

## Forecasting longevity improvements at older age in India

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Globally, mortality has improved at every ages in past and we expect to live longer than ever. Still, there is no evidence about its improvement or trends at older ages in a developing country like India, which is supposed to be a country of rapid growth of population ageing in coming future.

Mortality projection is a methodologically challenging area as there is an uncertainty in occurrence of death as well as for future predictions. This study aims to analyze mortality estimates at older age and to explore methods of extrapolating life expectancy at age sixty by the year 2032 by sex, residence and states.

**Data and methods** Age-specific death rates (ASDR) by sex, residence and sixteen major states for each year from 1970 to 2007 are taken from sample registration system (SRS) reports. Then single year ASDR are converted in five year moving average. Using these average death rates abridged life table are constructed for the period of 1970 to 2007.

Sigma, beta and conditional beta convergence have been studied to examine the past trends of life expectancy change among the states. State GDP per capita at different periods is taken as conditional variable for conditional beta convergence model. Extrapolation of life expectancy at age 60 is done by applying different regression method. State-GDP per capita future growth is assumed as same level as in last five years. First of all linear regression is applied using time series data for India and some selected states. Finally, convergence model of forecasting is applied for the states using dynamic panel regression fixed effect model by system Generalize Method of Moments (GMM) and life expectancy at age sixty is forecasted for all major states. In forecasting model state GDP per capita is taken as conditional variable.

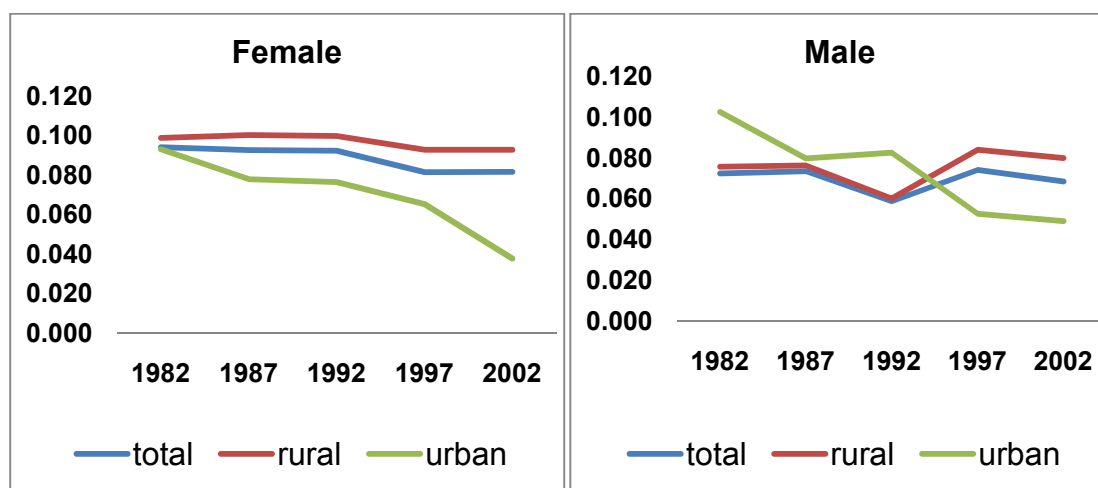
### Findings and conclusions

The value of R square and residuals suggest that linear regression model is fitted well in case of India and some selected states. Slope of regression suggest that female life expectancy is going to increase with higher pace in coming future than male, which raise a policy concern for more elderly women available for social security in future. Extrapolation by linear regression shows India's female life expectancy at age 60 is going to be 21.9 years in 2032, while for males the LE60 in 2032 is 19.1 years. Rural-urban differences may diminish by

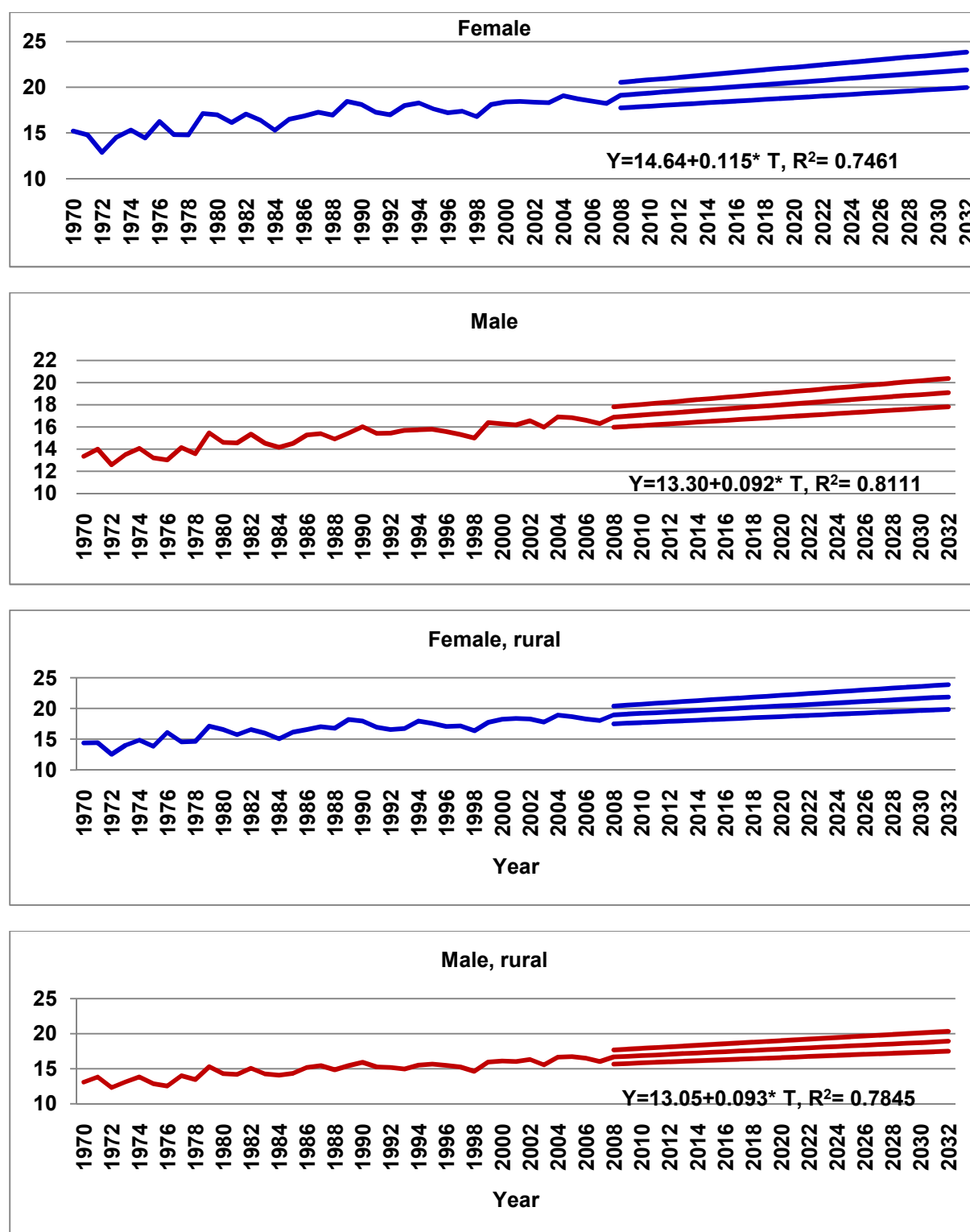
2032. In the most demographically advance state of Kerala female LE60 is going to be 24.9 years in 2032 while for male 18.8 years. However in Uttar Pradesh which is economically backward female LE60 is going to be 20.7 years by 2032.

