

BMJ Open Socioeconomic inequality in functional deficiencies and chronic diseases among older Indian adults: a sex-stratified cross-sectional decomposition analysis

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ABSTRACT

Objectives Older adults with adverse socioeconomic conditions suffer disproportionately from a poor quality of life. Stratified by sex, income-related inequalities have been decomposed for functional deficiencies and chronic diseases among older adults, and the degree to which social and demographic factors contribute to these inequalities was identified in this study.

Design Cross-sectional study.

Participants Data used for this study were retrieved from the WHO Study on Global AGEing and Adult Health Wave 1. A total of 3753 individuals (men: 1979, and women: 1774) aged ≥60 years were found eligible for the analysis.

Measures Instrumental Activity of Daily Living (IADL) deficiency and presence of chronic diseases.

Method The decomposition method proposed by Adam Wagstaff and his colleagues was used. The method allows estimating how determinants of health contribute proportionally to inequality in a health variable.

Results Compared with men, women were disproportionately affected by both functional deficiencies and chronic diseases. The relative contribution of sociodemographic factors to IADL deficiency was highest among those with poor economic status (38.5%), followed by those who were illiterate (22.5%), which collated to 61% of the total explained inequalities. Similarly, for chronic diseases, about 93% of the relative contribution was shared by those with poor economic status (42.3%), rural residence (30.5%) and illiteracy (20.3%). Significant difference in predictors was evident between men and women in IADL deficiency and chronic illness.

Conclusion Pro-poor intervention strategies could be designed to address functional deficiencies and chronic diseases, with special attention to women.

INTRODUCTION

Globally, older women experience lower mortality rates and in a few cases, lower prevalence of chronic diseases as compared with their male counterparts.^{1–4} Contrary to this, functional limitation and physical disability among women has been higher than that among men, particularly in low/middle-income countries.^{5–6} Existing evidence shows that the difference in male–female functional

Strengths and limitations of this study

- This study, the first of its kind, examines the decomposition of socioeconomic inequality in functional deficiency and chronic illness separately for older men and women.
- The findings revealed pro-poor inequality in Instrumental Activity of Daily Living (IADL) deficiency and pro-rich inequality in the occurrence of chronic diseases among both older men and women in India.
- While being poor and illiterate contributed highest to the IADL deficiency among men, rural residence followed by social group and religion contributed most among women.
- Being poor, lives in rural areas and illiterate contributed significantly to the chronic illness among men, whereas among women, it was poor economic status, rural residence and illiteracy.
- The cross-sectional study design prevents establishment of any causal inferences from the study results.

limitation could be explained in terms of higher prevalence and severity of arthritis and musculoskeletal disease^{4,7} among women along with psychosocial factors—women are more likely to over-report ill health and functional limitations, whereas men would under-report their weaknesses.⁸ This pattern may be more evident in low/middle-income countries where gender norms significantly determine demographic, health and socioeconomic outcomes.

Examining disparities in socioeconomic status and their effect on health outcomes in developing societies is high on the list of priorities in the global agenda. A study has shown that poor economic status contributes to over half of the inequality in self-rated health among older adults in India, followed by illiteracy and rural residence.⁹ However, the distribution of socioeconomic resources between men and women is not the same, which gives rise to different explanations

for the existing socioeconomic inequalities in health by gender. Of the total older adult population in India, nearly half of them, mostly women, are dependants, often due to widowhood, divorce or separation.¹⁰ Majority of older adult women are deprived of economic security and receive poor healthcare.¹⁰ If results for male and female participants are not studied separately, aggregate results may mask imperative disparities in the mechanism of functional deficiency and chronic diseases.¹¹

Stratified by sex, income-related inequalities for functional deficiencies and chronic diseases among older adults are decomposed, and the degree to which social and demographic determinants contribute to these inequalities is identified.

This study has the following objectives:

1. To examine the differences in functional deficiency and chronic diseases among older men and women separately
2. To estimate the relative contribution of socioeconomic and demographic factors to the overall functional deficiencies and chronic diseases, separately among men and women.

