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Healthy Ageing and Gender Gap in India; Evidence from the Longitudinal Ageing Study in India - Wave 1

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Role of Individual and Household Data

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Background

- The combined demographic and epidemiological transition can potentially challenge population health (Lloyd-Sherlock et al. 2012; Maresova et al. 2019).
- It is observed that these transitions are taking place at a rapid pace in LMICs (Abdel R. Omran 2005; Frenk et al. 1989; Olshansky and Ault 1986), which may result in severe health and non-health consequences as there is a shortage of resources (Hewa and Liu 2018).
- Alternative public policy target→ healthy ageing.
- Previous studies conducted in high-income country contexts confirm the possibility of healthy ageing even towards the later years of life (Fries 1980, 2005; Mor 2005). These studies emphasize the importance of squeezing the health burden or the "compression of morbidity" into a short period, preferably towards the end of life.

- Though average life expectancy has been increasing in the past few decades, generally, older adults are noted for higher burden due to chronic diseases (Divo, Martinez, and Mannino 2014; Maresova et al. 2019) and disability (Bleijenberg et al. 2017; McGrath et al. 2019), which may lead to loss of overall well-being and health status (Chiaranai, Chularee, and Srithongluang 2018; Maresova et al. 2019; Raina et al. 2020). Studies also confirmed that older adults are at high risk of low cognitive health (Murman 2015) and depression (Pilania et al. 2019).
- From the supply side perspective of geriatric medicine, the system is yet to develop or still evolving in most developing country contexts.

The question

- Historically, higher life expectancy is consistently reported among the female gender category (Arias, Tejada-Vera, and Ahmad 2021; Hossin 2021). Contrary to this advantage, women are less likely to experience healthy life expectancy than men, and this gender gap in healthy ageing become highly prevalent among older adults (Gómez-Costilla, García-Prieto, and Somarriba-Arechavala 2021; Patel et al. 2021).
- In the Indian context, women older adults face poor health outcomes compared to male older adults (Pandey and Ladusingh 2015).
- It is also to be noted that an Indian context-based comprehensive health assessment was not done yet.

- Therefore, our study aims to assess the health status of Indian older adults with a multidimensional health assessment approach (using Healthy Ageing Index (HAI) (Irshad et al. 2021)) , find key determinants of healthy ageing and the gender-based inequality in healthy ageing.