Standard deviation and coefficient of variation have significantly decline for female life expectancy by states which means there is a sigma convergence. Further, sigma convergence is more prevalent in urban female life expectancy. However, in case of male life expectancy sigma convergence is not found and it is only can be observed in urban male. Past trends of life expectancy shows that there is a inter-state disparity in longevity improvements at older ages, the states having lower initial values has gained more years of life expectancy than the states having higher value at initial time, this hypothesis is tested by sex and place of residence.

**Figure1 Sigma convergence: coefficient of variation**



**Figure 2 Life expectancy at age 60: forecast by linear regression**



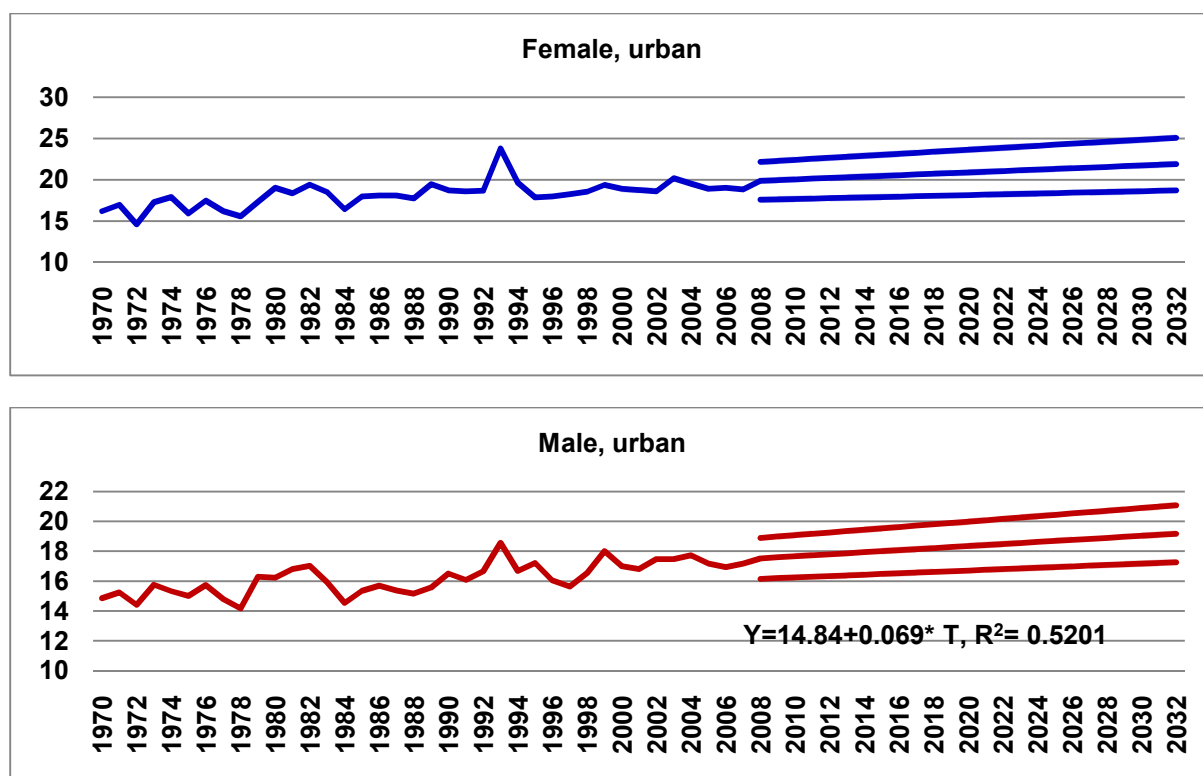


Figure 3 Female life expectancy projections by convergence model, India