This study hopes to collate and analyse data to prepare and design programmes to improve the functional capacity and management of chronic diseases among the older adults in India. The National Health Policy of India, 2017 acknowledges the healthcare needs of the ageing population in India and recommends focused interventions¹² to tackle the rising burden of functional deficiency and chronic diseases.¹³

METHODS

Study population

Data required for this study were retrieved from the WHO Study on Global AGEing and Adult Health (SAGE) Wave 1, collected between 2007 and 2010 in India. SAGE is a nationally representative multicountry (China, Ghana, India, Mexico, Russian Federation and South Africa) study to monitor the health and well-being of adult population aged 50 years and older.¹⁴ In India, respondents were selected from six states—Assam, Karnataka, Maharashtra, Rajasthan, Uttar Pradesh and West Bengal using a multistage, stratified, random sampling design with every individual having a known non-zero probability of being selected. Overall, the individual response rate was over 92%. More about the sampling process and SAGE India survey can be obtained from the official report.^{14 15} This study followed the United Nation's agreed cut-off age for defining older population (60 years and older). A total of 3753 individuals (men: 1979, and women: 1774) aged 60 years and older were included in this study.

Functional deficiency and chronic disease

Two health outcome events, functional deficiency and presence of chronic diseases, were analysed. Functional deficiency was measured in terms of Instrumental Activity of Daily Living (IADL). IADL measures the ability to

perform relatively complex activities of daily living.¹⁶ Studies have identified a hierarchical structure within the disablement process model from health to disability, and concluded that the first level of disability includes persons with only mobility impairment.¹⁷ The next level in the progression includes those with impairment in mobility plus a limitation in an IADL. Finally, level 3 includes those with mobility, IADL and basic difficulties in daily activities.^{17 18} Although, IADL may not assess functional limitation in basic tasks such as sitting or standing for a long period, bathing, dressing and so on, it provides a basic understanding of the onset of functional difficulties among older adults.¹⁹ This study follows the WHO-SAGE definition of IADL. In the WHO-SAGE survey, IADL is composed of five items that cover higher-level instrumental tasks.¹⁵ The respondents were asked if they had any difficulty doing the following instrumental tasks during the 30 days preceding the survey:

1. ...in taking care of your household responsibilities?
2. ...in joining community activities (eg, festivities, religious or other activities) in the same way as anyone else can?
3. ...in your day-to-day work?
4. ...in reaching your destination, using private or public transport if needed?
5. ...in getting out of your home?

The responses were categorised into 'none', 'mild', 'moderate', 'severe' and 'extreme'/'cannot do'. For this study, the responses were grouped into different difficulty levels:

- ▶ No difficulty (when the response was none or mild or moderate=0)
- ▶ Difficulty (when the response was severe or extreme=1).

The computed value of the sum of dichotomised five variables ranges from 0 to 5, where the higher score indicates poor physical functioning.

Besides IADL, respondents were asked if they were diagnosed with any of the following chronic medical conditions (as conveyed by a healthcare professional): angina, asthma, stroke, depression, chronic lung disease and hypertension. An affirmative response regarding any of these medical conditions confirmed the presence of chronic disease.

Covariates

Guided by existing literature, individual and household level binary (1 or 0) covariates that could explain maximum dimensions of inequality were considered. The covariates are sex of the respondent (male or female), current marital status (married or unmarried), social group (Scheduled Caste/Scheduled Tribe or Non-scheduled Caste/Tribe), religion (Muslim or Others), education of the respondent (illiterate or literate), economic status (poor or non-poor), residence (rural or urban) and tobacco use (never, and ever or current). In dichotomous covariates, the assigned value '1' represents the older population in a disadvantaged socioeconomic group, and

the assigned value of '0' indicates the older population in an advantageous position.