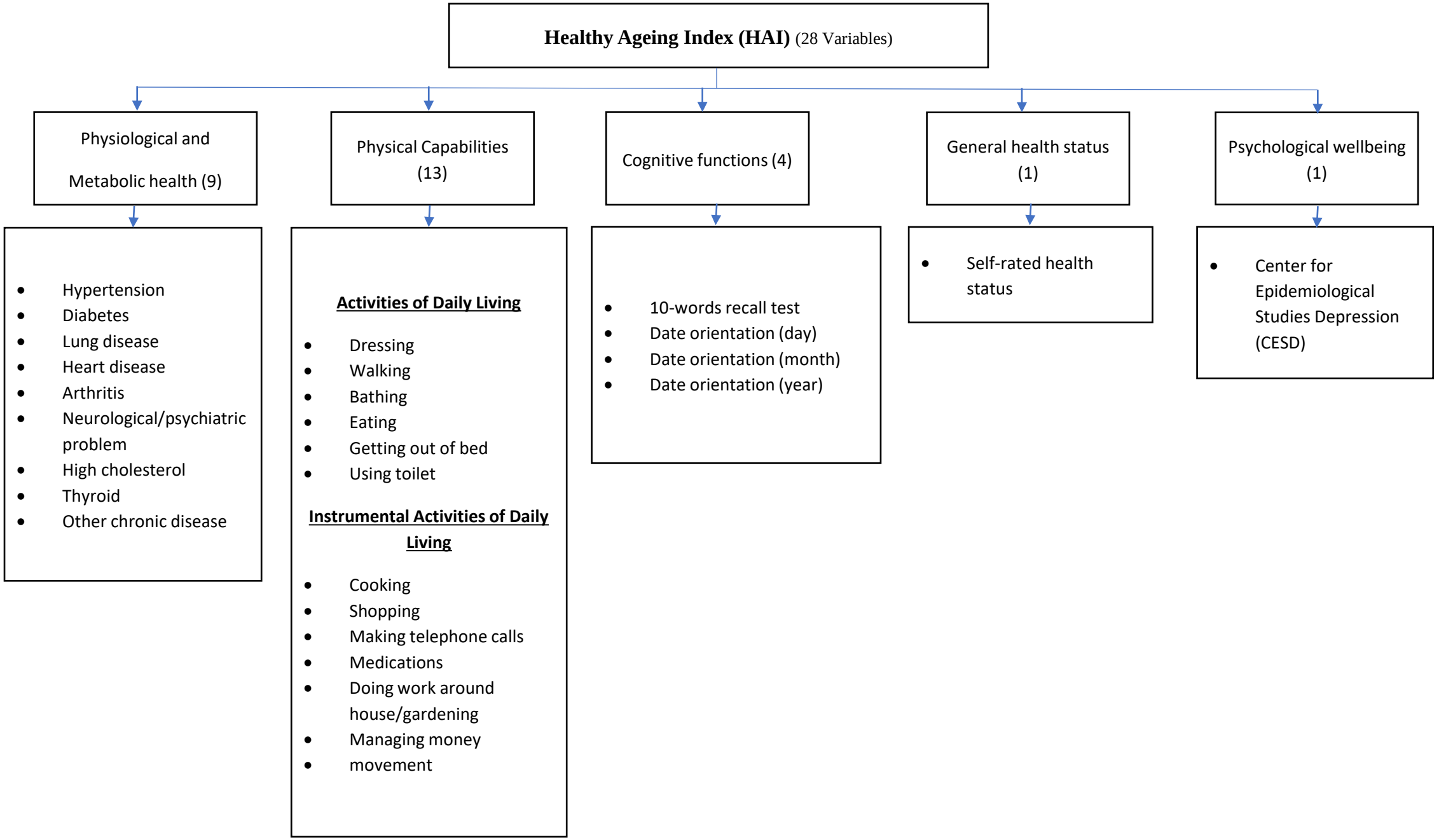
Methods

Data:

- The present study used data from the Longitudinal Ageing Study in India (LASI) wave 1, a national level survey conducted from April 2017 to December 2018.
- The survey interviewed a sample of 72250 consisting of all age-eligible (45 years and above) individuals and their spouses (no age criteria), separately, from 35 states and union territories of India (excluding Sikkim).
- The present study considered only individuals aged 60 years and above (31464 individuals). The bio-makers data of 28576 was available in the LASI. The final sample included for the analysis after dropping missing values and ineligible individuals were 23140 older adults who answered all the variables of interest in the study.

Outcome measure (Healthy Ageing Index (HAI):

- Multidimensional health assessment of older adults is well established (Daskalopoulou et al. 2019; Marengoni and Calderon-Larrañaga 2020; Wu et al. 2020; Yap et al. 2020). A systematic review study documenting the domains and measurements of healthy ageing has identified key health assessment domains, including physiological and metabolic health, physical capabilities, general health status, cognitive function and psychological well-being (Lu, Pikhart, and Sacker 2019).
- It also consists of subjective and objective health components of healthy ageing (Fernandez-Ballesteros 2011).
- The present study developed a multidimensional HAI including 28 variables covering physiological and metabolic health, physical capabilities, general health status, cognitive functions and psychological well-being domains. Each variable was coded in binary or quintile form with value taking between 0 and 100. Finally total score was harmonized to a 0 to 100 scale.


