Journal of Population Ageing (2022) 15:39–59
https://doi.org/10.1007/s12062-022-09357-7

Insights into Labor Force Participation among Older Adults: Evidence from the Longitudinal Ageing Study in India

Aparajita Chattopadhyay[1] · Junaid Khan[1] · David E. Bloom[2] · Debashree Sinha[1] · Itishree Nayak[3] · Sangeeta Gupta[1] · Jinkook Lee[4] · Arokiasamy Perianayagam[1]

Received: 1 October 2021 / Accepted: 4 January 2022 / Published online: 3 February 2022

Abstract

Using data collected in 2017–18 for the baseline wave of the Longitudinal Ageing Study in India, this paper analyzes labor force participation among older adults (people aged 60 years and older) and their job characteristics, income, and associated social security benefits. Analysis of a cohort of 31,464 older adults shows that although labor force participation declines with age, 36% of older adults in India are working; of these, two-thirds are employed primarily in agriculture and allied services, only 5% have a full-time job, and just 6% are covered by a work-related pension scheme. Older adults who have less education, live alone, do not have a chronic disease, and lack health insurance or pension coverage are more likely to work beyond age 60. The dominant predictor of labor force participation is health status, especially in rural India. Older adults are almost equally likely to work across wealth categories in urban India, rejecting the hypothesis that only the poor work beyond age 60 in India. Vulnerable (i.e., rural, living alone, divorced/separated) females work more than their male counterparts. Older adults continue to work depending on their physical capacity, which is highly age-dependent, across economic categories. Our results provide evidence for the pursuit of an older adult policy in India that focuses on healthy ageing particularly in the context of poor social security coverage and the unorganized nature of work, as healthy populations continue to engage in economic activity.

Keyword Labor force participation · Older adults · Longitudinal Ageing Study in India · India

✉ Debashree Sinha
debashreesinha04@gmail.com

Extended author information available on the last page of the article

Introduction

The global population aged 60 years and older numbered 962 million in 2017 and is expected to more than double by 2050 (UNDESA, 2017). In India, older adults (people aged 60 years and older are considered older adults in the present paper) comprise 8.6% of the population (Statistics and Programme Implementation, 2016), and their share is projected to surge to 19.8% or more by 2050; that is more than 319 million (UNDESA, 2017), which is close to the 2016 population of the United States, i.e., 323 million. With two-thirds of older adults living in villages and nearly half of them having poor socioeconomic status (Lena et al., 2009), India currently stands at a critical crossroads in confronting the economic and social security issues of ageing that must be addressed for the country to develop holistically (Chattopadhyay, 2004). Furthermore, research on the association of ageing with the work status and health of older adults is conflicting. While some studies indicate that rising longevity is closely associated with economic challenges and deteriorating health (Angel et al., 2003; Jeon et al., 2007; Bang et al., 2017; Kwak & Kim, 2019), empirical evidence mostly from the developed world indicates that older adults who remain engaged in work have better mental and physical health (Hao, 2008; Schwingel et al., 2009; Silver et al., 2020). There has not been much research on this critical issue in India, and as India ages it is important to understand the association between the health and work status of older adults in this country.

Several factors, especially gender, education, socioeconomic condition, health, rural-urban divide and social security status, determine labor force participation among older adults (Bowler, 1999; Schirle, 2008). The section below highlights the trend and complex association of factors that determine work among older adults.

Gender and Labor Force Participation

Workforce participation rates of older women increased from 1971 to 2001, while those of older men decreased (Dhillon & Ladusingh, 2013). One reason for this could be the feminization of ageing: a higher proportion of widows leads to a higher labor force participation rate due to economic vulnerability (Quinlan & Mayhew, 1998). Moreover, due to a dearth of alternative income-generating activities (Clark & Anker, 1993; Adhikari et al., 2011; India, 2011) and lack of skills (Reddy, 2016), nearly one-fifth of older women are engaged in farm-based economic activity in rural India, whereas only one-tenth of their urban counterparts are engaged in any economic activity (Selvaraj et al., 2014). This may explain the higher labor force participation rate of women in rural areas than in urban areas (Chaudhary & Verick, 2014). It is necessary to further study how the determinants of work differ by gender and by rural-urban status in India.

