Determinants of rural-urban differential in prevalence of undiagnosed and untreated hypertension among the older population (aged 45 years and above) in India

Background

The already inadequate healthcare delivery system in India has been left over-stretched faced with the challenge of tackling a raging pandemic. As management of COVID-19 related cases takes precedence over other health issues, several patients of chronic diseases may have progressed to advanced stages of their illnesses in the absense of timely medical intervention. Additionally, comorbidities like hypertensive conditions pose a greater risk of developing a severe disease or at worst, death, if infected with COVID-19. The lockdown, imposed as a measure to contain the spread of the disease, and decisions by several public hospitals in cities to temporarily shut out-patient departments' services may have inhibited non-COVID-19 related healthcare utilisation among the people, particularly among rural residents and even the urban poor who largely depend on the services of urban public-funded tertiary hospitals for treatment of chronic diseases. To compensate for the lack of physical OPD services, tele-consultations have emerged as an alternative. However, digital-divide acts as an impediment for the rural patients to access these services. In this backdrop, the present study aims to decompose the rural-urban differential in prevalence of undiagnosed and untreated hypertension, as an exercise of identifying the most vulnerable groups.

Data

The analysis would be done using the wave-1 data of Longitudinal Ageing Survey of India conducted during 2017-18. The LASI is a nationally representative large-scale sample survey that interviewed 72,250 older adults aged 45 and above across all states and union territories of India and collected data on the burden of disease, functional health, healthcare, and the social and economic wellbeing of older adults. In addition, the LASI also included several internationally validated biomarker tests including the physiological measure of blood pressure (systollic and diastollic).

Outcome variables:

Hypertension is defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg as per the standard classification protocol recommended by the World Health Organisation (WHO). Hypertension is indicative of health risks such as cardiovascular diseases

(CVDs) (stroke, coronary heart disease) and mortality. Two dependent variables have been identified as follows:

Undiagnosed hypertension- refers to persons who reported that they have not been diagnosed with hypertension by a health professional but measured systolic blood pressure was ≥140 mmHg or diastolic blood pressure was ≥90 mmHg or both

Untreated Hypertension- refers to those who reported that they have been diagnosed with hypertension by a health professional and currently have hypertension but are not receiving treatment.

Predictor variables:

Place of Residence- This variable was categorised as urban and rural. Rural India is comparatively less developed than urban India with poor public investment in healthcare infrastructure. Thus, accessibility of health care services especially geriatric care is an issue of concern in rural India

Covariates- Four broad domains of covariates have been identified that may induce inequalities in health-care utilization across rural and urban parts of India. These domains pertain to sets of demographic factors, socio-economic factors, social support/ institutional factors and geographical factors.

Methods

Bivariate percentage distribution (cross-tabulation) will be calculated to estimate the differentials in the rate of seeking treatment (by ailing persons) on medical advice by predictor variables. The results will be tested for statistical significance by using Pearson's Chi-squared test for homogeneity or independence. The sample data will be weighted to reflect the structure of Indian population using the formula provided in the report of the LASI (2017-18).

Two binary logistic models are proposed to capture the crude and the adjusted association between prevalence of undiagnosed and untreated hypertension and place of residence (rural/ urban). The model on adjusted association between prevalence of undiagnosed and untreated hypertension and place of residence will control for a vector of demographic, socio-economic status (SES), social support, institutional and regional variables. To further examine the complex interplay of these variables in determining the magnitude and direction of rural-urban differentials in prevalence of undiagnosed and untreated hypertension, interaction terms

betweeen residence and SES variables will be created and controlled for in the models. The results will be presented as crude (cOR) and adjusted odds ratios (aOR) with 95% confidence intervals (CI).

Finally, to compute the group differences (rural and urban) in the rate of healthcare utilization among the elderly population in India and to decompose these differences into the major contributing factors, Fairlie's decomposition method (1999) which is a non-linear approximation of the Blinder-Oaxaca decomposition technique (1973) will be employed. The average difference in the rates of heath care utilisation between rural and urban elderly persons may be expressed as:

$$\overline{Y}^R - \overline{Y}^U = \left[\sum_{i=1}^{N^R} \frac{F(X_i^R \hat{\beta}^R)}{N^R} - \sum_{i=1}^{N^U} \frac{F(X_i^U \hat{\beta}^U)}{N^U}\right] + \left[\sum_{i=1}^{N^U} \frac{F(X_i^U \hat{\beta}^R)}{N^U} - \sum_{i=1}^{N^U} \frac{F(X_i^U \hat{\beta}^U)}{N^U}\right]$$ (Fairlie, 1999)

Where,

$\overline{Y}^R$ *and* $\overline{Y}^U$ *are* the average probability of the binary outcome rural and urban population respectively,

N^R and N^U are the sample sizes for rural and urban older population respectively,

F is the cumulative distribution function of logistic distribution,

X_i^R *and* X_i^U are the row vectors of average values of the independent variables, and

$\hat{\beta}^R$ *and* $\hat{\beta}^U$ are the vectors of coefficient estimates for rural and urban older population respectively.

The first term in brackets, in the above equation, represents the part of the rural-urban gap in prevalence of undiagnosed and untreated hypertension that is due to the differences in the characteristics of the two groups, constituting the relative contribution of each of the observed predictor variables. The second term represents the degree to which rural and urban older population with similar observable characteristics have different rates of healthcare utilisation and also captures the portion of the rural-urban gap due to group differences in unmeasurable or unobserved endowments, constituting the 'unexplained' or residual part of the differences. The decomposition will been undertaken using the pooled estimated coefficients of the two groups- rural and urban. All the statistical analyses will be conducted using the software STATA version 16.

Expected findings

The findings of the study are expected to suggest a rural disadvantage with a higher prevalence rate of undiagnosed and untreated hypertension. The decomposition exercise of the study is expected to affirm the applicability of the social gradient hypothesis with findings suggesting that the level of health care utilisation is distributed along the social gradients. The findings are also expected to be consistent with the gender bias hypothesis, which posits that older women have worse health but also less access to the healthcare system.

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