# 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

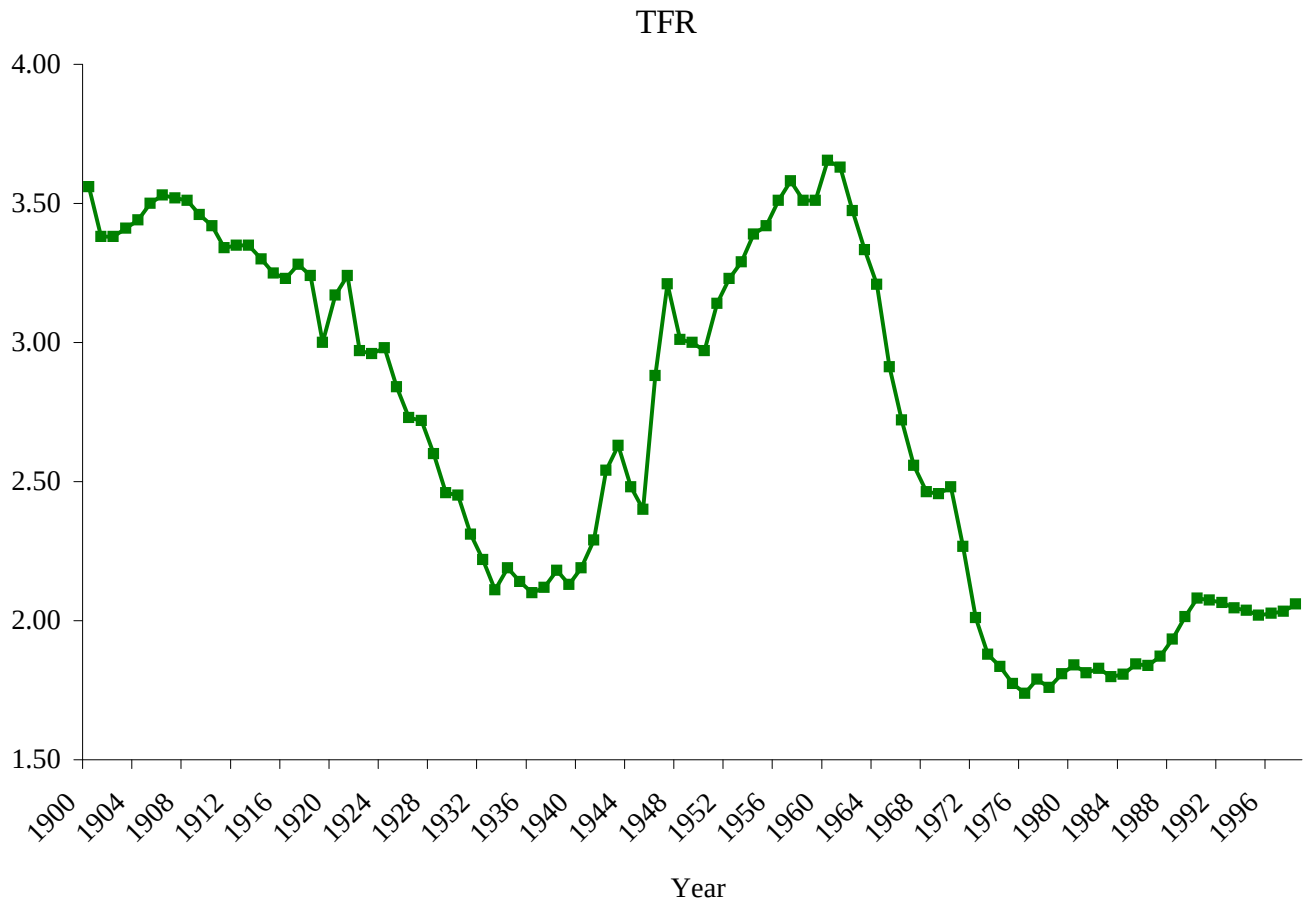


Figure: Total Fertility Rate

# Existing Econ Explanations

- Economic conditions (Easterlin, 1961)
  - Rise in "relative income" for Great Depression & WWII generation
- Introduction of home appliances (Greenwood, Seshadri and Vanderbroucke, 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

