

Trends and geographic differentials in mortality under age 60 in India

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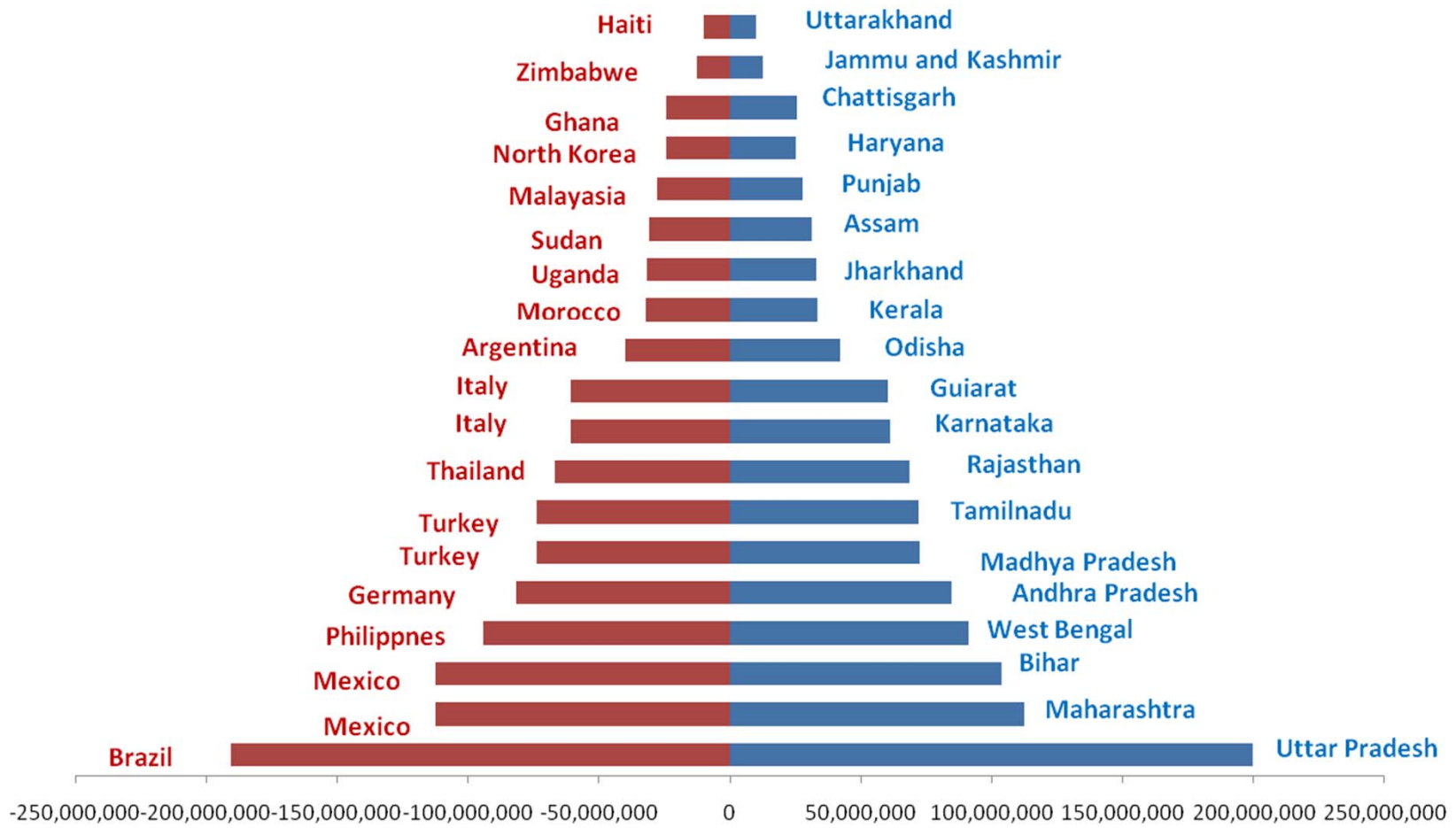
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Venue: INED, Paris

Comparison: Population of Indian states and other countries



Population Pyramid: Indian states and different countries, 2010-2011

India: Demographic Profile

- Total Population : 1210.2 million
- Sex ratio:940/1000 (f/m)
- Density: 382 people/km²
- Age Composition:0-14:29%, 15-64:64.9%
- Decadal growth rate :17.64 %
- Urban population:31.2 %
- TFR: 2.7
- LEB: 62.6(M) and 64.2(F)
- IMR:50 (per 1000 live births)
- MMR:254 (per 100,000 live births)
- Female literacy rate:65.46 %

Sources: Census of India, 2001 & RGI,2007



Inequality in Mortality

- ✓ Infant mortality in rural Orissa is almost 7 times higher (68 per 1000 live births) than urban Goa (10 per 1000 live births)
- ✓ The life expectancy at birth for women in urban Kerala is 76.7 year whereas the same for the women living in rural Madhya Pradesh is 56.3 years showing a gap of 20.4 years.

What is known about regional mortality variation in India?

- Clear north-south demographic division (Dyson and Moore 1983; Murthi et al. 1995)
- Child mortality for females in India also varies considerably across regions, reaching its highest levels in the north (Arokiasamy 2004; Subramanian et al. 2006)
- Different pace of mortality transition at different states (Bhat 1987 ; Chaurasia 2010)
- Adult mortality was lower in the north-western parts of the country (Bhat 1987)

Why there is an absence of all-age and adult mortality studies of in India ?

- Lack of fully functioning vital registration systems.
- Relatively high under five mortality and relatively low adult mortality.
- Abundance of large scale survey such as NFHS, DLHS etc which provides more information on under five mortality.