Healthy Ageing Index (HAI) (28 Variables)
Physiological and Metabolic health (9)
Physical Capabilities (13)
Cognitive functions (4)
General health status (1)
Psychological wellbeing (1)
Hypertension
Diabetes
Lung disease
Heart disease
Arthritis
Neurological/psychiatric problem
High cholesterol
Thyroid
Other chronic disease
Activities of Daily Living
Dressing
Walking
Bathing
Eating
Getting out of bed
Using toilet
Instrumental Activities of Daily Living
Cooking
Shopping
Making telephone calls
Medications
Doing work around house/gardening
Managing money
movement
10-words recall test
Date orientation (day)
Date orientation (month)
Date orientation (year)
Self-rated health status
Center for Epidemiological Studies Depression (CESD)

- Exploratory Factor Analysis (EFA) was applied.
- The Bartlett's sphericity test was significant (χ^2 = 1.14e+05, p<0.01) and the sample adequacy test statistic was higher (Kaiser–Meyer–Olkin = 0.89), which suggest that the data meet the minimum standards for factor analysis.
- Seven factors were derived from factor analysis (accounting for 51% of the total variance in HAI).
- Internal consistency: Cronbach Alpha = 0.80
- External validity: Used the correlation between HAI and Life Satisfaction (LS) score (Boateng et al. 2018). Higher LS is associated with better health outcomes and increased longevity (Beutell 2006). The Pearson's correlation coefficient between HAI and LS score shows a significant positive correlation (r= 0.15, p<0.01).

Predictor variables:

Socioeconomic and demographic variables		References
	Age, Gender, Education, Social background, Marital status, Monthly Per Capita Expenditure quintile (MPCE Quintile), Residence status, food security, work status and income earnings.	(Carrillo-Vega et al. 2019; Fernandes et al. 2018; Shahar et al. 2016)
Health risk behaviour		
	Smoking, Alcohol drinking and physical activity	(Liu et al. 2011)
Frailty variables		
	Grip strength, Body-balance test and gait speed	(L. P. Fried et al. 2001; Linda P. Fried et al. 2004; Makizako et al. 2015)
Support system		
	Government transfers to family and social welfare benefits.	(Morris et al. 2007)

Data analysis:

- Preliminary analysis- descriptive statistics.
- Multivariate analysis→
- To find the determinants of healthy ageing→ Quantile regression.
- Estimated at 10^{th}, 25^{th}, 50^{th},75^{th} and 90^{th} percentiles along with OLS.
- To explore the gender-difference in healthy ageing→ quantile regression decomposition method developed by Machado and Mata and later advanced by Blaise Melly, was applied.

→What the quantile regression decomposition analysis do?

- It estimates the total gender gap in healthy ageing at each percentile and then estimate the contribution of characteristics effect (explained gap) and coefficient effect (unexplained gap/**attributed to discrimination**) to the total gap in HAI.