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  - Increased life expectancy$\Longrightarrow$ Rise in women's investment in human capital & Rise in opportunity cost of children $\Longrightarrow$ Bust
- Integrated analysis of *both* secular fertility decline and Baby Boom & Bust
  - Rapid advances in maternal health $\Longrightarrow$ Baby Boom & Bust
  - Gradual reduction in infant mortality $\Longrightarrow$ 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

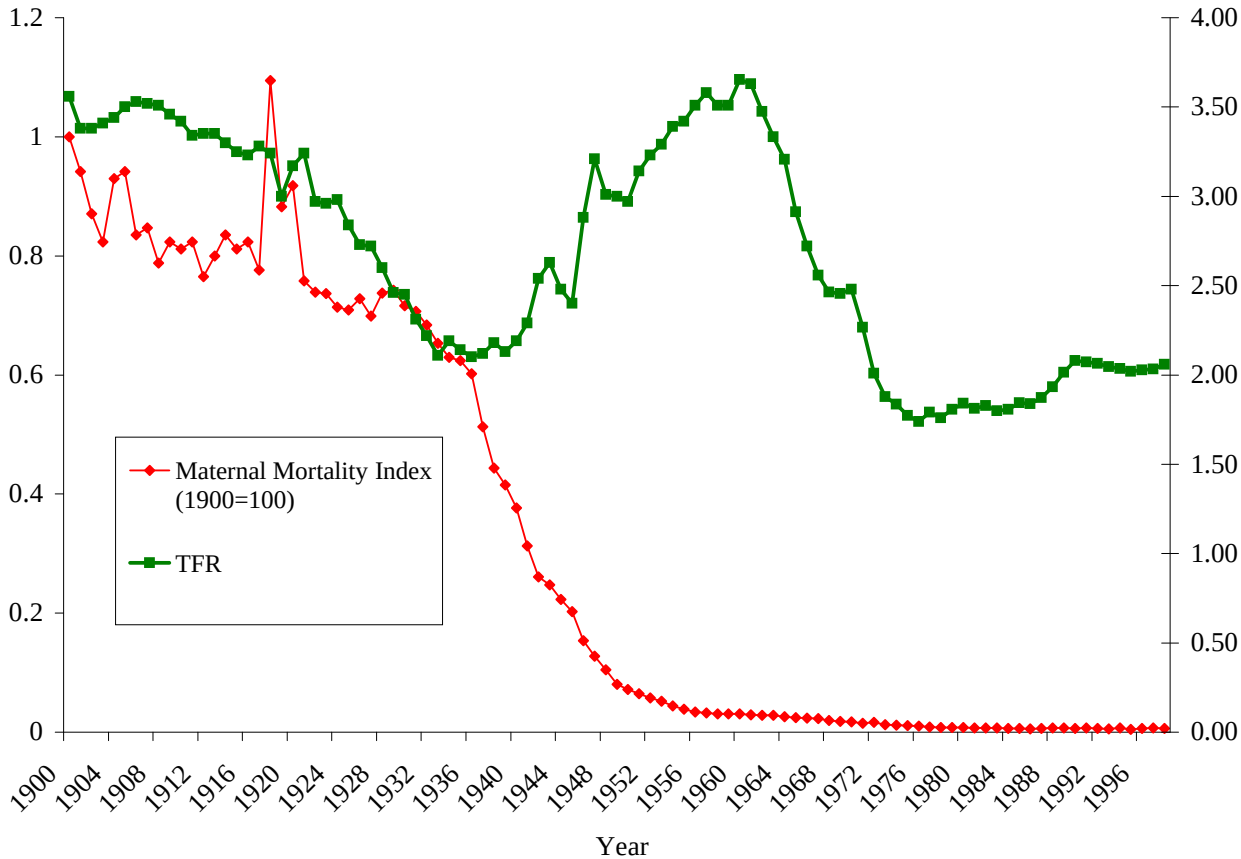


Figure: MMR Index and TFR

# Incidence of Maternal Mortality

# Advances in Maternal Health

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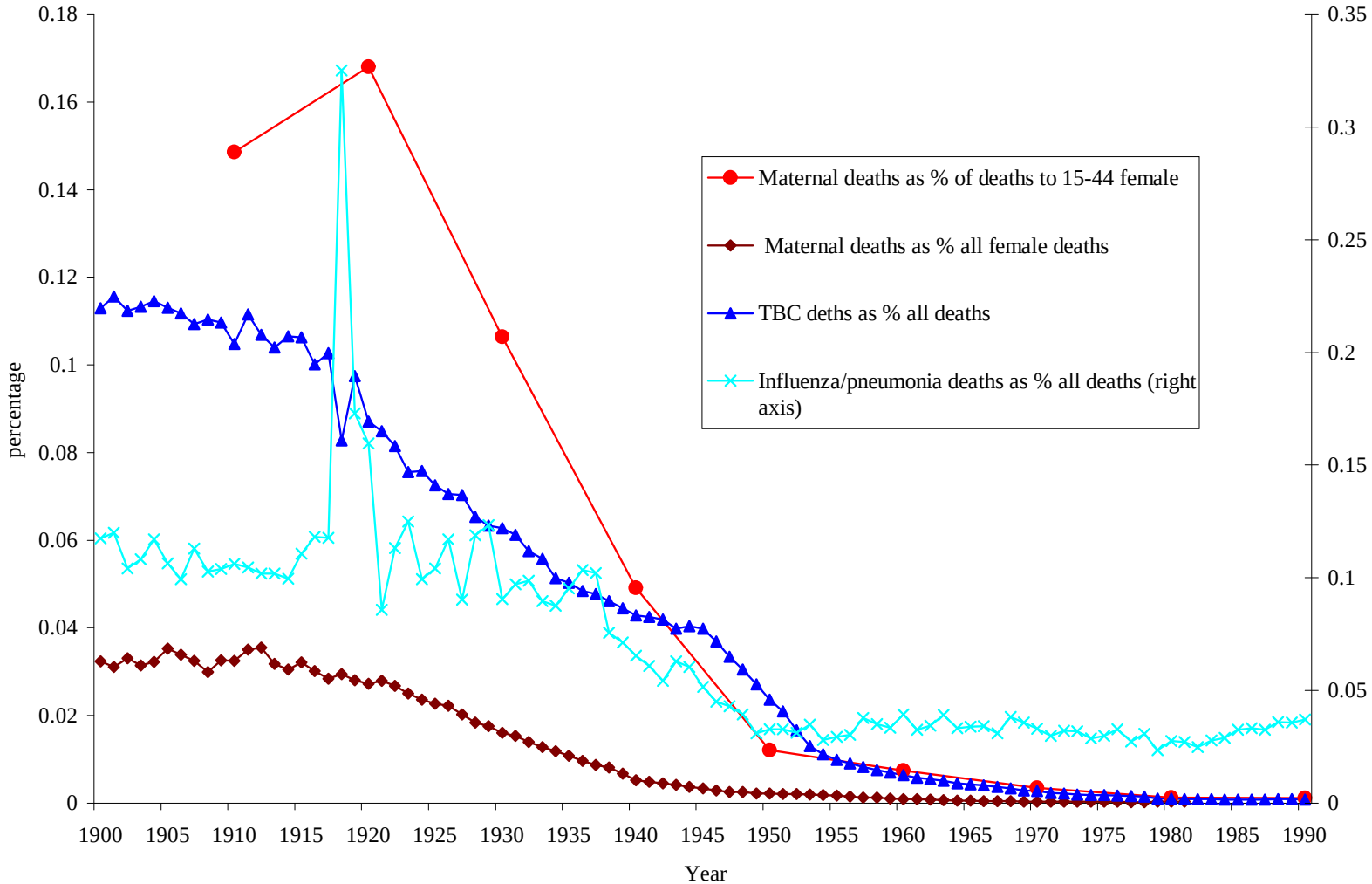