The critical role of marital status for a woman in Indian society has been documented in terms of lower access to material resources, and her own social position within and outside the family.²⁰ Studies from India²¹ and elsewhere²² show that both objective and subjective health measures along with healthcare use are substantially lower among older widowed women than among their married counterparts.^{23 24}

Earlier literature suggests the protective effect of education on an individual's health, which operates in several ways. For instance, education may positively affect health through postponing the onset of functional limitations and chronic conditions,²⁵ improve health through better management of illnesses and enhance individual capability to cope with negative emotions.²⁶ Considering fewer resources, such as power, authority, earnings, household income and wealth among women, the role of education appears to be vital in explaining women's health in low/middle-income countries like India.^{27 28} Among lifestyle factors, physical inactivity, unhealthy diet, consumption of alcohol and use of tobacco have been found to be prominent risk factors for non-communicable diseases.^{29 30} In India, smoking is higher among men and they smoke throughout their lives. Women smoke less than men but tend to become smokers at an older age.^{31 32}

Over 70% of the population lives in rural areas in India. Owing to variations in social experience, healthcare, pension policies, state provisions, rural and urban differences in health among older adults are critical. Moreover, with the increase of rural to urban migration among the young population for better education, employment and living opportunities, the older population left behind in rural areas is at risk.³³

Historically, Scheduled Castes and Scheduled Tribes are identified by the Government of India as socially and economically backward social groups and considered to be in need of protection from social injustice and exploitation, whereas non-Scheduled Caste/Tribes enjoy a higher status in the social hierarchy. Economic groups (poor or non-poor) were derived from the household wealth index provided in the data set by using the WHO standard approach to estimate income from selected indicator variables.³⁴ For the decomposition analysis, the top two quintiles (representing 40% of economic status) were grouped as non-poor, and the bottom three quintiles (representing 60% of economic status) were combined as poor.

Analytical approach

Stratified by sex, a decomposition analysis was conducted to measure the contribution of select covariates to explain the burden of IADL and presence of chronic diseases in following steps.³⁵ First, to quantify the extent of socioeconomic inequality in IADL and chronic diseases outcomes, we used Concentration Index (CI).³⁶ It could be computed as twice the weighted covariance of health

outcomes and relative ranking of individuals in economic gradient divided by variable mean as mentioned in equation (1).³⁷ The range of CI varies between -1 and +1, where a negative value refers that the poor health outcomes concentrated among the disadvantage group and positive values refers the opposite. The zero value of CI shows absence of inequality.³⁶

$$c = \frac{2}{\mu} cov_w(y_i, R_i) \quad (1)$$

where y_i and R_i are the poor IADL or presence of chronic diseases of the i^{th} individual and the fractional rank of i^{th} individual of the index of household economic status for weighted data; μ is the (weighted) mean of both health outcomes of the sample and cov_w denotes the weighted covariance.

Study used method developed by Wagstaff *et al*³⁸ to decompose socioeconomic inequality in poor IADL or presence of chronic diseases into its determinants. The method enables to show how factors contribute proportionally to health inequality. For instance, any linear regression model link the outcome of interest, y , to a set of k determinants, X_k as:

$$y_i = \alpha + \sum_{k=1} \beta_k X_{ki} + \epsilon_i \quad (2)$$

where ϵ is an error term. Given the relationship between y_i and X_{ki} in equation (2), the CI for y (C) can be written as:

$$C = \sum_{k=1} \left(\frac{\beta_k \bar{X}_k}{\mu} \right) C_k + \frac{GC_\epsilon}{\mu} = C_y + \frac{GC_\epsilon}{\mu} \quad (3)$$

where μ is the mean of y , \bar{X}_k is the mean of X_k , C_k is the CI for X_k (defined analogously to C) and, in the last term, GC_ϵ is the generalised concentration index for ϵ_i .

In equation (3), C can be thought of as being made up of two components—'explained' and 'unexplained' components. The 'explained' or 'deterministic' component is similar to weighted sum of the CIs of the regressors where the weights are simply the elasticities associated with a percentage change in the explanatory variable $\left(\frac{\beta_k \bar{X}_k}{\mu} \right)$ of y with respect to each X_k . On the other hand, 'unexplained' or 'residual' refers to inequality in outcome that cannot be described by systematic variation in the X_k across different socioeconomic groups.