Education and Labor Force Participation

An increase in education is expected to increase ability, willingness, and opportunities to work at older ages (Peracchi & Welch, 1994; Bass, 2009; Haider & Loughran, 2011). A positive relationship between education and employment at later ages is observed because more educated workers initiate their careers relatively later than their uneducated counterparts, and may thus need to work until relatively older ages to sustain income security and savings (Börsch-Supan & Ferrari, 2020). Furthermore, in developed countries like Denmark, Germany, and Sweden, task complexity and work autonomy lead to higher employment rates with education (Larsen & Pedersen, 2017). However, the positive relationship between higher education and employment at later ages does not hold true for India; here, older adults with higher education tend to withdraw from the labor force due to the lack of suitable job opportunities (Das & Desai, 2003).

Economic Status and Labor Force Participation

Almost three-fourths of older adults in India are partially or completely economically dependent on others (Kumar & Kumar, 2019), either due to widowhood or cessation of income (Rajan, 2010) or due to a change from salary to pension income (Lena et al., 2009). This economic insecurity motivates older adults in India to continue to work beyond the age of 60 (Kanfer et al., 2013). Furthermore, older adults who have relatively poor socioeconomic status are also more likely to participate in the labor force (Reddy, 2016), mainly for basic sustenance. So, is it true that in India, only poor older adults are working?

Health Conditions and Labor Force Participation

Health plays a crucial role in determining work status in old age. Older adults in India suffer from several non-communicable diseases (NCDs) such as diabetes, hypertension, heart disease, and arthritis (Kanitkar et al., 2018; Kaur et al., 2019; Talukdar, 2017; Chattopadhyay, 2004). Getting engaged in work may also be rooted in escalating health expenditures (Brinda et al., 2012; Mohanty et al., 2014), lack of government support and social security (Gupta et al., 2001; Asher, 2009), inadequate personal savings (Bloom et al., 2010), and the weakening of traditional support systems such as family and kinship (Kumar, 2003). The abovementioned conflicting literature raises a series of questions for policymakers in India: Do healthy older adults work in India? Are the economically weaker older adults more likely to work?

Based on the literature review and research questions, we conceptualize a framework that illustrates various conditions that influence labor force participation among older adults in India (Fig. 1). We have classified four broad conditions: (1) "Work status and work characteristics," or the "ultimate condition," i.e., the final outcome of a combination of factors like (2) "socioeconomic characteristics" or

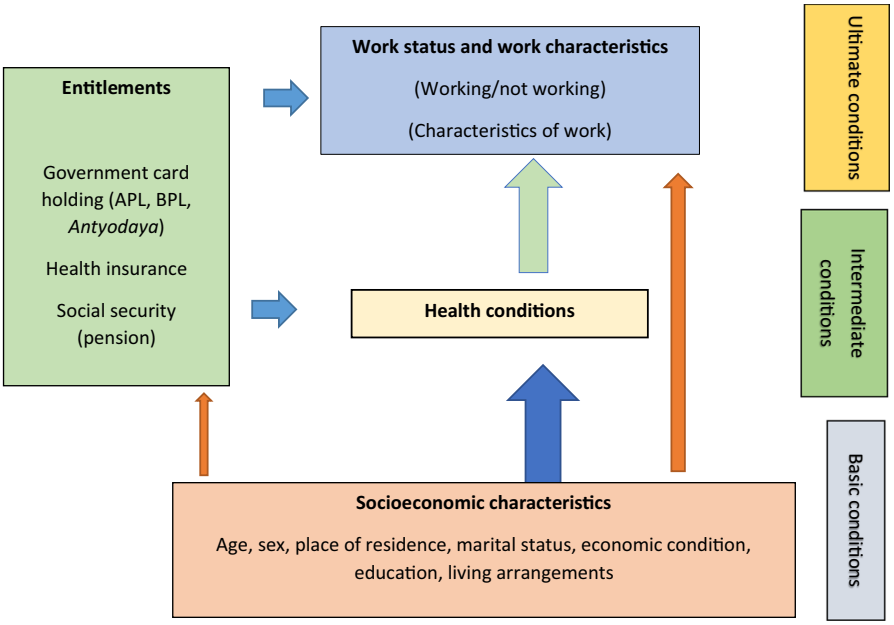


Fig. 1 Conceptual framework depicting the influence of basic conditions, intermediate conditions, and entitlements on work status among older adults in India. *Note:* APL = above poverty line; BPL = below poverty line; *Antyodaya* card = a government card that provides highly subsidized food to the poorest families in India

the "basic condition"; (3) "health conditions" or the "intermediate condition"; and (4) "entitlements" (i.e., holding of government cards like the above poverty line (APL), below poverty line (BPL), and *Antyodaya* cards; health insurance; and social security).

We hypothesize that mainly the poor, rural, and less educated population without social security engage in work at age 60 and beyond. Assessing and determining the factors associated with labor force participation in older ages is an important ingredient in designing policies that focus on healthy and active ageing.