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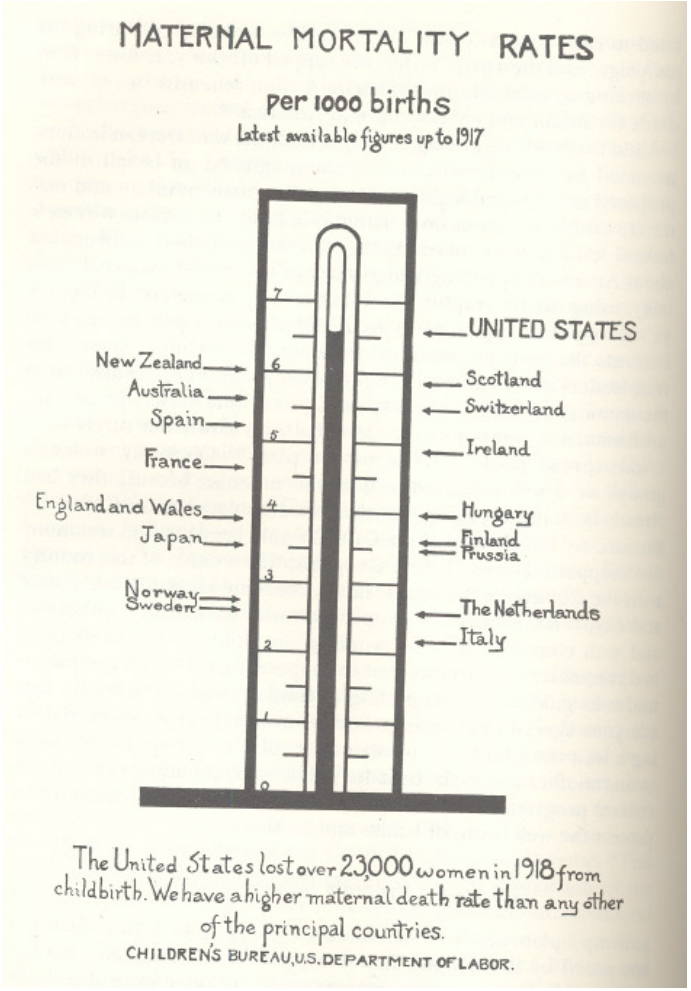
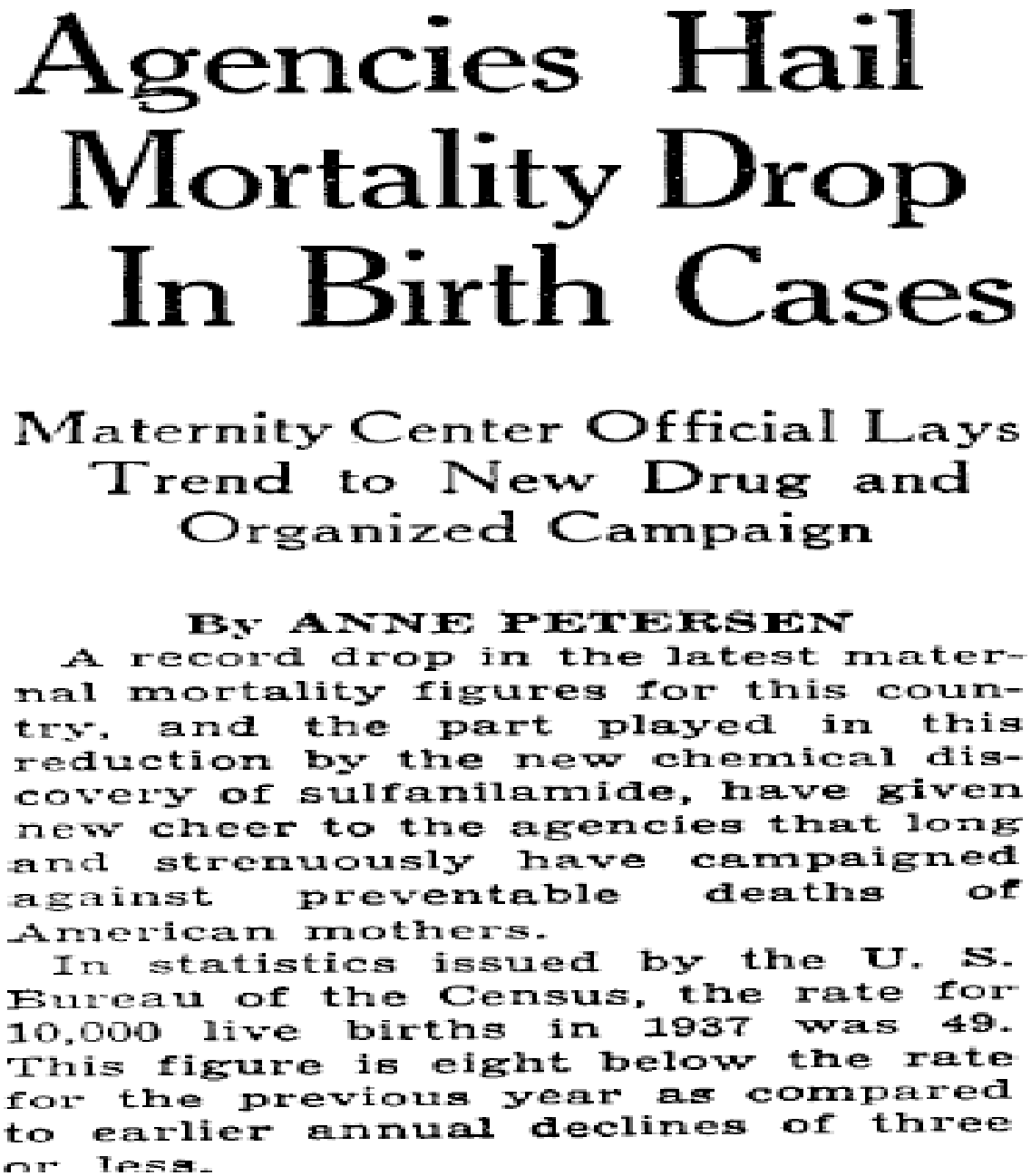