To do a decomposition analysis, the following steps are required:

1. The outcome variable against its factors needs to be regress to find out the coefficients of the explanatory variables (β_k).
2. Calculate mean of the outcomes and each of its factors (μ and X_k).
3. Using equation (1) where y_i and μ are determinant for the i^{th} individual and the determinant mean, respectively. The values of all variables included in equation (3) are known.
4. At last, the net contribution of each factor can be quantified in two following steps:

- Computing net contribution of each factor by multiplying the health outcomes elasticity with respect to that factor and its CI $\left(\frac{\beta_k \bar{x}_k}{\mu}\right) C_k$
- Calculate the percentage contribution of each factor through dividing its net contribution by the CI of the health outcome $\frac{\left(\frac{\beta_k \bar{x}_k}{\mu}\right) C_k}{C}$.

Ethics statement

This study used the WHO-SAGE Wave 1 data available in the public domain for use by researchers (<http://www.who.int/healthinfo/sage/en/>); thus, no ethical clearance is required for this study. The WHO-SAGE survey participants in all selected countries were informed about the survey, design, purpose and how it would benefit society at large. The survey was conducted under the supervision of the respective national governments.

Patient and public involvement

This study did not involve any patient and/or public.

RESULTS

Table 1 presents the sample distribution of population aged 60 and above covered in the SAGE survey. Nearly, three-fifths of the sample size belonged to the age group 60–69 years among both men and women. Over half of the women (54%) were widowed as compared with just 11% among men. Every three out of four women in the sample did not attend any formal level of schooling, whereas the corresponding figure among men was 36%. Majority of the older population resides in rural areas (70%). Nearly 75% of the men used tobacco, while among women, it was 38%.

The decomposition analysis has been interpreted based on three components: mean, marginal effects and CIs. Negative CI for IADL (or functional deficiencies) indicates that inequality was concentrated among the poor, and positive CI for chronic diseases among the rich, which indicates a higher burden. Positive (negative) contributions of association can be interpreted by indicating that the total health inequality would be lower (higher) if that association had no impact on the health outcome (instead of that reflected in marginal effects). The contributions are a mixture of positives and negatives, which sum up to 100. The positive percentages were adjusted on a pro rata basis to offset the negative percentages, as the positive percentages exaggerate the importance of the determinants. Each health outcome analysis was trailed by a gender-based comparison to comprehend if there were any real contrasts among the contributions of various sociodemographic constituents among men and women in their income health inequality.

Results of the relative contribution of sociodemographic factors to functional deficiencies were highest among those with poor economic status (39%), followed by those who were illiterate (23%), which collated to 61% of total explained inequalities (table 2). Findings show

that nine selected covariates together explained 82% of the total inequalities. Sex-stratified analysis highlights major contrasts, where the positive adjusted percentile contribution by poor economic status for men was 61.8%, whereas it was negative for women and thus, adjusted on the pro rata basis for other positive contribution factors (table 3). The highest percentile contribution in functional deficiencies among women was rural resident (50%), which was substantially low at 5% among men. The second point of comparison was illiteracy, which was 27% for men and only 0.1% for women. Among women, Muslims accounted for 17% of the total inequality in functional deficiency and SC/ST social groups, another 16%.

In case of chronic health condition (table 4), about 93% of the relative contribution of sociodemographic factors was shared by three factors—poor economic status (42%), rural residence (31%) and illiteracy (20%). Sex-wise comparison (table 5) suggests that among both men and women, poor economic status (45% and 41%) contributed the highest, followed by rural place of residence (31% and 27%) and illiteracy (18% and 22%), respectively. However, among women, the contribution of social groups (SCs/STs) was noticeable (9%).

DISCUSSION AND CONCLUSION

Although health disparities by socioeconomic group have been firmly established with years of research, difference in functional ability and chronic health by sex remains inconclusive among older adults in low/middle-income countries. We believe that this is the first study on sex-stratified decomposing socioeconomic inequality in functional deficiency and chronic illness among older adults in India.

The findings show pro-poor inequality in IADL (or functional) deficiency and pro-rich inequality in the presence of chronic illness among older adults sample. Determinants such as poor economic status, illiteracy and rural residence were major contributors to overall IADL deficiency, and there is a similar pattern among men. However, in the case of women, rural residence, belonging to SCs/STs social groups and being Muslim contributed significantly to IADL deficiency. The findings further suggest that poor economic status, followed by rural residence and illiteracy contributed the highest in explaining overall inequality in chronic health. Available evidence from India and other low/middle income countries highlighted low economic status,^{27 39} poor education^{40 41} and residential segregation,^{42–44} as key predictors of functional ability and presence of chronic health among older adults. But, hardly any study ever attempted to quantify the contribution of these factors.