Data and Methods

Wave 1 of the Longitudinal Ageing Study in India (LASI, 2020), the first ever nationwide survey in India, focuses on understanding the economic aspects of ageing as one of its aims. The study collects information on current work status, type of work, characteristics of main job, social insurance coverage related to work, etc. LASI follows the Indian Census definition of work, which includes all kinds of labor excluding one's own housework, irrespective of wages received. Unpaid workers who assist in the operation of household farms or in non-farm economic activities are also considered to be workers in LASI. The total sample size of the older adult population aged 60 and older is 31,464. However, to visualize the propensity to work

by age, scatter plots and linear fits were plotted by age using a sample of individuals aged 45+ (the 45–59 age group comprises 34,098 individuals). The bivariate analyses used national-level survey weights.

For the regression analysis, the sample was restricted to those aged 60 years and older. Work status is the dependent variable and socioeconomic status, health measures, and social security are used as explanatory factors. Within the study framework, we predicted the working status of older adults through logistic regression estimation, specified as follows:

$$\begin{aligned}\ln\frac{p}{1-p} =& \beta_0 + \beta_1 * age + \beta_2 * sex \\ &+ \beta_3 * residence + \beta_4 * education + \beta_5 * marital\ status \\ &+ \beta_6 * living\ arrangement + \beta_7 * MPCE\ quintile \\ &+ \beta_8 * cardholding + \beta_9 * NCD\ status \\ &+ \beta_{10} * insurance + \beta_{11} * state,\end{aligned}$$

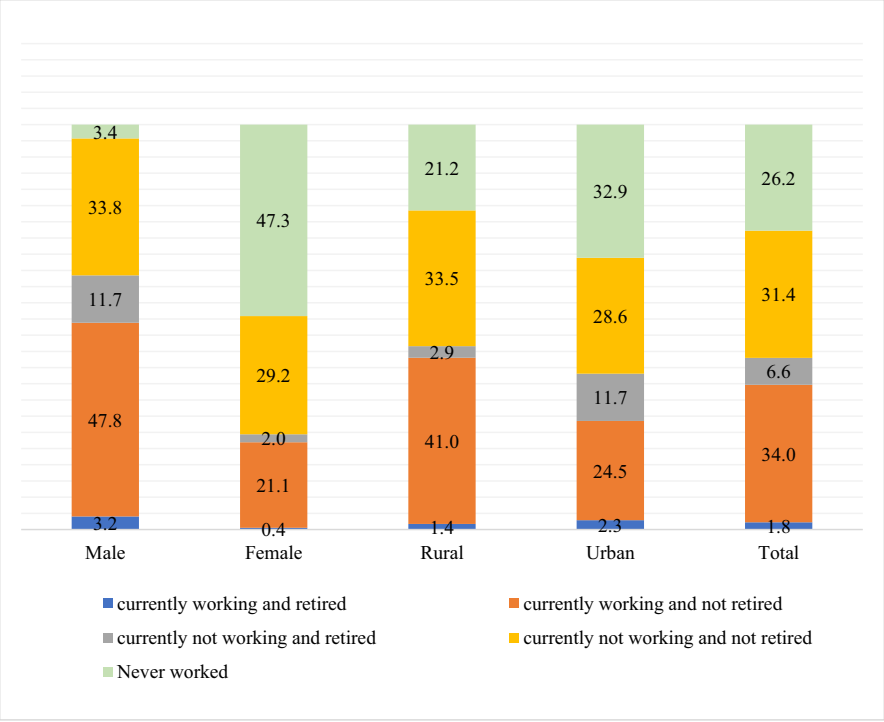
where p denotes the probability that a person above the age of 60 is currently working, β_i is the corresponding estimated coefficient for the i-th variable, and β_0 is the constant. By controlling for the state-level fixed effects in the analysis, we generated an adjusted odds ratio (AOR). Further, the model included a series of interaction terms to test hypotheses pertaining to economic wellbeing and work. In the LASI survey, a household's economic wellbeing is primarily assessed by MPCE, which is calculated using the food and non-food consumption of the household. The questionnaire consists of 11 food items and 29 non-food items. Both the food and non-food expenditures were standardized to a 30-day reference period. MPCE is used as the key indicator of a household's economic wellbeing in our study.

