Maternal Health and Fertility

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“Three Perspectives on Technology and Childbirth in America”
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Research Agenda

◊ Progress in medical technologies related to *motherhood* since mid 19th century played critical role in:
  ▶ Baby boom and subsequent baby bust
  ▶ Setting forth process that led to change in women’s social & economic role

◊ Main developments:
  ▶ Decline in maternal morbidity and mortality & perinatal mortality
  ▶ Introduction and commercialization of effective breast milk substitutes

◊ Significance “medical progress”:
  ▶ Motivated by independent scientific discoveries and public health concerns
  ▶ Largely preceded increase in fertility and LFP

◊ Approach:
  ▶ Explore theoretical and empirical link between maternal health and fertility, women’s Lfp and education choices
Today’s Talk: US Baby Boom and Bust

- US total fertility rate rose from 2.12 to 3.65 between 1937 and 1960 and dropped to 1.74 in 1976

Figure: Total Fertility Rate
Existing Econ Explanations

- Economic conditions (Easterlin, 1961)
  - Rise in "relative income" for Great Depression & WWII generation
- Introduction of home appliances (Greenwood, Seshadri and Vanderbrouck, 2005)
  - Time cost of children goes down
- WWII (Doepke, Hazan and Maoz, 2007)
  - Young women face unfavorable labor market conditions due to high participation rates of older women
Our Contribution

- Dramatic improvement in maternal health starting in mid-1930s can explain US Baby Boom and (indirectly) Bust
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- Mechanism
  - Decline in health burden of childbirth $\implies$ Boom
  - Increased life expectancy $\implies$ Rise in women’s investment in human capital & Rise in opportunity cost of children $\implies$ Bust

Joint work with Stefania Albanesi @ Columbia University
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- Integrated analysis of both secular fertility decline and Baby Boom & Bust
  - Rapid advances in maternal health $\rightarrow$ Baby Boom & Bust
  - Gradual reduction in infant mortality $\rightarrow$ secular decline

- Joint work with Stefania Albanesi @ Columbia University
Maternal Health and Fertility
Maternal Health

Maternal Mortality Ratio

- MMR dropped from 51.16 to 2.87 per 10,000 live births between 1936 and 1956

Figure: MMR Index and TFR
Incidence of Maternal Mortality
Advances in Maternal Health
Incidence of Maternal Mortality

Maternal deaths as % of deaths to 15-44 female
Maternal deaths as % all female deaths
TBC deaths as % all deaths
Influenza/pneumonia deaths as % all deaths (right axis)
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Incidence of Maternal Mortality

MATERNAL MORTALITY RATES
per 1000 births
Latest available figures up to 1917

UNITED STATES

New Zealand
Australia
Spain
France
England and Wales
Japan
Norway
Sweden

Scotland
Switzerland
Ireland
Hungary
Finland
Russia
The Netherlands
Italy

The United States lost over 23,000 women in 1918 from childbirth. We have a higher maternal death rate than any other of the principal countries.

CHILDREN'S BUREAU, U.S. DEPARTMENT OF LABOR.
Evidence on Advances in Maternal Health
Agencies Hail Mortality Drop In Birth Cases

Maternity Center Official Lays Trend to New Drug and Organized Campaign

By ANNE PETERSEN

A record drop in the latest maternal mortality figures for this country, and the part played in this reduction by the new chemical discovery of sulfanilamide, have given new cheer to the agencies that long and strenuously have campaigned against preventable deaths of American mothers.

In statistics issued by the U. S. Bureau of the Census, the rate for 10,000 live births in 1937 was 49. This figure is eight below the rate for the previous year as compared to earlier annual declines of three or less.