# Evidence on Advances in Maternal Health



# 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*

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  - *1935 Social Security Act Title V*
- 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

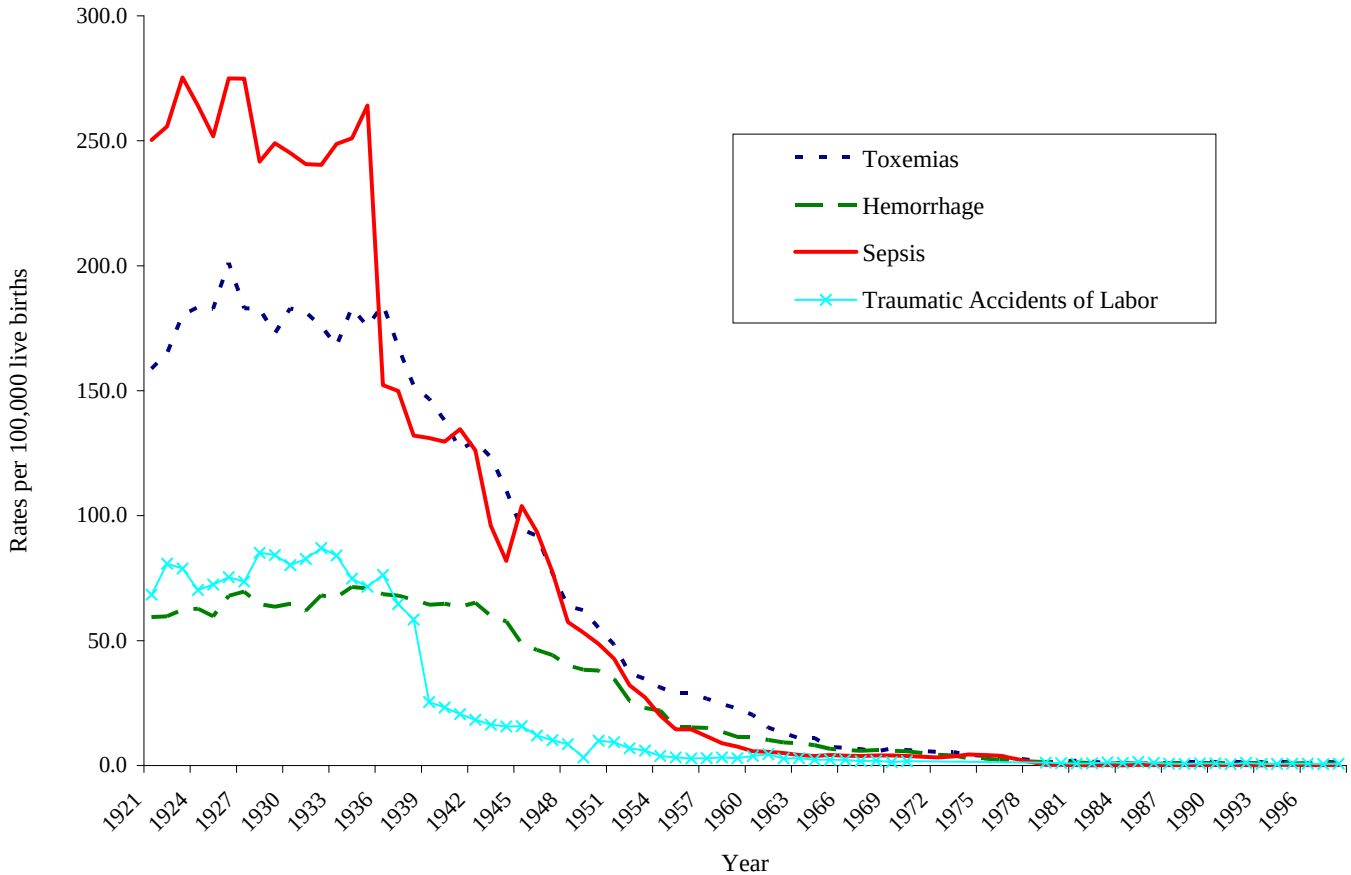


Figure: Trends maternal deaths by cause

# Advances in Maternal Health

## Hospitalization

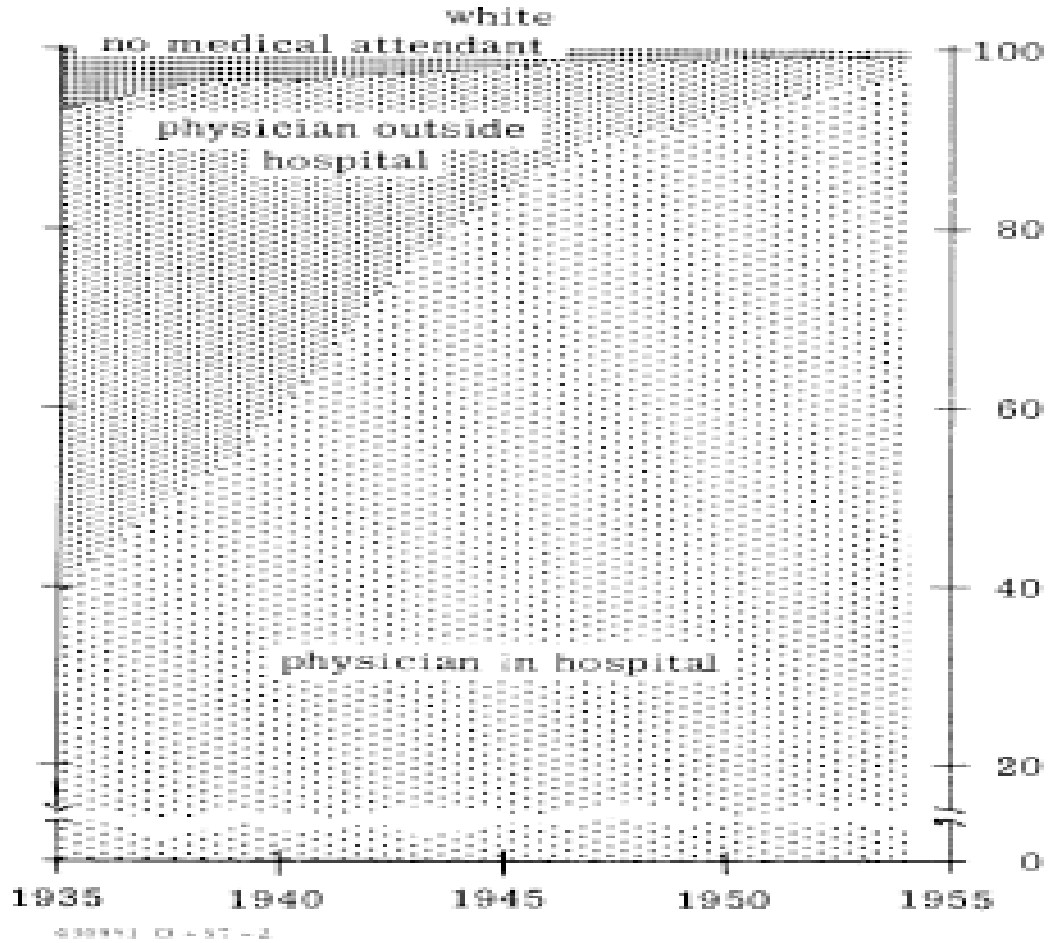


Figure: Live births per attendant 1935-1954. Source: Children's bureau, Statistical Series N. 42, 1954.

