialist evidence

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- We collect longitudinal data on social policies related to poverty, income and gender inequality for all LMICs
  - Breastfeeding breaks at work (1995-current)
  - Minimum wage (1999-current)
How have minimum wages evolved over time?
strategic questions + data + empirical methods → consequentialist evidence

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- We collect longitudinal data on social policies related to poverty, income and gender inequality for all LMICs
  - Breastfeeding breaks at work (1995-current)
  - Minimum wage (1999-current)
  - Maternal and paternal leave policies (1995-current)
  - Minimum age of marriage (1995-current)
  - Family cash benefits (1999-current)
  - Child labour (1995-current)
strategic questions + data + empirical methods $\rightarrow$ consequentialist evidence

- Discussions between academics and knowledge users to identify relevant research questions that can be answered
- We collect longitudinal data on social policies related to poverty, income and gender inequality for all LMICs
- Join policy data to survey data from harmonized DHS/MICS or other sources to create multilevel datasets
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- We collect longitudinal data on social policies related to poverty, income and gender inequality for all LMICs
- Join policy data to survey data from harmonized DHS/MICS or other sources to create multilevel datasets
- Apply empirical methods, including those commonly used in epidemiology and economics, to rigorously evaluate the impact of policy reforms on health and health inequality
Increased Duration of Paid Maternity Leave Lowers Infant Mortality in Low- and Middle-Income Countries: A Quasi-Experimental Study

Arijit Nandi, Mohammad Hajizadeh, Sam Harper, Alissa Koski, Erin C. Strumpf, Jody Heymann

Background
Maternity leave reduces neonatal and infant mortality rates in high-income countries. However, the impact of maternity leave on infant health has not been rigorously evaluated in low- and middle-income countries (LMICs). In this study, we utilized a difference-in-differences approach to evaluate whether paid maternity leave policies affect infant mortality in LMICs.

Methods and Findings
We used birth history data collected via the Demographic and Health Surveys to assemble a panel of approximately 300,000 live births in 20 countries from 2000 to 2008; these observational data were merged with longitudinal information on the duration of paid maternity leave provided by each country. We estimated the effect of an increase in maternity leave in the prior year on the probability of infant (<1 y), neonatal (<28 d), and post-neonatal (between 28 d and 1 y after birth) mortality. Fixed effects for country and year were included to control for, respectively, unobserved time-invariant confounders that varied across countries and temporal trends in mortality that were shared across countries. Average rates of infant, neonatal, and post-neonatal mortality over the study period were 55.2, 30.7, and 23.0 per 1,000 live births, respectively. Each additional month of paid maternity leave was associated with 7.9 fewer infant deaths per 1,000 live births (95% CI 3.7, 12.0), reflecting a 13% relative reduction. Reductions in infant mortality associated with increases in the duration of paid maternity leave were concentrated in the post-neonatal period. Estimates were robust to adjustment for individual, household, and country-level characteristics, although there may be residual confounding by unmeasured time-varying confounders, such as coincident policy changes.

Conclusions
More generous paid maternity leave policies represent a potential instrument for facilitating early-life interventions and reducing infant mortality in LMICs and warrant further discussion in the post-2015 sustainable development agenda. From a policy planning perspective, further work is needed to elucidate the mechanisms that explain the benefits of paid maternity leave for infant mortality.
Increased leave lowered infant mortality.

*results were robust to adjustment for individual, household, and country-level characteristics, including the wage replacement rate, GDP per capita, female labor force participation, government health expenditure per capita, and total health expenditure per capita.
This is hard.

- We measure national policies, although there may be sub-national variations in social policy approaches.

- Comprehensive information about implementation is limited globally—we try to measure intention-to-treat effects.

- Cross-national data is limited at the individual- or household-levels for specific health targets (e.g., maternal mortality).

- Standard threats to internal validity apply, including the potential for unmeasured confounding & measurement error.
Recommendations.

- Invest in global data infrastructure for tracking trends in social policy approaches and development related targets

- Integrate quasi-experimental methods (i.e., ITS, DD, IV, RD) into our public health & epidemiologic pedagogy

- Involve “knowledge users” in the research process to help identify research gaps and specify policy-relevant questions

- Encourage reviews for systematically synthesizing results, identifying research gaps, understanding heterogeneity, and reducing redundancies
THANKS!

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Efe Atabay, John Frank, Mohammad Hajizadeh, Sam Harper, Jody Heymann, Jay Kaufman, Alissa Koski, Lauren Maxwell, José Mendoza Rodriguez, Erin Strumpf, Ilona Vincent, and all of the research team

PARTNER INSTITUTIONS:

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FOR FURTHER INFORMATION SEE WWW.MACHEQUITY.COM
The global MACHEquity team.
1. IDENTIFY “POLICY EXPERIMENTS”.
Prioritizing specific policy reforms with the potential to affect major sources of global morbidity and mortality prioritized by the UN Development Goals

2. EVALUATE.
- Quasi-experiments. Estimating policy impact, and inequalities by gender, SES, and urban-rural residence
- Mediation analysis. Examining mechanisms through which policies influence health targets
- Cost-effectiveness. Comparing the costs and benefits of policies that have a robust effect on health

3. SUPPORT EVIDENCE-BASED DECISION MAKING.
Translating research findings for academic and non-academic audiences and identifying practical solutions for improving socioeconomic development and health

4. FEEDBACK.
Refining research priorities based on knowledge created and changing priorities of network partners