In the LASI sample, the number of older adults receiving a pension is quite low (see Table 2). Thus, making an unbiased estimate of the effect of pensions on current work status is difficult, especially for females and rural residents, as the sample size is too small at the national level. Therefore, the pension variable is included only in the regression that considers the entire older adult population. Although the pension information was limited in the dataset, we checked the sensitivity of the model by including a "receiving pension (yes/no)" variable in the estimation. The variable's inclusion did not significantly change the results, and thus we retained the existing estimation,

Indian rupee (INR) to USD conversion is based on the March 2020 conversion rate of $1=74 Indian rupees.

Results

The descriptive statistics and multivariate models reveal the work characteristics and determinants of work among older adults in India.



Note: Retired means officially retired from an organized sector of employment. The superannuation of government employees ranges from 58 to 65 years for state and central government employees.

Fig. 2 Percentage distribution of older adults by work status, India, LASI Wave 1, 2017–18. *Note:* Retired means officially retired from an organized sector of employment. The superannuation of government employees ranges from 58 to 65 years for state and central government employees

Work Status of Older Adults in India

More than one-third (36%) of older adults currently work, 38% have worked in the past but do not currently work, and the remaining 26% have never worked (Figure 2). To elaborate on this distribution further, 34% of older adults currently work and are not yet (officially) retired, 2% currently engage in work post-official retirement from an organized employment sector, 7% are officially retired and currently do not work, 31% neither currently work nor are retired from any organized sector job, and 26% have never worked. About 12% of older males and 2% of older females who currently do not work are retired from jobs in an organized sector. Almost half of older females had never worked (47%) compared to 3% of the males. The proportion of older adults who neither are currently engaged in work nor are officially retired from any organized sector is higher in rural areas (41%) than in urban areas (25%) and among males (51%) than females (22%).

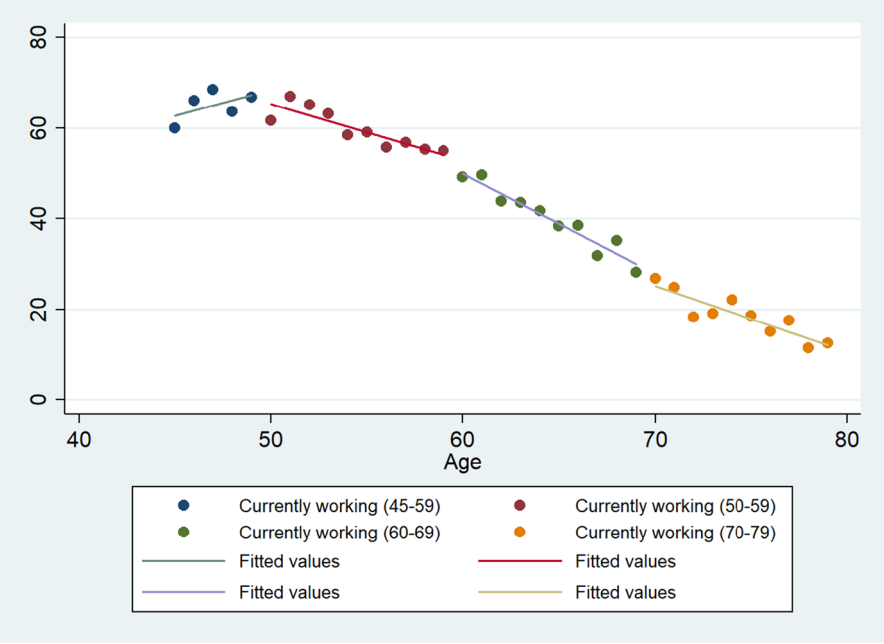


Fig. 3 Percentage of the population working by age in India, 2017-18: scatter plot and linear fits

Age and Labor Force Participation

Figure 3 shows a strong age-associated decline of labor force participation among older adults. The proportion of the population that is working begins to decline after age 50. About 60% of older adults work during their 50s. That share declines to 20% and less after age 70.

Characteristics of Work and Social Security

Among working older adults, about 44% (including 47% of males and 37% of females) work in self- or family-owned farming, fishing, or forestry enterprises, while 16% of males and 33% of females work as agricultural laborers. About 18% of older adults work in service-related jobs, and 13% are own account workers (Table 1). Only 5% of older adults reported having full-time jobs, and 82% had worked for more than six months in the last year. Further, among current workers, about one-fourth (24%) have documentary evidence of employment. Most (54%) older adults work in the private sector or in individual households. Among those who are engaged in business or are self-employed, most own small enterprises with no employees; 5% have full-time jobs, only 9% receive a pension, and a similar proportion have a provident fund.