Place of residence contributed to about 50% of the inequality in functional deficiency, and nearly 30% in case of chronic illness among women. This could perhaps be attributed to excess engagement of women in informal rural activities throughout their life as compared with

Table 1 Sample distribution for population aged 60 and above, WHO Study on Global AGEing and Adult Health, India

Background characteristics	Men		Women		Total	
	n	%	n	%	n	%
Age of the respondent						
60–64	615	30.0	613	33.8	1228	31.9
65–69	589	29.3	500	25.8	1089	27.5
70–74	395	21.2	335	20.1	730	20.6
75–79	206	11.8	153	9	359	10.4
80+	174	7.6	173	11.1	347	9.4
Marital status						
Unmarried	32	1.5	9	1.2	36	1.4
Married	1660	87.8	812	44.7	2477	66.1
Widowed	287	10.5	953	54	1240	32.5
Education of the respondent						
No formal education	745	36.3	1320	75.6	2149	56.2
Less than primary	317	12.9	159	9.6	446	11.2
Completed primary	341	19.5	161	8.9	494	14.2
Completed secondary	234	13.0	59	2.4	275	7.6
Completed high school	203	11.8	52	2.2	234	6.9
Completed college/university/postgraduate	139	6.3	23	1.1	155	3.7
Religion of the respondent						
Hinduism	1603	83.7	1473	86.9	3076	85.3
Islam	245	12.6	170	10.3	415	11.5
Others	63	3.6	60	2.7	123	3.2
Ethnicity of the respondent						
Scheduled tribe	114	5.4	73	4.5	187	5.0
Scheduled caste	329	16.8	284	16.8	613	16.8
No caste or tribe	340	12.9	325	14.8	665	13.9
Others	1122	64.8	1013	63.9	2135	64.3
Place of residence						
Urban	472	29.6	501	30.4	973	30.1
Rural	1507	70.3	1273	69.5	2780	69.9
Wealth quintile						
Poorest	387	22.5	363	24.8	750	23.7
Poor	403	22.6	344	21.9	747	22.3
Middle	358	17.5	346	19.4	704	18.5
Higher	382	17.5	309	15.9	691	16.8
Highest	381	19.7	341	17.7	722	18.8
Tobacco use						
No	523	24.7	1110	62.3	1633	43.5
Former/Current	1387	75.2	592	37.6	1979	56.5
Total	1979		1774		3753	

urban women. For instance, in rural areas, women contribute significantly as agricultural labourers and are involved in core household management tasks including livestock rearing, collection of firewood and fetching water even in later life.⁴⁵ Their healthcare needs and

nutritional requirements during childhood and adulthood have largely been neglected, in addition to lack of economic security, mobility and poor social interactions within the community.⁴⁶ The high contribution of rural areas in both IADL and chronic illness could be due to

Table 2 Contribution of predictor variables based on decomposition analysis for IADL among older population aged 60 years and above, WHO-SAGE 2007–2008

Covariates	Mean	Beta	CI	Contribution to CI	% Contribution	Adjusted % contribution
Poor	0.41	0.107†	-0.58	-0.03	38.65	38.52
Tobacco use	0.55	0.040	-0.06	0.00	2.14	2.13
Illiterate	0.68	0.165**	-0.13	-0.02	22.56	22.48
SC/ST	0.22	0.050	-0.25	0.00	4.35	4.33
Muslim	0.12	0.279**	-0.13	-0.01	6.09	6.07
Rural	0.74	0.156**	-0.11	-0.02	18.91	18.85
Married	0.65	-0.223**	0.03	-0.01	6.36	6.34
Older (70+)	0.38	0.474**	0.00	0.00	-0.34	
Female	0.47	0.172**	-0.01	0.00	1.28	1.28
IADL	0.76		-0.11	-0.09	100.0	100.0

Significant levels: **<0.01; †<0.10.