# Maternal Health Burden

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## Risk of Death

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

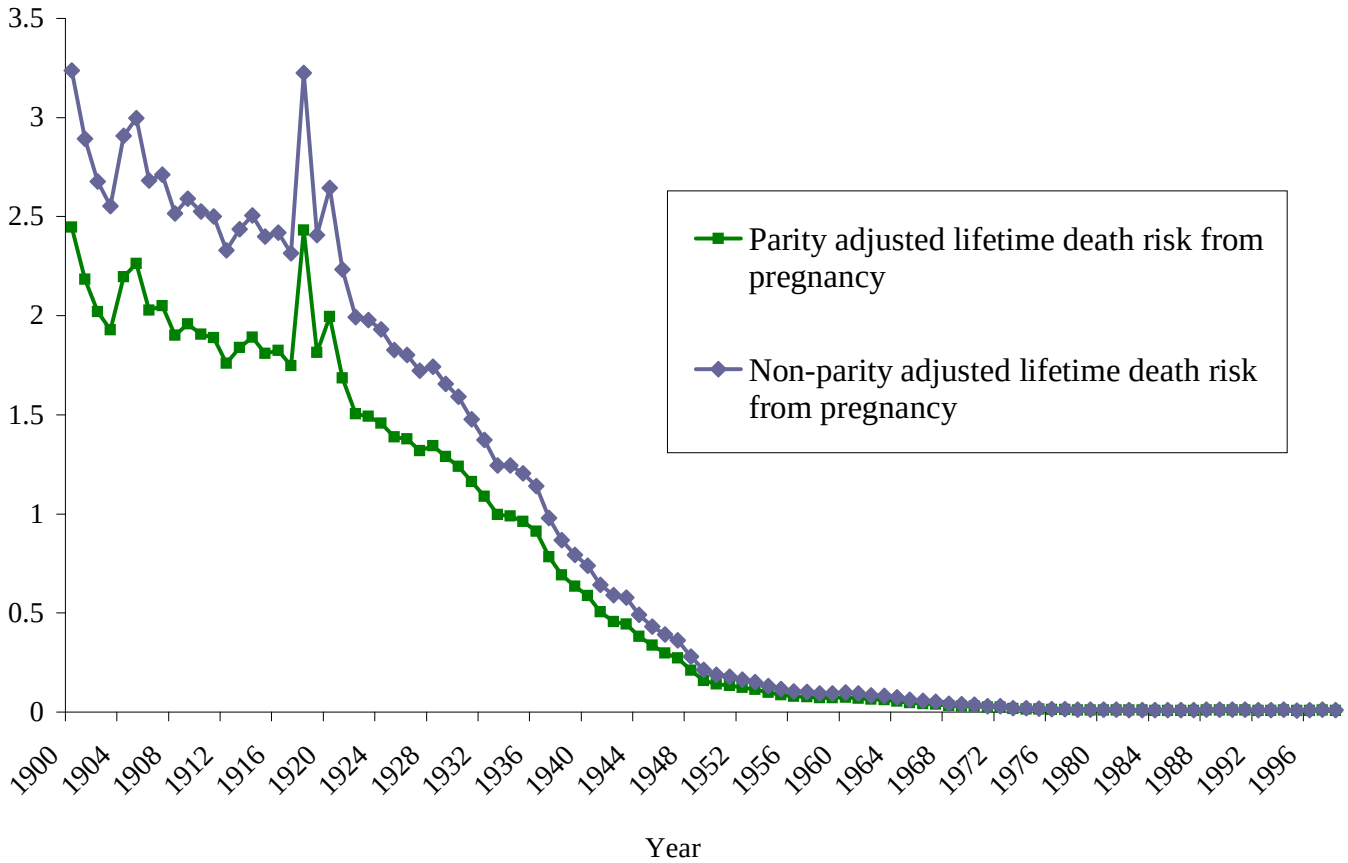


Figure: Source: Author's calculations based on Berry (1977)