Table 1 Percentage of older adults by characteristics of current job and social security of ever workers, India, LASI Wave 1, 2017–18

Characteristics of main job	Male	Female	Total
Type of main job among current workers[1]			
Farm/fishery/forestry (own/family)	46.6 (44.1–49.1)	36.9 (34.4–39.5)	43.4 (41.5–45.3)
Agricultural laborer	15.7 (14.5–17.1)	33.1 (30.6–35.8)	21.4 (20.0–22.7)
Nonagricultural business owner	4.9 (4.1–5.9)	1.7 (1.2–2.6)	3.9 (3.3–4.6)
Own account worker	14.6 (13.2–16.2)	8.8 (7.5–10.3)	12.7 (11.7–13.9)
Wage/salary worker	17.1 (15.6–18.8)	17.0 (15.0–19.3)	17.1 (15.8–18.4)
Paid family worker	1.0 (0.7–1.4)	2.4 (1.8–3.3)	1.5 (1.2–1.8)
Number	*7,237*	*3,401*	*10,638*
Having side job among current workers[1]	10.5 (9.8–11.2)	7.9 (7–8.8)	9.7 (9.1–10.2)
Number	*7,293*	*3,421*	*10,714*
Duration of work in a year[1]			
Less than 6 months	14.6 (13.4–15.9)	25.1 (22.8–27.5)	18.0 (16.9–19.2)
6 months or more	85.4 (84.0–86.6)	74.9 (72.5–77.2)	82.0 (80.8–83.1)
Number	*7,252*	*3,417*	*10,669*
Type of employer of wage and salary workers[2]			
Government sector	15.9 (14–17.8)	20.4 (17.1–23.8)	17.3 (15.7–19)
Private sector/organization/entrepreneur	54.4 (51.9–57)	38.4 (34.3–42.4)	49.5 (47.3–51.7)
Cooperatives	1.8 (1.1–2.5)	2.0 (0.8–3.2)	1.9 (1.3–2.5)
NGO/trust	6.1 (4.8–7.3)	2.5 (1.2–3.8)	5.0 (4–5.9)
Individual household	21.7 (19.6–23.9)	36.7 (32.6–40.7)	26.3 (24.4–28.3)
Number	*1,439*	*560*	*1,999*
Having documentary evidence of work[2]	24.0 (19.1–29.7)	23.3 (18.4–28.9)	23.8 (20.0–28.0)
Number	*1,509*	*599*	*2,108*
Having full time job[3]	6.7 (6.3–7.1)	2.6 (2.3–2.8)	4.5 (4.3–4.8)

Table 1 (continued)

Characteristics of main job	Male	Female	Total
Number	*15,098*	*16,366*	*31,464*
Covered under work-related pension[4]	12.1 (11.6–12.7)	3.0 (2.6–3.3)	8.6 (8.3–9.0)
Number	*14,314*	*8,331*	*22,645*
Covered under provident fund[4]	8.4 (8.0–8.9)	2.2 (1.9–2.5)	6.0 (5.7–6.4)
Number	*14,314*	*8,331*	*22,645*
Current monthly earnings from work-related activities in INR ($)[5]			
Agricultural and allied activities	5,558 ($75) (5,348–5,768)	3,531 ($48) (3,353–3,709)	4,856 ($66) (4,704–5,009)
Self-employed	9,122 ($123) (8,579–9,665)	4,326 ($59) (3,677–4,975)	8,142 ($110) (7,684–8,600)
Wage and salary workers	8,397 ($114) (7,910–8,884)	4,247 ($58) (3,695–4,798)	7,012 ($95) (6,627–7,397)
Number	*7,073*	*3,233*	*10,306*
Mean monthly pension amount in INR ($) among those receiving pension[6]	15,571 ($213) (15,071–16,071)	13,806 ($189) (12,241–15,372)	15,354 ($210) (14,875–15,834)
Number	*1,909*	*287*	*2,196*
Having health insurance[7]	19.7 (19.1–20.3)	16.9 (16.3–17.5)	18.2 (17.8–18.6)
Number	*15,098*	*16,366*	*31,464*

Note: The figures in parentheses indicate 95% CI; INR = Indian rupee; NGO = nongovernmental organization.

Main job: Main job is defined as a paid job at which a person works for the longest hours.

Side job: Side job is defined as any job other than the respondent's main job.

Full-time worker: Full-time jobs are those in which a person is expected to work for a certain number of hours every week. The number of hours required to work is defined by the company, institute, or the government (for government jobs it is usually 40 hours per week). However, this may vary with the company and the type of job as defined by the employer.

Own account worker: Refers to an individual who works for him/herself, without employees.