Objective

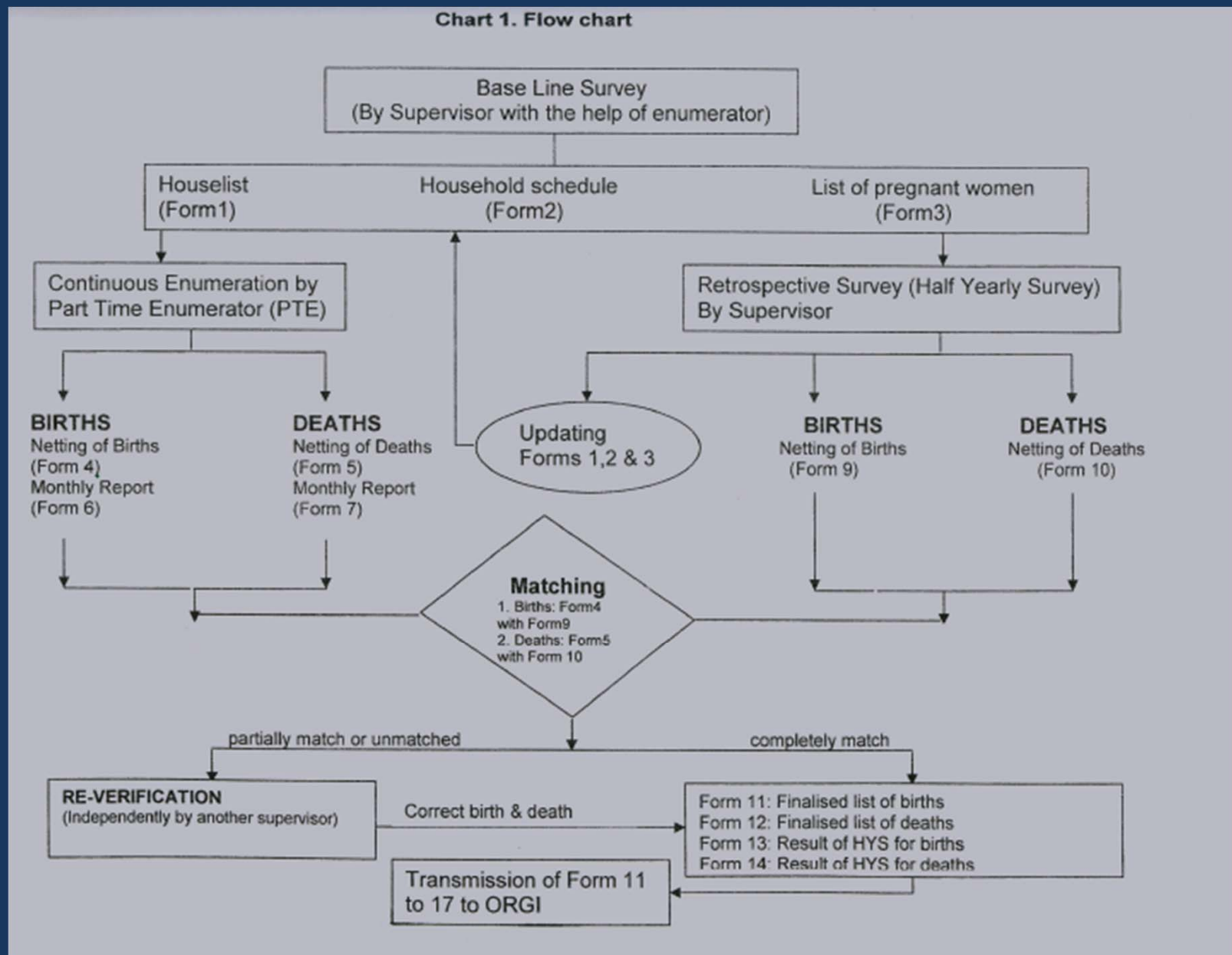
- To analyze variation in mortality for a broad range of child and adult ages for the whole of India and for its sixteen major states, which contain 96 per cent of the country's population.

Data Source and Description

Sample Registration System (1970-2006)

- **Periodicity: annual, since 1970**
- **Estimated parameters: fertility and mortality indicators (e.g. life tables)**
- **Life tables and aggregated published for five year periods: 1970-1975 – 2000-2004.**
- **Regional focus: 16 bigger states**
- **Representative sample: ~3 million people in 1970s; ~6 million people since the 1980s.**

Flow chart of the data collection



Evaluation of data quality

- ✓ Review of prior data quality studies (e.g Bhat, 1987)
- ✓ Comparison of mortality indicators from SRS to the NFHS estimates
- ✓ Comparison of observed age-specific mortality rates to estimated mortality rates using Gompertz model.

Methods

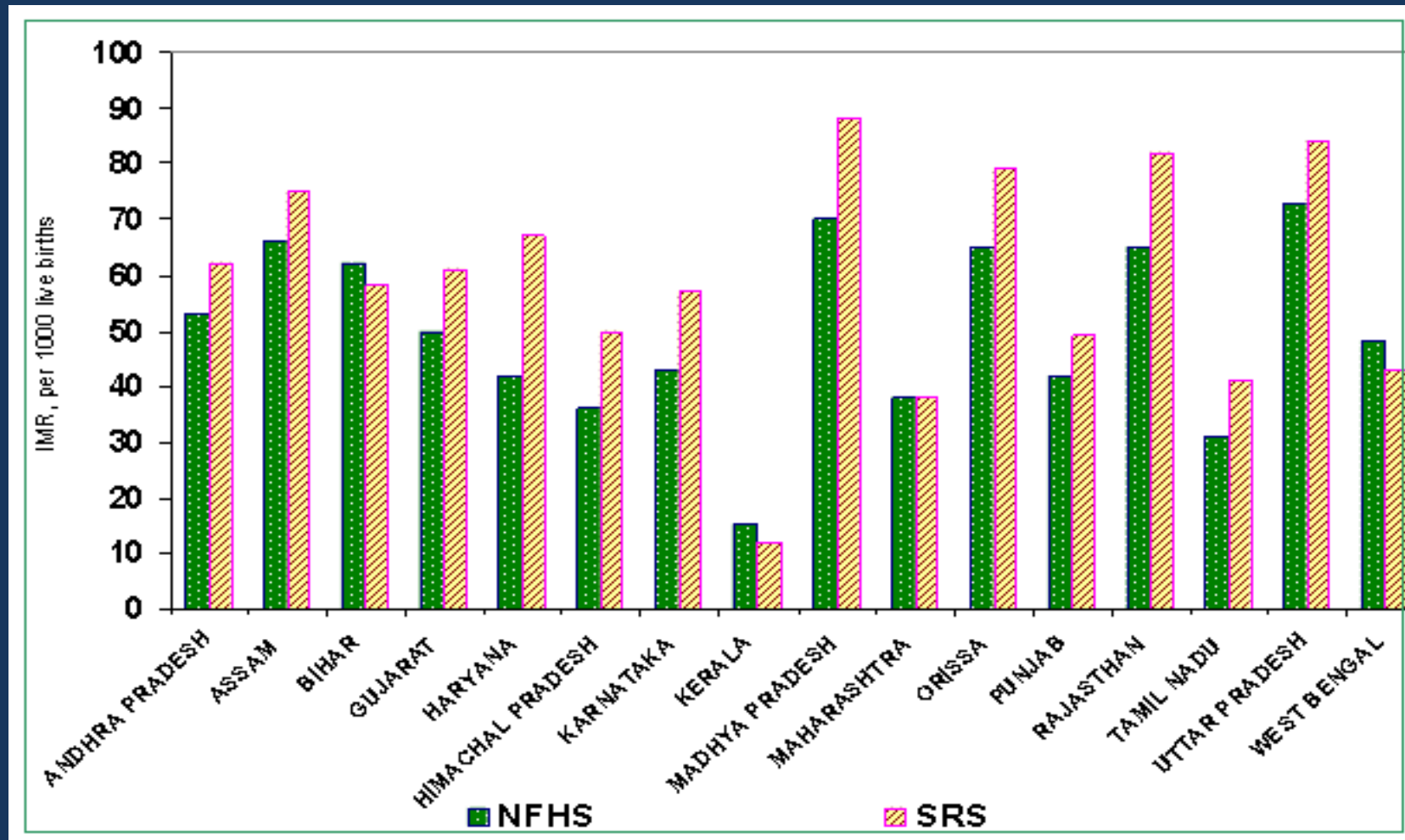
- Temporary life expectancy (Arriaga 1984)
- Two inequality measures - GINI coefficient and Dispersion Measure of Mortality (Moser et al 2005)
- Method for the decomposition of temporary life expectancy by age (Andreev 1982; Arriaga 1984; Pressat 1985; Andreev et al. 2002)