# Maternal Health Burden

## MMR and Female Life Expectancy

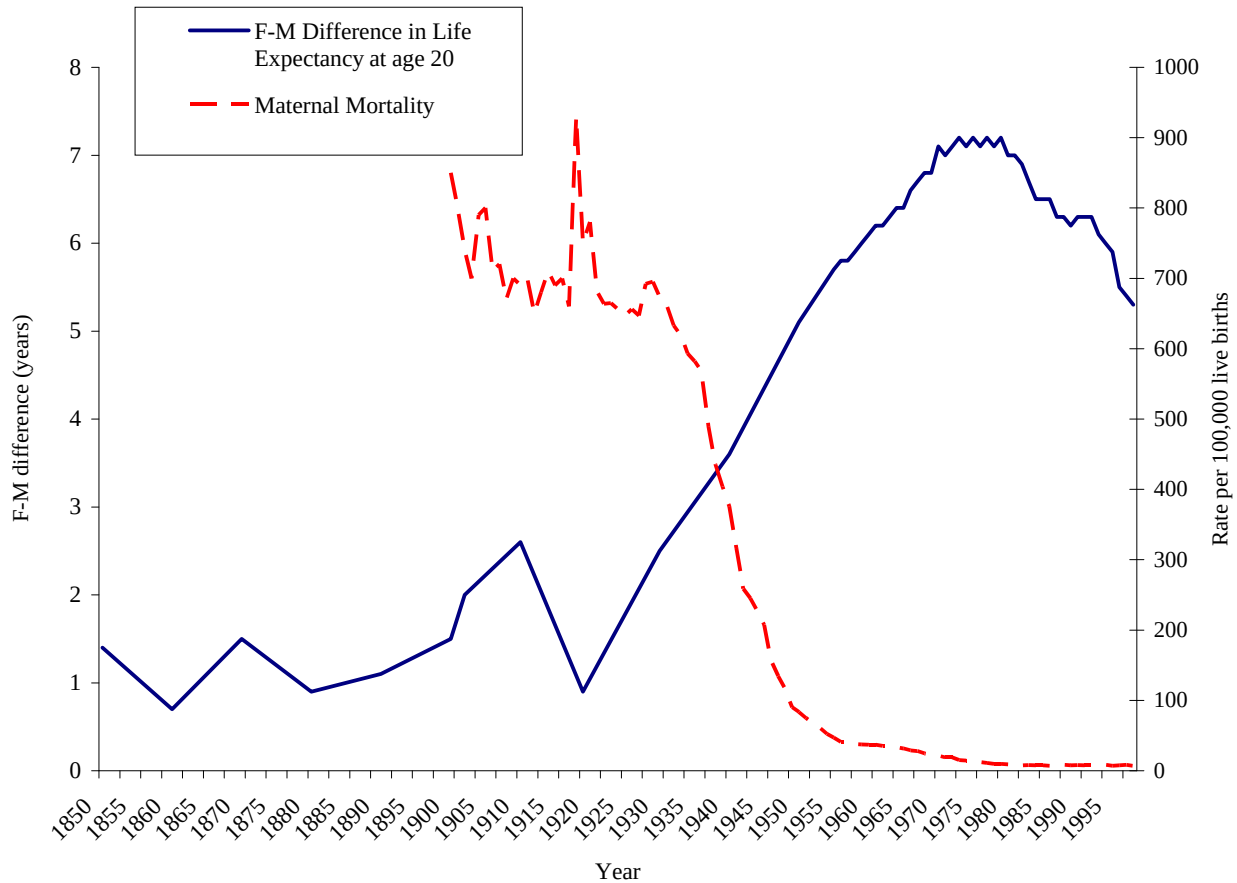


Figure: MMR and F-M Differential in Life Expectancy at age 20

# 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

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## Maternal Conditions

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

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| Common Maternal Conditions | | | |
|---|---|---|---|
| | DW* | I** | D** |
| Fistula & lacerations | 0.43 | 0.08 | 56 months |
| Hypertensive disorders | 0.38 (childbearing years) | 0.10 | chronic |
| | 0.47 (after childbearing) | | |
| Anaemia | 0.09 | 0.06 | chronic |
| * WHO, ** Albanesi and Olivetti (2009) | | | |

$I$ = incidence, $D$ = duration, $DW$ = disability weight

- For comparison: Blindness 0.60, AIDS 0.50, adult malaria 0.17

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## Maternal Conditions

- Estimated Time Cost per Pregnancy Conditional on Survival
  - Years lost to disability (WHO):

$$YLD = I \times D \times DW$$

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  - Estimates for 1920s (Albanesi and Olivetti, 2009):

$$\begin{aligned} YLD^{14-44} &= 1.17 \\ YLD^{44+} &= 1.09 \end{aligned}$$

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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 $\Longrightarrow$ Exposure differs by cohort
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- 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

# 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!