Agriculture and allied industries: Include both owners and laborers engaged in Farm/fishery/forestry

[1]based on those who are currently working; [2]based on those who are wage and salaried worker; [3]based on all older adults; [4]includes ever worked older adults covered under work related social insurance; [5]based on current workers who reported earnings from main and side job; [6]based on those receiving pension

The mean monthly individual earnings of the currently working older adults in each category of work are as follows: $65 for self- or family-owned farm, fishery, or forestry enterprise-related work; $60 for agricultural laborers; $126 for nonagricultural business workers; $109 for self-employed workers, and $95 for wage and salary workers. Table 1 shows the average earnings for three broad categories of work: agriculture and allied work (owner and laborer, $66), self-employed (business owner and own account worker, $110), and wage-salary worker ($95). Monthly pension income is $210 per month, which is substantially higher than the monthly income of current workers; 18% of older adults reported having health insurance.

Determinants of Work

Regression model estimation of current working status, when adjusted for state-level fixed effects, shows that multiple factors predict an individual's work status (Table 2). With increasing age, the likelihood of labor force participation decreases. After age 60, a person is 11% (AOR: 0.89; p-value<0.01; 95% CI: 0.887–0.896) less likely to work with each unit increase in age. Compared with males, females are even less likely to work (AOR: 0.22; p-value<0.01; 95% CI: 0.202–0.231).

Socioeconomic Factors Odds of labor force participation among both male and female older adults decrease with increasing educational attainment. Older adults with an education less than 5 years are 16% (AOR: 0.84; p-value<0.01; 95% CI: 0.767–0.926) less likely to work than those with no formal education. Similarly, older adults who have completed 5–9 years of schooling are 22% (AOR: 0.78; p-value<0.01; 95% CI: 0.717–0.231) less likely to work than those with no schooling, and those who have completed 10 years or more of schooling are 47% (AOR: 0.63; p-value<0.01; 95% CI: 0.202–0.231) less likely to work than those with no schooling.

Marital status reveals important gender differentials in the likelihood of working. For instance, divorced/separated females are 2.04 times more likely to work (AOR: 2.04; p-value<0.05; 95% CI 1.13–3.69) than their married counterparts, in contrast to divorced males (AOR: 0.62; p-value<0.05; 95% CI: 0.394–0.985), who are less likely to work than their married counterparts.

Further, the living arrangements of older adults reveal strong associations with the probability of working. Older adults who live with others are less likely to work than those older adults living alone. Among older adults who live with others, the likelihood of working is lowest among those older adults who live with children and others (AOR: 0.45; p-value<0.01; 95% CI: 0.389–0.515), followed by those living with others only, those living with a spouse and children, and those living with a spouse and/or others. In comparison to older adults who live alone, older males living with a spouse and children and older females living with children and others are less likely to work.

Rural women (AOR: 0.25; p-value<0.01; 95% CI: 0.227–0.266) are more likely to working than their counterpart urban women (AOR: 0.16; p-value<0.01; 95% CI:

Table 2 Who Works at age 60 and beyond? Logistic regression estimates of current work among older adults, India, LASI Wave 1, 2017–18

Background characteristics	Total	Male	Female	Rural	Urban
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95%CI)	AOR (95% CI)
Basic Conditions					
Age	0.89*** (0.886–0.895)	0.89*** (0.885–0.896)	0.89*** (0.883–0.898)	0.89*** (0.884–0.895)	0.89*** (0.885–0.903)
Sex		NA	NA		
Male®					
Female	0.21*** (0.198–0.226)			0.25*** (0.227–0.266)	0.16*** (0.138–0.180)
Place of residence				NA	NA
Rural®					
Urban	0.64*** (0.597–0.689)	0.75 (0.682–0.817)	0.52*** (0.461–0.587)		
Socioeconomic factors					
Education					
No schooling®					
Less than 5 years of school	0.86*** (0.780–0.941)	1.04 (0.922–1.164)	0.70*** (0.590–0.822)	0.87** (0.782–0.975)	0.84* (0.698–1.009)
5–9 years completed	0.82*** (0.753–0.884)	0.95 (0.864–1.049)	0.52*** (0.440–0.609)	0.85*** (0.773–0.937)	0.74*** (0.635–0.857)
10 or more	0.63*** (0.566–0.692)	0.58*** (0.519–0.649)	0.31*** (0.233–0.402)	0.57*** (0.502–0.654)	0.51*** (0.436–0.600)
Marital status					
Currently married®					
Widowed	0.84 (0.614–1.156)	0.57*** (0.378–0.849)	1.13 (0.661–1.950)	0.99 (0.671–1.459)	0.67 (0.390–1.153)
Divorced/separated/deserted/other	1.01 (0.708–1.444)	0.62** (0.394–0.985)	2.04** (1.127–3.697)	1.21 (0.775–1.878)	0.73 (0.398–1.331)
Living arrangement					
Living alone®					
Living with spouse and/or others	0.62*** (0.445–0.863)	0.70 (0.450–1.076)	0.82 (0.468–1.438)	0.85 (0.568–1.278)	0.32*** (0.177–0.561)
Living with spouse and children	0.56*** (0.400–0.773)	0.66* (0.429–1.021)	0.63 (0.359–1.097)	0.75 (0.504–1.130)	0.30*** (0.169–0.527)
Living with children and others	0.44*** (0.383–0.506)	0.65*** (0.493–0.847)	0.41*** (0.351–0.489)	0.49*** (0.414–0.572)	0.35*** (0.268–0.465)
Living with others only	0.53*** (0.442–0.641)	0.73* (0.532–1.014)	0.54*** (0.426–0.676)	0.56*** (0.454–0.700)	0.48*** (0.331–0.688)
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)