Results and Discussion

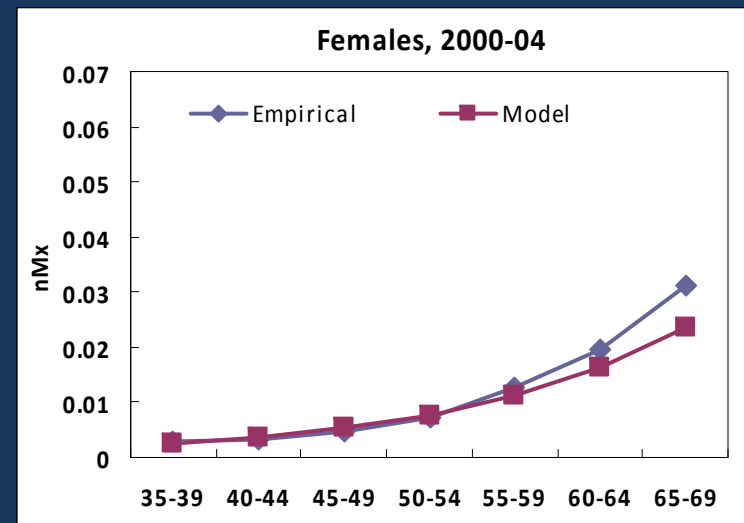
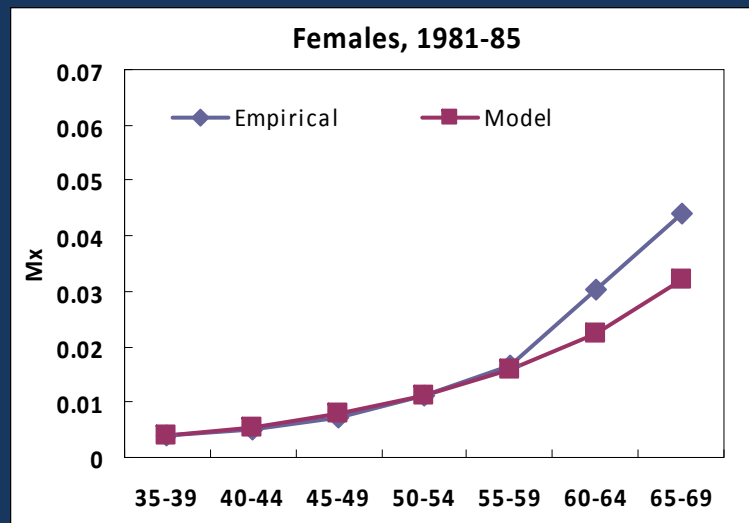
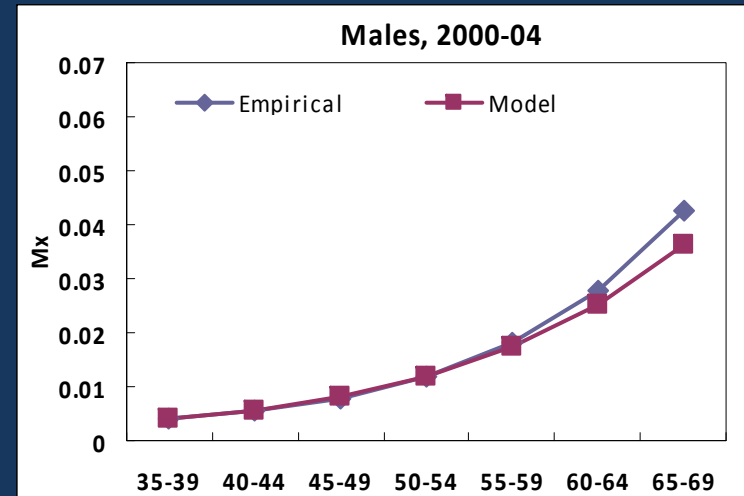
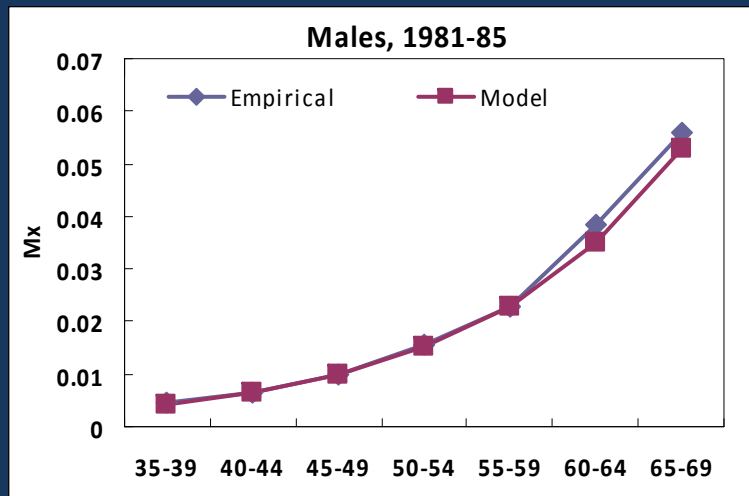
Quality of data