Results

	OLS	Quantile Regression				
		10th Quantile	25th Quantile	50th Quantile	75th Quantile	90th Quantile
Age (Ref: 60-69 years)						
70-79 years	-2.01* (-2.35 - -1.68)	-3.63* (-4.45 - -2.81)	-2.86* (-3.42 - -2.30)	-1.90* (-2.27 - -1.53)	-1.06* (-1.36 - -0.75)	-0.64* (-0.89 - -0.39)
80 years and above	-4.98* (-5.53 - -4.43)	-9.30* (-10.65 - -7.95)	-7.23* (-8.15 - -6.30)	-4.53* (-5.14 - -3.91)	-2.86* (-3.35 - -2.36)	-1.37* (-1.79 - -0.96)
Gender (Ref: Male)						
Female	-3.73* (-4.13 - -3.34)	-5.14* (-6.09 - -4.18)	-4.61* (-5.26 - -3.95)	-3.55* (-3.98 - -3.11)	-2.84* (-3.19 - -2.48)	-1.88* (-2.18 - -1.59)
Education (Ref: no schooling)						
Up to 5 years	3.46* (3.07 - 3.85)	4.58* (3.63 - 5.53)	4.72* (4.07 - 5.37)	3.53* (3.09 - 3.96)	2.54* (2.19 - 2.89)	1.49* (1.20 - 1.78)
6-10 years	5.24* (4.82 - 5.65)	7.66* (6.65 - 8.67)	7.00* (6.31 - 7.69)	5.22* (4.76 - 5.68)	3.82* (3.45 - 4.19)	2.31* (2.00 - 2.62)
Above 10 years	6.56* (5.95 - 7.16)	10.22* (8.74 - 11.70)	8.55* (7.53 - 9.56)	6.29* (5.61 - 6.96)	4.36* (3.81 - 4.90)	2.58* (2.12 - 3.03)
Social background (ref: Scheduled Tribe-ST)						
Scheduled Caste	-1.64* (-2.13 - -1.16)	-1.66* (-2.84 - -0.47)	-2.03* (-2.84 - -1.22)	-1.59* (-2.13 - -1.06)	-1.18* (-1.62 - -0.75)	-0.88* (-1.24 - -0.51)
Other Backward Caste	-2.45* (-2.87 - -2.04)	-2.43* (-3.44 - -1.41)	-3.37* (-4.07 - -2.68)	-2.60* (-3.06 - -2.14)	-1.78* (-2.16 - -1.41)	-1.19* (-1.50 - -0.88)
General	-2.20* (-2.66 - -1.74)	-2.49* (-3.62 - -1.37)	-2.98* (-3.75 - -2.22)	-2.23* (-2.74 - -1.72)	-1.48* (-1.89 - -1.07)	-1.05* (-1.39 - -0.70)
Marital status (Ref: in union)						
Not in union	-1.02* (-1.35 - -0.68)	-1.52* (-2.33 - -0.71)	-0.84* (-1.39 - -0.29)	-1.04* (-1.41 - -0.67)	-0.56* (-0.86 - -0.26)	-0.61* (-0.86 - -0.36)