Table 2 (continued)

Background characteristics	Total	Male	Female	Rural	Urban
MPCE quintiles					
Richest®					
Poorest	1.08 (0.983–1.197)	1.05 (0.923–1.191)	1.18** (1.008–1.382)	1.05 (0.936–1.180)	1.29** (1.063–1.560)
Poor	1.16*** (1.059–1.282)	1.11* (0.982–1.257)	1.27*** (1.085–1.476)	1.17*** (1.044–1.307)	1.20* (0.994–1.444)
Middle	1.14*** (1.040–1.255)	1.16** (1.027–1.306)	1.14* (0.980–1.331)	1.09 (0.978–1.219)	1.33*** (1.110–1.597)
Richer	1.17*** (1.067–1.286)	1.19*** (1.060–1.344)	1.16* (0.995–1.356)	1.19*** (1.063–1.323)	1.19* (0.988–1.424)
Health Conditions					
Chronic disease					
No®					
Yes	0.61*** (0.571–0.647)	0.63*** (0.581–0.680)	0.57*** (0.509–0.628)	0.57*** (0.525–0.612)	0.69*** (0.615–0.767)
Entitlements					
Card holding					
APL card®					
BPL card	1.32*** (1.229–1.425)	1.24*** (1.128–1.366)	1.55*** (1.371–1.748)	1.30*** (1.191–1.424)	1.52*** (1.324–1.741)
Antyodaya card	1.35*** (1.197–1.512)	1.32*** (1.127–1.541)	1.50*** (1.252–1.793)	1.38*** (1.205–1.579)	1.39*** (1.089–1.766)
No card/other	0.90** (0.819–0.992)	0.86** (0.765–0.974)	0.92 (0.782–1.090)	0.91 (0.808–1.027)	0.87* (0.734–1.023)
Health insurance coverage					
No®					
Yes	0.87*** (0.802–0.934)	0.95 (0.859–1.046)	0.79*** (0.699–0.889)	0.85*** (0.776–0.930)	0.94 (0.810–1.080)
Receiving pension					
No®					
Yes	0.52*** (0.459–0.580)		NA		
State-level fixed effects[a]			Yes		

Note: [a]State-level fixed effects are controlled for in each specification; *p<0.05, **p<0.01, *** p<0.001; ®: Reference

MPCE: monthly per capita consumption expenditure; APL: above poverty line; BPL: below poverty line

Antyodaya card: a government card that provides highly subsidized food to the poorest families in India

0.138–0.180), and the reverse is true for males, i.e., chances to working are lower for rural males than for urban males (Table 2).

Older adults in the middle three MPCE quintiles are significantly more likely to work than the richest 20% of the population. Compared to those in the richest quintile, older adults in the second-lowest quintile (the "poor" older adults) and the second-highest quintile (the "richer" older adults) are 12% to 19% more likely to work, respectively. The corresponding AORs for males and females show that females in lower MPCE quintiles are more likely to work than their male counterparts. The middle classes in urban areas are highly likely to work after age 60 (AOR: 1.33; p-value<0.01; 95% CI: 1.11–1.60) as compared with the corresponding rural population.

Health and Entitlement Factors The presence of chronic disease conditions among older adults influence their choice to work. Older adults with at least one chronic disease (such as lung disease, heart disease, bone or joint disease, and diabetes) are 39% less likely to work than their disease-free counterparts (AOR: 0.61; p-value<0.01; 95% CI: 0.571–0.646). For both older males and females, better health status significantly determines engagement in work. Nevertheless, chronic disease is a stronger predictor of work status in rural areas than in urban areas, i.e., those with chronic diseases in rural areas are less likely to work after age 60 (AOR: 0.57; p-value<0.01; 95% CI: 0.525–0.612) than those in urban areas (AOR: 0.69; p-value<0.01; 95% CI: 0.615–0.767).