IADL, Instrumental Activity of Daily Living; SAGE, Study on Global AGEing and Adult Health.

inadequate healthcare infrastructure, poor accessibility and substandard quality of care.^{47 48} This situation put women at a disproportionate disadvantage compared with their urban counterparts with better civic infrastructure, improved health facilities and regular check-ups.

Thus, the combined effect of heavy physical activities and widespread gender neglect in health and nutrition put rural women at a higher risk of functional limitations during later life as compared with their urban counterparts.

Table 3 Sex-stratified contribution of predictor variables based on decomposition analysis for IADL among older population aged 60 years and above, WHO-SAGE 2007–2008

Covariates	Mean	Beta	CI	Contribution to CI	% Contribution	Adjusted % contribution
Male						
Poor	0.41	0.252**	-0.58	-0.10	62.90	61.83
Tobacco use	0.73	0.000	-0.06	0.00	0.00	
Illiterate	0.54	0.233**	-0.21	-0.04	26.98	26.52
SC/ST	0.23	-0.030	-0.24	0.00	-1.73	
Muslim	0.13	0.120	-0.11	0.00	1.61	1.59
Rural	0.76	0.060	-0.11	-0.01	5.18	5.09
Married	0.84	-0.200**	0.01	0.00	2.28	2.25
Older (70+)	0.39	0.402**	-0.02	0.00	2.77	2.73
IADL	0.6		-0.2	-0.2	100.0	100.0
Female						
Poor	0.42	-0.060	-0.58	0.02	-45.38	
Tobacco use	0.35	0.070	-0.09	0.00	7.60	4.74
Illiterate	0.84	0.000	-0.08	0.00	0.23	0.14
SC/ST	0.21	0.145†	-0.26	-0.01	26.32	16.43
Muslim	0.10	0.509**	-0.16	-0.01	27.12	16.93
Rural	0.72	0.290**	-0.12	-0.03	79.52	49.64
Married	0.45	-0.244**	0.05	-0.01	19.42	12.12
Older (70+)	0.37	0.551**	0.02	0.01	-14.81	
IADL	0.90		-0.04	-0.03	100.0	100.0

Significant levels: **<0.01; †<0.10.

IADL, Instrumental Activity of Daily Living; SAGE, Study on Global AGEing and Adult Health.

Table 4 Contribution of predictor variables based on decomposition analysis for chronic disease of all the older population aged 60 years and above, WHO-SAGE 2007–2008

Covariates	Mean	Beta	CI	Contribution to CI	% Contribution	Adjusted % contribution
Poor	0.41	-0.113**	-0.58	0.06	42.60	42.25
Tobacco	0.55	0.020	-0.06	0.00	-0.84	
Illiterate	0.68	-0.143**	-0.13	0.03	20.47	20.30
SC/ST	0.22	-0.071*	-0.25	0.01	6.13	6.07
Muslim	0.12	-0.030	-0.13	0.00	0.65	0.65
Rural	0.74	-0.242**	-0.11	0.05	30.73	30.48
Married	0.65	0.010	0.03	0.00	0.15	0.15
Older (70+)	0.38	0.091**	0.00	0.00	0.07	0.07
Female	0.47	0.000	-0.01	0.00	0.03	0.03
Chronic Disease	0.43		0.15	0.15	100.0	100.0

Significant levels: * <0.05 ; ** <0.01 .

SAGE, Study on Global AGEing and Adult Health.

The combined influence of social group (SCs/STs) and religion (Muslim) contributes to over 30% of the inequality in IADL disability among women. There were similar observations by other Indian studies among older population, where particular social groups were more disadvantaged in health and healthcare.⁴⁹ Complex

interactions exist between social groups (castes) and religion in India where substantial inequality is present by gender, access to education, economic status and social groups.⁵⁰ The SC/ST and Muslim population, particularly women, are disadvantaged socioeconomically compared with other social groups. Historically, they are socially

Table 5 Sex-stratified contribution of predictor variables based on decomposition analysis for chronic disease of all the older population aged 60 years and above, WHO-SAGE 2007–2008