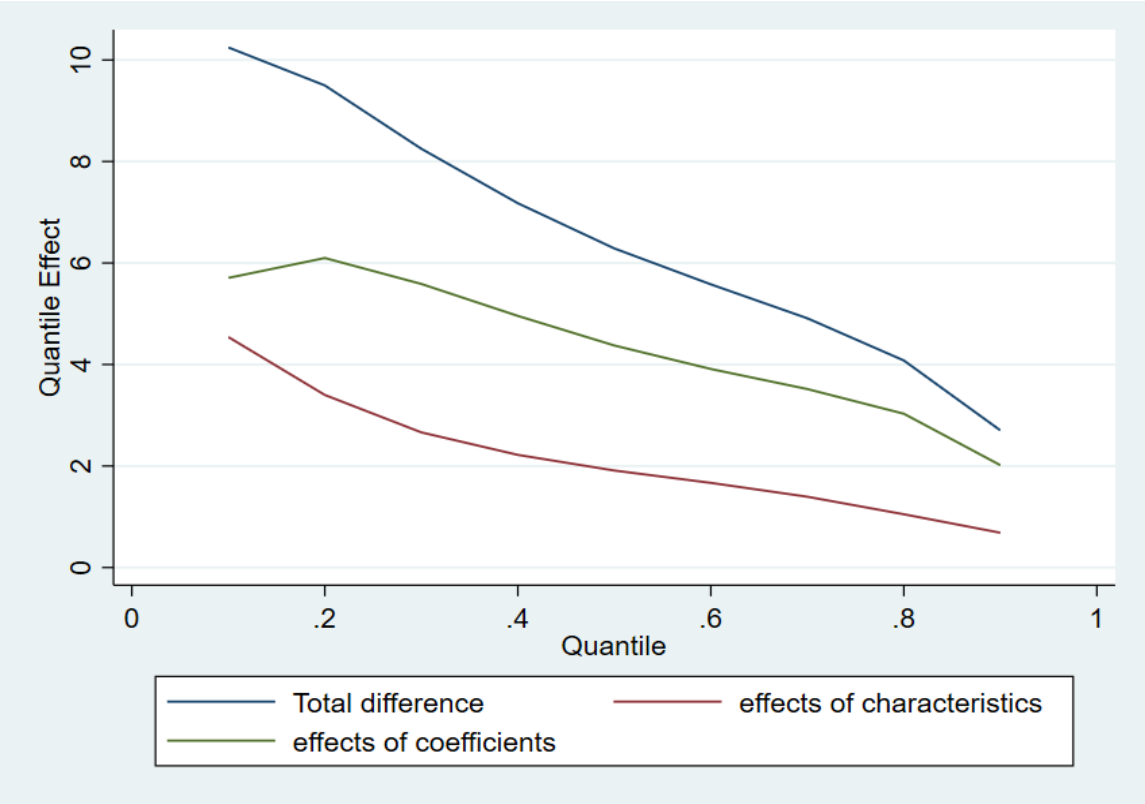
MPCE Quintile (Ref: poorest)						
Poorer	0.28 (-0.16 - 0.71)	0.61 (-0.45 - 1.68)	0.36 (-0.37 - 1.08)	0.28 (-0.20 - 0.76)	0.22 (-0.17 - 0.62)	0.01 (-0.32 - 0.33)
Middle	0.19 (-0.25 - 0.62)	0.19 (-0.88 - 1.26)	0.13 (-0.60 - 0.86)	0.16 (-0.33 - 0.64)	0.31 (-0.08 - 0.71)	0.24 (-0.09 - 0.56)
Richer	-0.16 (-0.61 - 0.29)	0.15 (-0.94 - 1.24)	-0.13 (-0.87 - 0.62)	-0.27 (-0.76 - 0.23)	-0.21 (-0.61 - 0.19)	-0.20 (-0.54 - 0.13)
Richest	-0.26 (-0.73 - 0.21)	-0.39 (-1.53 - 0.76)	-0.54 (-1.33 - 0.24)	-0.45 (-0.97 - 0.07)	-0.10 (-0.52 - 0.33)	0.10 (-0.25 - 0.44)
Residence (Ref: rural)						
Urban	1.39* (1.06 - 1.72)	1.92* (1.11 - 2.72)	1.59* (1.04 - 2.14)	0.96* (0.59 - 1.32)	0.76* (0.46 - 1.06)	0.72* (0.48 - 0.97)
Ever smoke (Ref: no)						
Yes	-0.76* (-1.08 - -0.44)	-1.42* (-2.20 - -0.63)	-0.95* (-1.48 - -0.41)	-0.43* (-0.78 - -0.07)	-0.45* (-0.74 - -0.16)	-0.41* (-0.65 - -0.17)
Ever drink (Ref: no)						
Yes	-0.67* (-1.07 - -0.26)	0.10 (-0.89 - 1.10)	-0.68* (-1.36 - -0.00)	-1.11* (-1.56 - -0.66)	-0.89* (-1.25 - -0.52)	-0.64* (-0.94 - -0.33)
Physical activity (Ref: no)						
Yes	1.10* (0.76 - 1.43)	1.65* (0.83 - 2.46)	1.41* (0.85 - 1.97)	0.97* (0.60 - 1.34)	0.63* (0.33 - 0.93)	0.53* (0.28 - 0.78)
Food security (Ref: yes)						
No	-4.49* (-5.12 - -3.86)	-7.19* (-8.72 - -5.65)	-5.92* (-6.97 - -4.87)	-3.79* (-4.49 - -3.09)	-2.65* (-3.21 - -2.08)	-2.10* (-2.57 - -1.63)