- **SRS is considered as the most reliable systems for vital statistics in India**
- **Coverage of infant deaths across the states by SRS is as good as or even better than coverage by NFHS**
- **Good agreement between mortality estimates from SRS and NFHS up to age 60**
- **Questionable estimates for old ages: possible undercount in censuses? (Bhat, 1987)**

Comparison of infant mortality rates from the NFHS-3 (for the period 2001-2005) and the SRS (2002-2006), 16 states of India

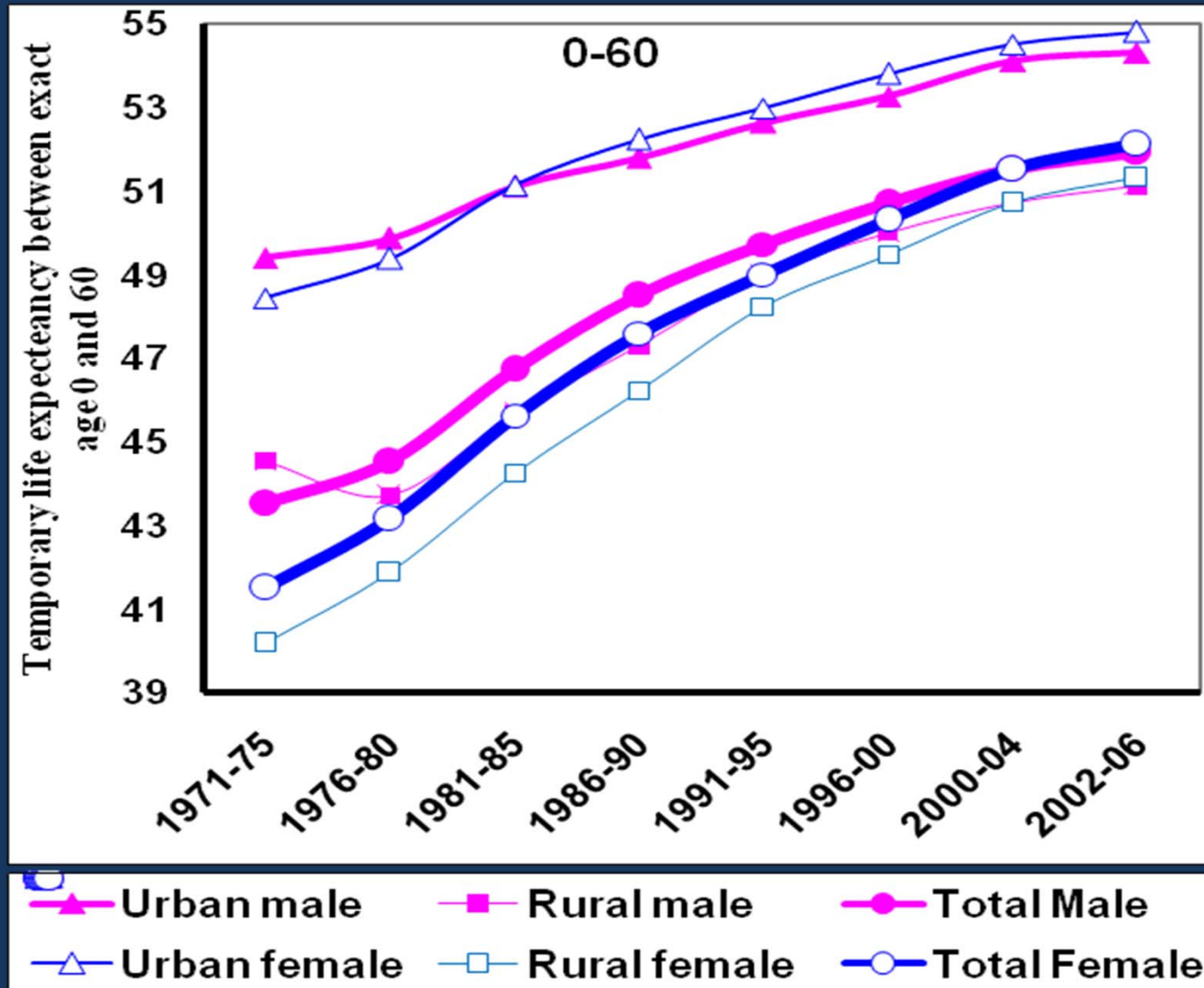


Old age mortality: Comparison with Gompertz curve

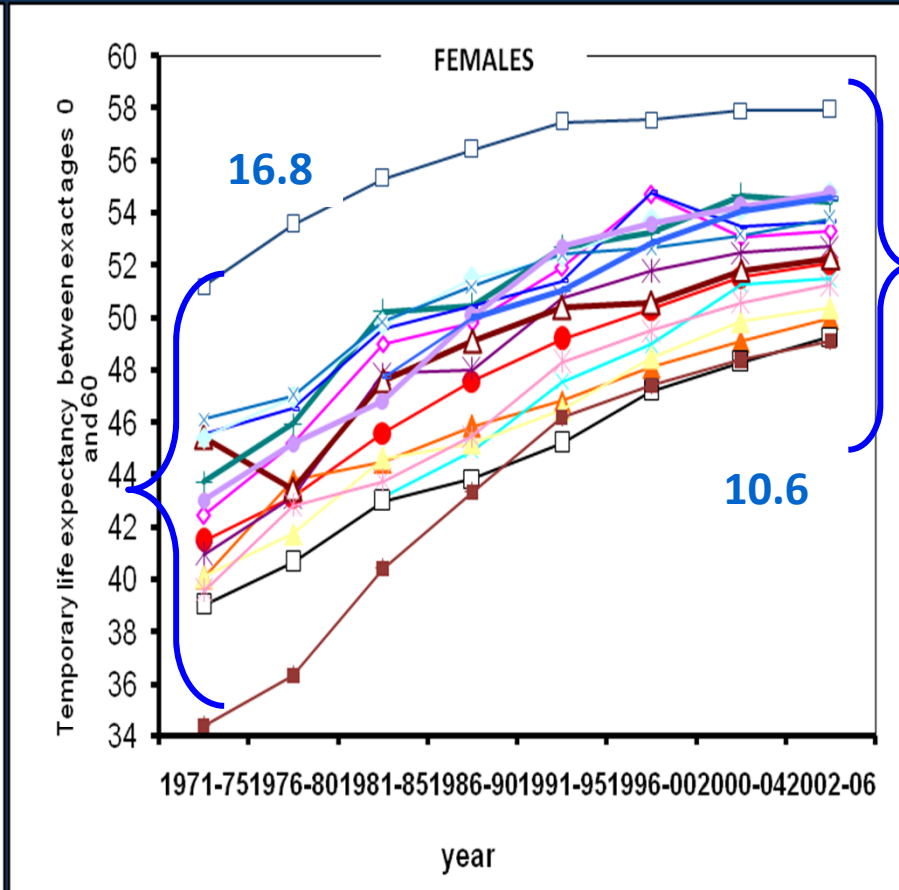
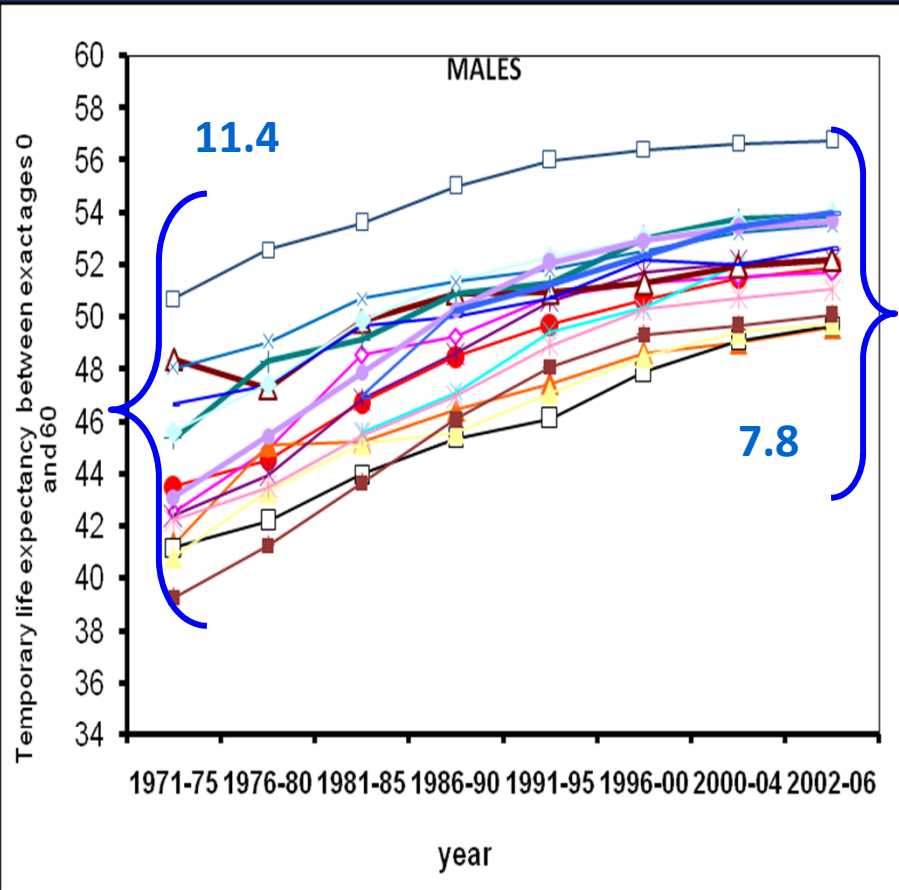


Results

Trends in temporary life expectancy between exact ages 0-60, 1971-1975 – 2002-2006