Covariates	Mean	Beta	CI	Contribution to CI	% Contribution	Adjusted % contribution
Male						
Poor	0.41	-0.119**	-0.58	0.06	45.75	45.04
Tobacco	0.73	-0.010	-0.06	0.00	0.36	0.35
Illiterate	0.54	-0.104**	-0.21	0.03	18.59	18.30
SC/ST	0.23	-0.030	-0.24	0.00	3.05	3.00
Muslim	0.13	-0.070	-0.11	0.00	1.61	1.59
Rural	0.76	-0.247**	-0.11	0.04	31.78	31.28
Married	0.84	0.030	0.01	0.00	0.45	0.45
Older (70+)	0.39	0.149**	-0.02	0.00	-1.59	
Chronic Disease	0.45		0.14	0.14	100.0	100.0
Female						
Poor	0.42	-0.115**	-0.58	0.07	42.60	41.15
Tobacco	0.35	0.040	-0.09	0.00	-1.80	
Illiterate	0.15	-0.226**	-0.08	0.04	23.32	22.53
SC/ST	0.21	-0.110*	-0.26	0.02	9.27	8.95
Muslim	0.10	0.030	-0.16	0.00	-0.84	
Rural	0.72	-0.221**	-0.12	0.05	28.09	27.14
Married	0.45	-0.020	0.05	0.00	-0.88	
Older (70+)	0.37	0.020	0.02	0.00	0.24	0.24
Chronic Disease	0.41		0.16	0.16	100.0	100.0

Significant levels: * <0.05 ; ** <0.01 .

excluded, illiterate and mainly engage in the informal sectors or as agricultural labourers.⁵⁰ Thus, there is the likelihood of reporting physical deficiency among women belonging to these social and religious groups. However, more research is required to establish this fact, at least in the case of Muslim women. Although, in recent years many affirmative initiatives have been launched to ensure better education, occupation and livelihood opportunities to those belonging to SCs/STs, especially women, it is too early to expect any major change.

Economic status was found to be the major contributor in explaining inequality in both IADL and chronic illness among older adults. However, sex-stratified analysis suggests that household economic status was a major factor in both IADL and chronic illness among men. But, in the case of women, household economic status and not IADL deficiency contributed to chronic illness. Earlier evidence supports these results and states that lack of economic support to older adults increased the likelihood of underutilisation of healthcare services in case of any morbidity/illness.⁴³ Studies argue that when it comes to interaction between gender and wealth, Indian women are at a disadvantage due to the long history of patriarchal kinship and economic structure at the household level.^{51–53} Studies have documented that women in South Asia have restricted access to, and control over, resources within the household,⁵⁰ poor access to preventive and curative care as they are economically dependent on their husbands or on the male heads of household⁵⁴ and are most vulnerable when healthcare has to be purchased out-of-pocket or through private insurance.^{55–57} Resource-poor older individuals had lower use of healthcare despite their illness and this could be affecting women adversely considering the inadequate social protection plan, coupled with poor performance, specifically for the economically disadvantaged older people.⁵⁸ This was reflected in earlier studies, too.

Strengths and limitations

The strengths and limitations of the study need to be highlighted. The methodological strength of the present study includes application of the concentration index. It is sensitive to changes in the outcome distribution (IADL and chronic illness) of the population across socioeconomic groups. The application of decomposition analysis³⁸ to examine the contribution of socioeconomic factors to the overall health inequality between the poor and the rich strengthens the findings of this study. Another major strength of this study is the nationally representative sample of older population drawn from the SAGE survey. SAGE is one of the prominent sources of data that provides substantial health and related information pertaining to the older population in India. It has addressed major data gaps in terms of growing socioeconomic inequalities in health in low/middle-income countries like India.¹⁴ The study has used diagnosed chronic morbidity rather than reported to reduce any bias in the responses.

As far as the limitations are concerned, first, the findings based on regression-based decomposition models lack any causal interpretations. Second, the study does not include any variables related to psychosocial factors and the health system, which might explain both functional limitations and chronic illness among older adults. Third, the cross-sectional study design prevents establishment of any causal inferences from the study results. Finally, how health measures could have been affected by the type and composition of an individual's social network³³ has not been considered in this analysis.

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