Grip strength (Ref: high)						
Low	-2.19* (-2.50 - -1.87)	-3.50* (-4.27 - -2.73)	-2.40* (-2.93 - -1.88)	-1.79* (-2.14 - -1.44)	-1.28* (-1.56 - -0.99)	-0.66* (-0.90 - -0.43)
Gait speed (Ref: normal/fast)						
Slow	-5.14* (-5.64 - -4.64)	-6.95* (-8.17 - -5.73)	-6.82* (-7.66 - -5.99)	-5.28*(-5.83 - -4.73)	-3.09* (-3.54 - -2.64)	-2.52* (-2.89 - -2.15)
Body-balance (Ref: failed to perform semi-tandem test)						
Failed to perform full-tandem test	2.62* (1.96 - 3.27)	5.15* (3.55 - 6.76)	4.06* (2.96 - 5.16)	2.79* (2.06 - 3.52)	1.90* (1.31 - 2.49)	1.41* (0.92 - 1.90)
Completed full-tandem test	4.74* (4.12 - 5.36)	8.35* (6.83 - 9.87)	6.63* (5.59 - 7.67)	4.69* (4.00 - 5.39)	3.35* (2.79 - 3.91)	2.33* (1.87 - 2.80)
Work status (Ref: Currently not working)						
Never worked	1.43* (1.03 - 1.82)	1.14* (0.17 - 2.10)	1.74* (1.09 - 2.40)	1.40* (0.96 - 1.84)	1.01* (0.65 - 1.36)	0.69* (0.40 - 0.99)
Currently working	3.55* (3.09 - 4.00)	6.24* (5.14 - 7.35)	4.38* (3.63 - 5.14)	2.61* (2.10 - 3.11)	1.60* (1.19 - 2.01)	0.78* (0.44 - 1.12)
Personal income (Ref: No)						
Yes	-0.72* (-1.19 - -0.25)	-0.99 (-2.14 - 0.16)	-0.78 (-1.56 - 0.01)	-0.61* (-1.13 - -0.09)	-0.44* (-0.86 - -0.02)	-0.08 (-0.43 - 0.27)
Social welfare benefits (Ref: No)						
Yes	-0.11 (-0.43 - 0.21)	0.08 (-0.71 - 0.86)	-0.30 (-0.84 - 0.24)	-0.08 (-0.44 - 0.28)	-0.23 (-0.52 - 0.06)	-0.33* (-0.57 - -0.09)
Government transfers (Ref: No)						
Yes	-0.43* (-0.73 - -0.13)	-0.39 (-1.12 - 0.33)	-0.47 (-0.97 - 0.02)	-0.70* (-1.03 - -0.37)	-0.47* (-0.74 - -0.20)	-0.25* (-0.47 - -0.03)
Visit family/friends (Ref: No)						
Yes	1.38* (1.02 - 1.75)	2.97* (2.07 - 3.86)	1.17* (0.57 - 1.78)	0.55* (0.14 - 0.95)	0.61* (0.28 - 0.94)	0.38* (0.11 - 0.65)
Constant	80.98* (80.05 - 81.92)	63.28* (61.00 - 65.56)	74.90* (73.34 - 76.46)	84.06* (83.02 - 85.09)	89.47* (88.63 - 90.31)	93.42* (92.72 - 94.11)

Discussion

- Findings confirm that healthy ageing was determined by socioeconomic, demographic, health behaviour, food security and nutrition and social capital factors, which was confirmed with the evidence from previous studies (Feng et al. 2013; Gu and Feng 2015; Gureje, Oladeji, and Abiona 2011; Sha, Yan, and Cheng 2018)
- Findings confirm the gender difference in healthy ageing, and female older adults had lower levels of healthy ageing than male older adults, which is similar to the existing study's findings (Park, Jang, and Kim 2010).
- Overall, increased years of age, low social capital entitlement (not in union and not visiting friends/family), smoking, drinking of alcohol, lack of food security and high frailty (grip strength and gait speed) lead to unhealthy ageing.
- Older adults who maintain engagement in physical activity, with low frailty (good body-balance) and more years of education had more likelihood to attain healthy ageing.

Decomposition Analysis



- The decomposition analysis results indicate that the discrimination factor largely contributes to the gender gap in healthy ageing. The policy implication of this gender difference is crucial as female older adults generally have a longer life expectancy (Kolip and Lange 2018) and a higher prevalence of old age-related vulnerability (Prasad 2011; Schröder-Butterfill and Marianti 2006).

Concluding remarks

- Evidence reveals the prevalence of gender-based inequality in healthy ageing in India.
- Therefore, prioritisation should be given to reduce gender inequality in healthy ageing.

Thank you!