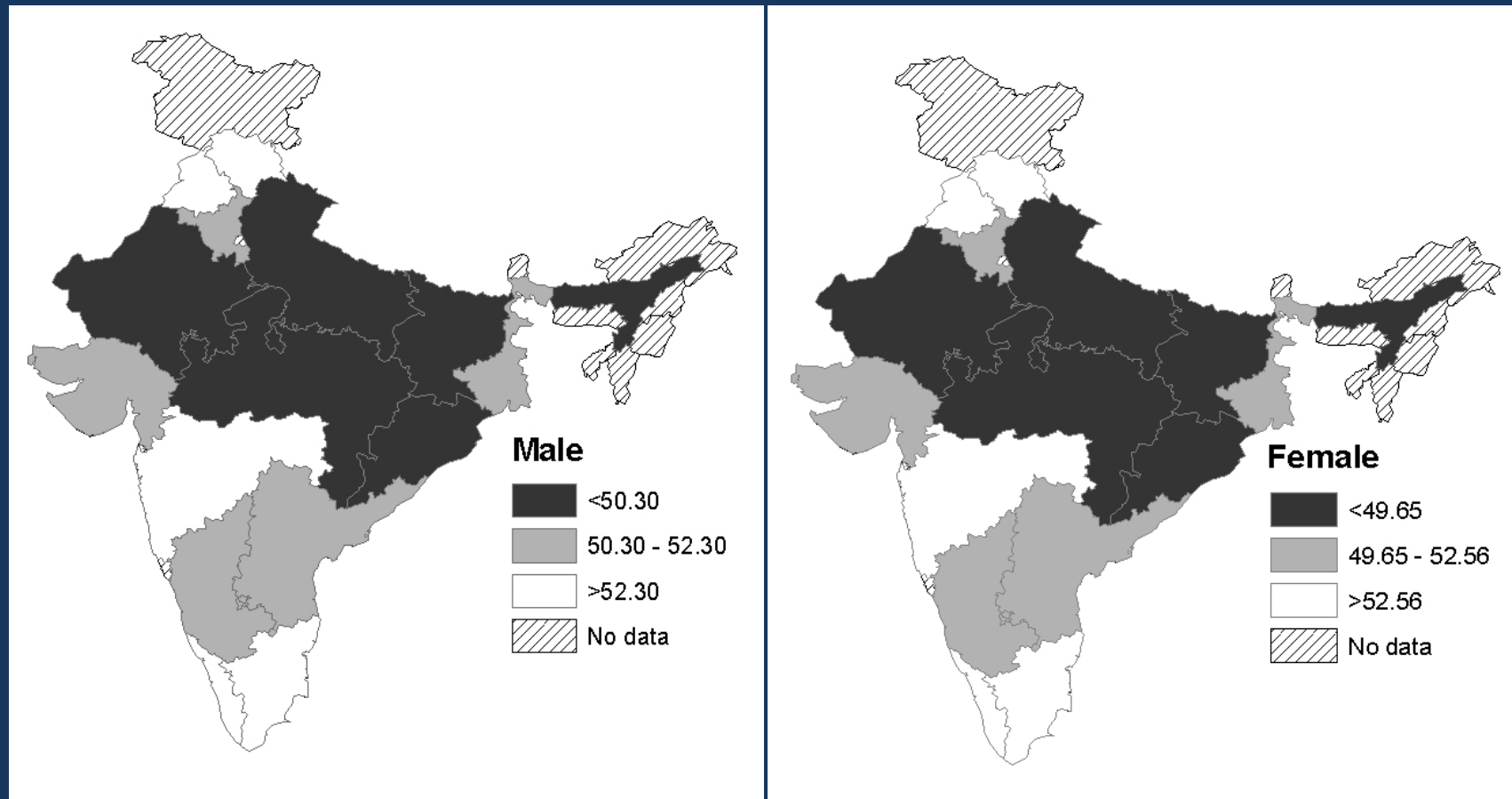


Trends in temporary life expectancy between exact ages 0 and 60 in the 16 states of India, 1971-1975 – 2002-2006

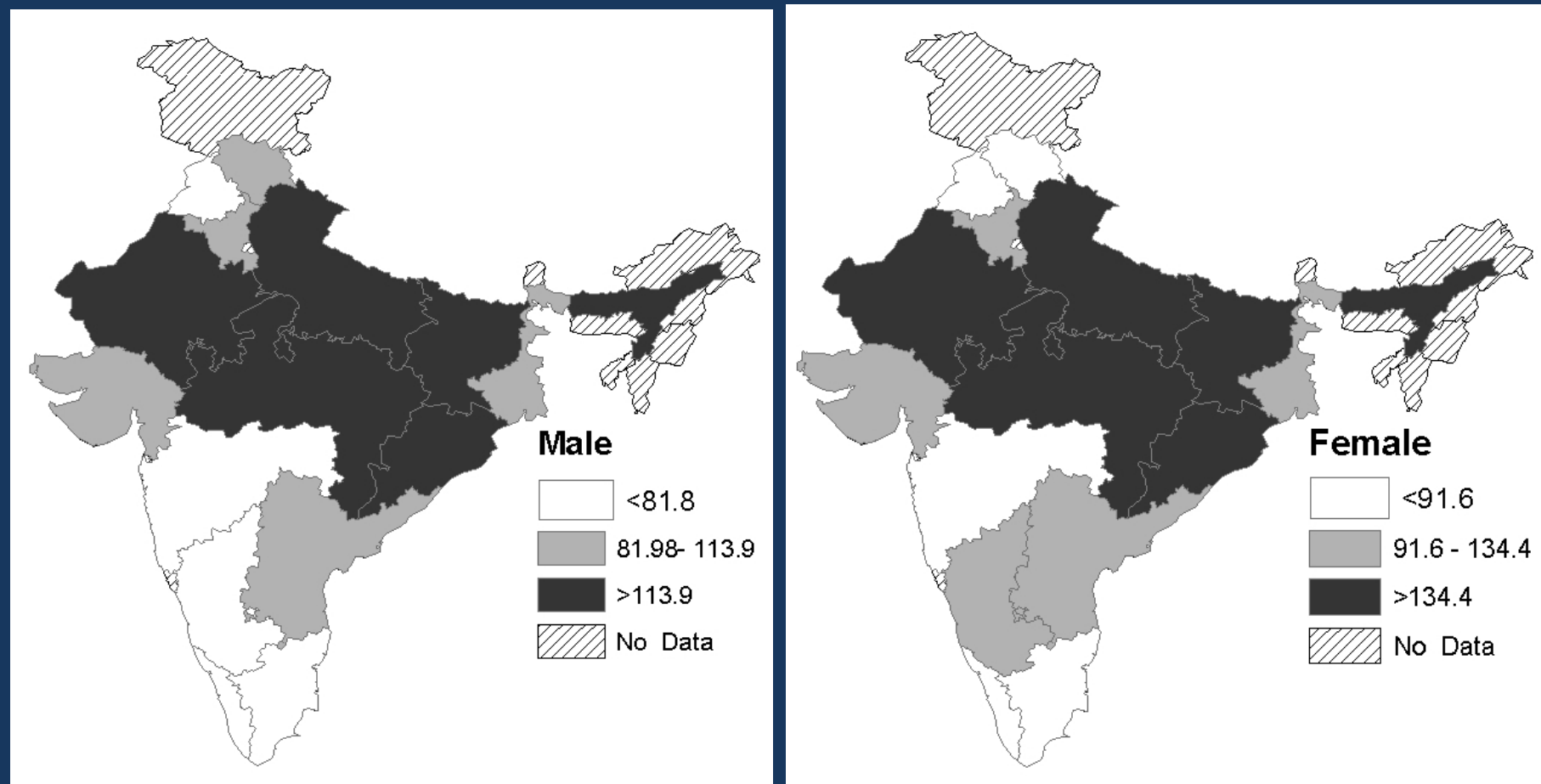


- | | | | | | |
|--------------------|------------------|-------------|-----------------|------------------|------------|
| ● India | ◇ Andhra Pradesh | ▲ Assam | ✦ Bihar | ✧ Gujarat | △ Harayana |
| — Himachal Pradesh | — Karnataka | □ Kerala | — Maharashtra | □ Madhya Pradesh | ★ Orissa |
| ✦ Punjab | ✧ Rajasthan | — TamilNadu | — Uttar Pradesh | — West Bengal | |