Figure: The New York Times: Published April 9, 1939
Advances in Maternal Health
Developments

- Government programs
  - 1912 Children’s Bureau
  - 1921-1929 Sheppard-Towner Act
  - 1933 White House Conference on Child Health Protection, Fetal Newborn, and Maternal Mortality and Morbidity Report
  - 1935 Social Security Act Title V
Advances in Maternal Health

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- **Medical and scientific**
  - Prenatal care (1910-)
  - Certification and licensing of medical professionals (1930-)
    - Standardization of obstetric practices
    - Improved obstetric training
  - *Sulfa drugs (1936)*
  - *Blood banking (1937)*
Advances in Maternal Health

Maternal Mortality by Cause

Figure: Trends maternal deaths by cause
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Hospitalization

Figure: Live births per attendant 1935-1954. Source: Children’s bureau, Statistical Series N. 42, 1954.
Maternal Health Burden
Maternal Health Burden

Risk of Death

- Parity adjusted lifetime risk of death in pregnancy and childbirth falls from 3.2% to 0.1% between 1900 and 1960

**Figure:** Source: Author’s calculations based on Berry (1977)
Maternal Health Burden

MMR and Female Life Expectancy

Figure: MMR and F-M Differential in Life Expectancy at age 20
Maternal Health Burden

Life Expectancy

- F-M differential in life expectancy at age 20 rose from 2.5 to 6.6 years between 1930 and 1960
- Estimates from Rethereford (1972):
  - Drop in MMR accounts for 14% of the rise in F-M differential in life expectancy between 1910 and 1965
  - Drop in MMR accounts for 100% of the change in F-M differentials in mortality rates at age 20-39
Maternal Health Burden
Maternal Conditions

- For each maternal death, at least 20 mothers experience severe disabling conditions in 1920s (Kerr, 1933)
Maternal Health Burden

Maternal Conditions

- For each maternal death, at least 20 mothers experience severe disabling conditions in 1920s (Kerr, 1933)

<table>
<thead>
<tr>
<th>Common Maternal Conditions</th>
<th>DW*</th>
<th>I**</th>
<th>D**</th>
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<tbody>
<tr>
<td>Fistula &amp; lacerations</td>
<td>0.43</td>
<td></td>
<td></td>
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<tr>
<td>Hypertensive disorders</td>
<td>0.38 (childbearing years)</td>
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<tr>
<td>Anaemia</td>
<td>0.47 (after childbearing)</td>
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<tr>
<td></td>
<td>0.09</td>
<td>0.08</td>
<td>56 months</td>
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<tr>
<td></td>
<td></td>
<td>0.10</td>
<td>chronic</td>
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<tr>
<td></td>
<td></td>
<td>0.06</td>
<td>chronic</td>
</tr>
</tbody>
</table>

* WHO, ** Albanesi and Olivetti (2009)

\[ I = \text{incidence}, \ D = \text{duration}, \ DW = \text{disability weight} \]

- For comparison: Blindness 0.60, AIDS 0.50, adult malaria 0.17
Maternal Health Burden
Maternal Conditions

- Estimated Time Cost per Pregnancy Conditional on Survival
  - Years lost to disability (WHO):
    \[
    YLD = I \times D \times DW
    \]
    
    \( I = \) incidence, \( D = \) duration, \( DW = \) disability weight

- Estimates for 1920s (Albanesi and Olivetti, 2009):
  
  \[
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  \[
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Maternal Health Burden

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- Reduction in incidence of maternal conditions
  - Post-partum conditions requiring re-admission
    - 1920s: 114.4 per 1,000 deliveries
    - 1986-87: 8.1 per 1,000 deliveries
Empirical Analysis
Approach

- **Goal:** Study effect of drop in MMR on fertility
- **Maternal health shock**
  - Concentrated between 1936-1956 \( \implies \) Exposure differs by cohort
  - Large variation across US states in size of drop

Findings:
- Fertility rises by more for states and cohorts that are more exposed to maternal health shock
- Female education rises more for states and cohorts that are more exposed to maternal health shock

Findings broadly consistent with theoretical predictions
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  - First difference: Across cohorts
  - Second difference: Across states

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Broader implications

- Albanesi and Olivetti (2009) examine impact on female LFP
  - Find that improved maternal health plays critical role
  - Simulations suggest that improved maternal health alone increases income per capita by 50%

- Link between income and fertility
  - Advances in maternal health weaken link between fertility decline and rise in living standards
Thank you!