Temporary Life expectancy between exact age 0-60 for 16 Indian states, 2000-2004

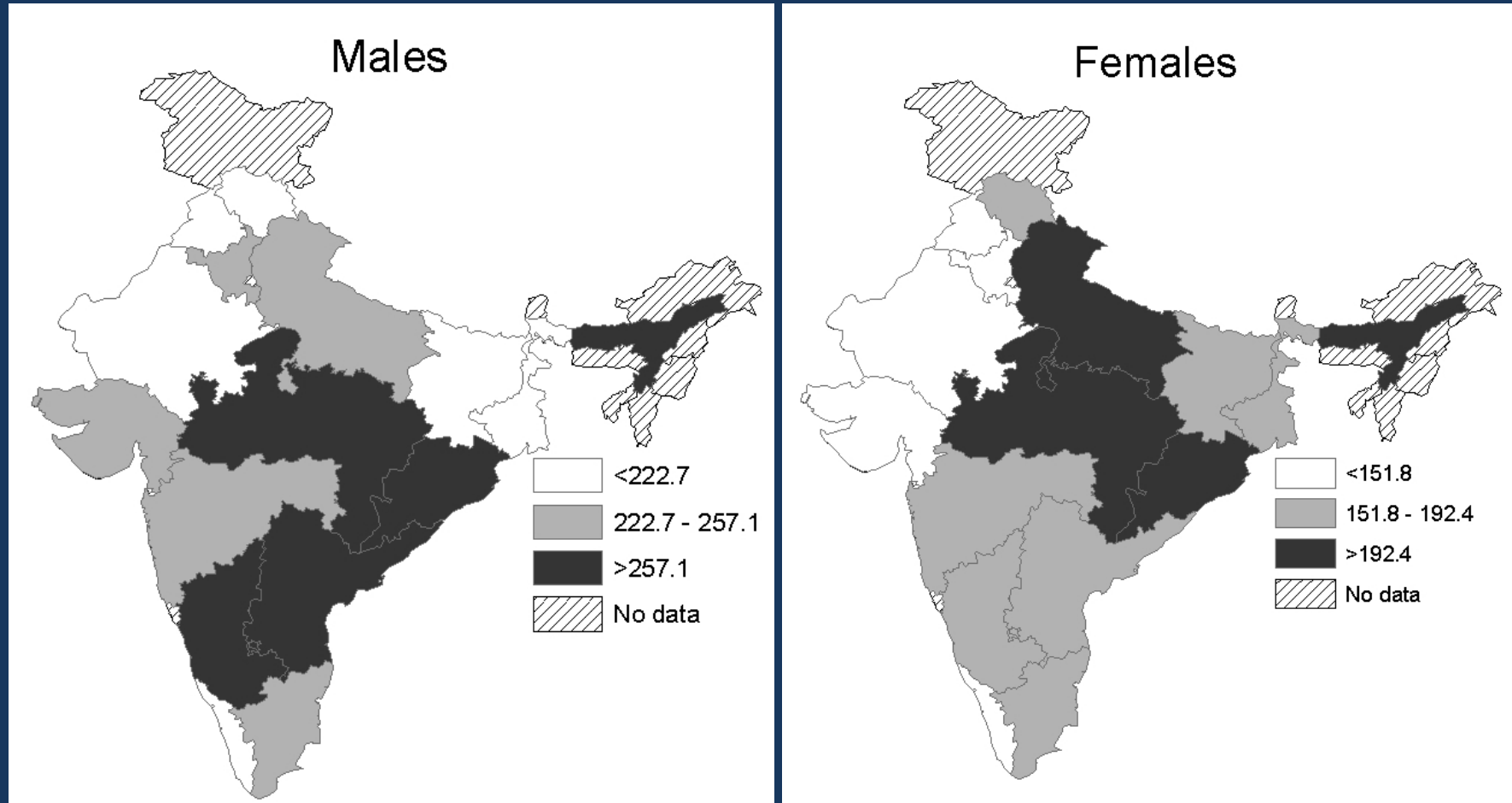


Probability of dying between exact ages 0 and 15 (x 1000) for Indian states in 2000-04



1- Haryana, 2- Himachal Pradesh, 3- Punjab, 4 - Rajasthan, 5 - Uttar Pradesh, 6 – Madhya Pradesh, 7 - Assam, 8 – Bihar, 9 – Orissa, 10 - West Bengal, 11 – Gujarat, 12 – Maharashtra, 13 - Andhra Pradesh, 14 – Karnataka, 15 – Kerala, 16 - Tamil Nadu.

Probability of dying between exact ages 15 and 60 (x 1000) for Indian states in 2000-04



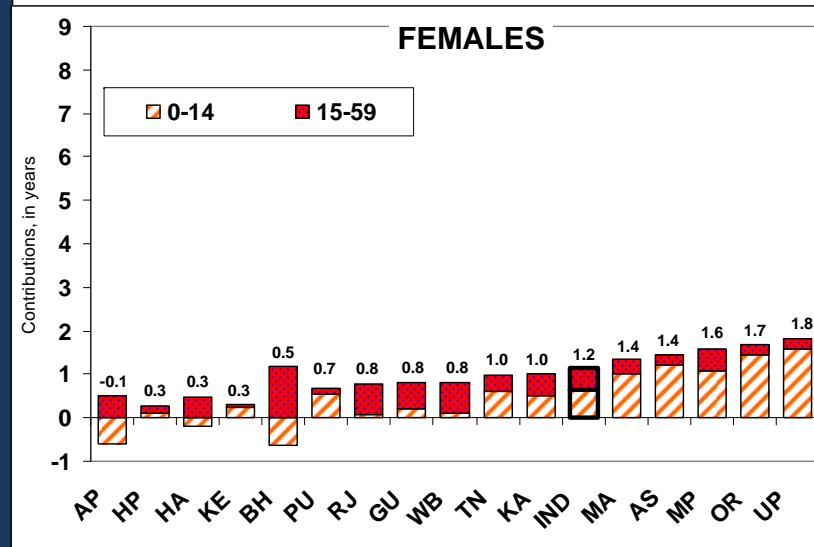
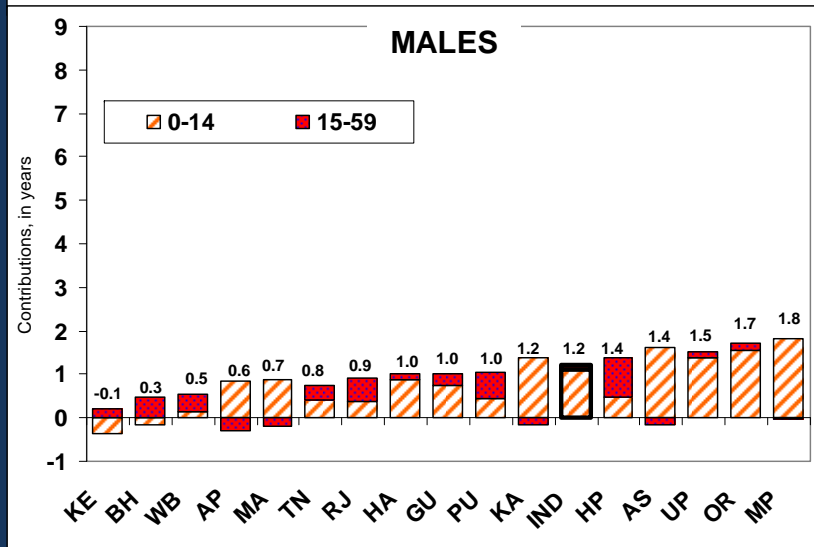
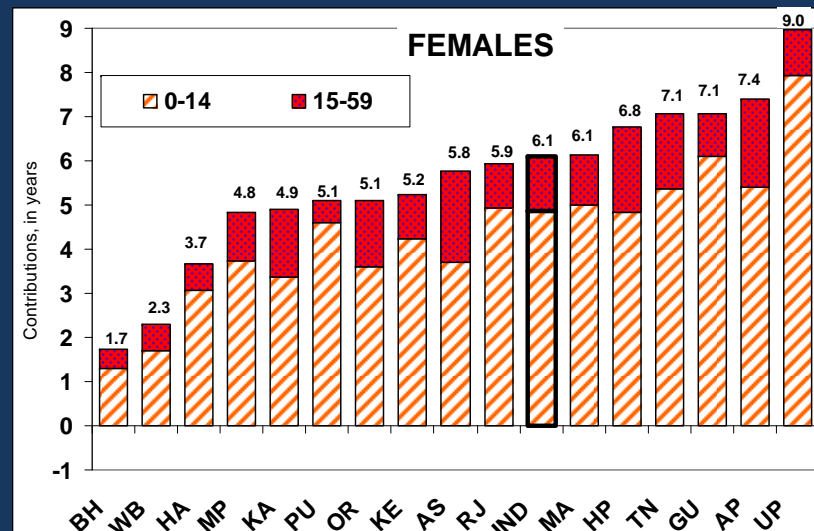
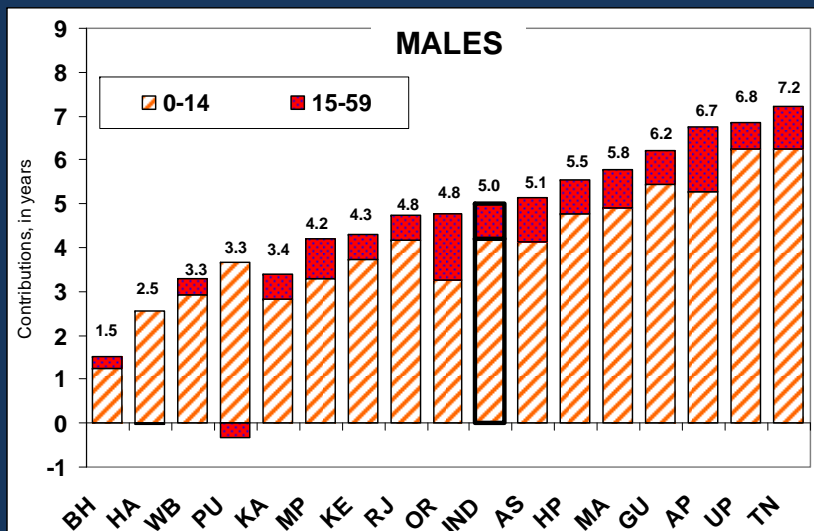
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Gini coefficient and dispersion measure of mortality for age group 0-60 in India in 1971-1975 – 2002-2006

	Male		Female	
Year	Gini %	DMM (in years)	Gini %	DMM (in years)
1971-75	4.0	1.7	6.1	2.5
1981-85	3.1	1.4	4.6	2.1
1991-95	2.4	1.2	3.4	1.7
2000-04	1.9	1.0	2.9	1.5
2002-06	2.2	1.1	2.9	1.5

Relative contribution of age groups in reduction of mortality

Decomposition of changes TLE 0-60 by two broad age groups for India and 16 of its states, 1970-75 -986-90 & 1991-95 to 2000-04



Conclusion

- **The quality of SRS data is acceptable for young and adult ages; but probably not for old age.**
- **We generally observe:**
 - **increase in temporary life expectancy;**
 - **convergence across states over time.**
- **However, after a spectacular progress during the 1970s and 1980s, health improvements in slowed down substantially in 1990s and 2000s.**

Contd.

- Most of increase in temporary life expectancy was a consequence of declines in mortality among infants and children.
- Since 1990s, mortality among both infants and children and adults made smaller contributions than during previous periods.
- While child mortality shows north-south gradient, adult mortality represents a less clear pattern with signs of an east-west differential among males.

Future steps

- In order to have a clearer vision about where India stands in its health transition, it is important to look at causes of death. -> *but this is still a challenging task!*
- In particular, it is important to evaluate the scale of newly emerging health threats such as growing burden of non-communicable diseases and injuries.

Thanks for attention !