BPL card holder status among older adults is a substantial source of variance in the propensity to work. BPL cardholders are 36% more likely to work than APL cardholders, irrespective of gender. Similarly, *Antyodaya* cardholders (i.e., the poorest families in India who receive highly subsidized food) are 38% more likely to work than APL cardholders. The economic divide in the population as revealed by cardholding status is reflected in urban and rural BPL and *Antyodaya* cardholders being much more likely to work after age 60 than APL cardholders. Health insurance coverage is another key predictor of working status among older adults. Those with health insurance are less likely to work (AOR: 0.87; p-value<0.01; 95% CI: 0.81–0.943) than those who do not have health insurance. The trend for older adults receiving pensions is similar: they are 48% (AOR: 0.52; p-value<0.01; 95% CI: 0.459–0.580) less likely to work than those who do not receive a pension.

Interaction Effects Table 3 shows that compared with the richest 20%, older adults across the remaining MPCE quintiles are highly likely to work beyond age 60. Table 4 shows that with increasing age, the odds of working sharply decrease at a similar rate across MPCE quintiles. For instance, those aged 70–79 and 80+ are 70% and 90% less likely to work, respectively, than 60–69-year-olds across the MPCE quintiles. This universally decreasing propensity to work with increasing age suggests that age dominates economic status in determining the propensity to work.

Table 4 presents the interaction between MPCE quintile and disease status (with/without chronic disease) and between MPCE quintile and gender on current work

Table 3 Adjusted odds ratio showing age effects on current work status by MPCE quintile in India, LASI Wave 1, 2017–18

MPCE × Age	AOR	95% CI	
Poorest x 60–69®			
Poorest x 70–79	0.32***	0.27	0.37
Poorest x 80+	0.08***	0.06	0.11
Poorer x 60–69®			
Poorer x 70–79	0.39***	0.33	0.44
Poorer x 80+	0.10***	0.07	0.13
Middle x 60–69®			
Middle x 70–79	0.38***	0.33	0.44
Middle x 80+	0.13***	0.10	0.17
Richer x 60–69®			
Richer x 70–79	0.42***	0.36	0.49
Richer x 80+	0.11***	0.08	0.15
Richest x 60–69®			
Richest x 70–79	0.31***	0.26	0.37
Richest x 80+	0.14***	0.10	0.19

Note: All other variables within the study framework are controlled; ®: Reference; *p<0.05, **p<0.01, *** p<0.001; MPCE: monthly per capita consumption expenditure; AOR: adjusted odds ratio

Table 4 Adjusted odds ratio showing effects of MPCE on current work status by chronic disease and gender interaction among older adults, India, LASI Wave 1, 2017–18

MPCE × Disease	AOR	95% CI		MPCE × Gender	AOR	95% CI	
Poorest x without chronic disease	1.23***	1.10	1.38	Poorest x Male	4.92***	4.29	5.64
Poorest x with chronic disease	0.66***	0.57	0.77	Poorer x Male	5.22***	4.55	5.98
Poorer x without chronic disease	1.29***	1.15	1.44	Middle x Male	5.36***	4.68	6.15
Poorer x with chronic disease	0.74***	0.64	0.85	Richer x Male	5.41***	4.72	6.21
Middle x without chronic disease	1.26***	1.12	1.41	Richest x Male	4.31***	3.75	4.96
Middle x with chronic disease	0.72***	0.63	0.83	Poorest x Female	1.2**	1.05	1.39
Richer x without chronic disease	1.26***	1.12	1.41	Poorer x Female	1.29***	1.12	1.49
Richer x with chronic disease	0.76***	0.66	0.87	Middle x Female	1.18**	1.02	1.36
Richest x with chronic disease	0.63***	0.55	0.72	Richer x Female	1.2**	1.04	1.39
Richest x without chronic disease®				Richest x Female®			

Note: All other variables within the study framework are controlled.

MPCE: monthly per capita consumption expenditure

®: Reference; *p<0.05, **p<0.01, *** p<0.001; AOR: adjusted odds ratio

status, mainly to explore whether economic conditions or other factors like health and gender dominate the decision to work at older ages. The estimated AOR shows that disease-free older adults are almost equally likely to work across MPCE quintiles. Older adults in the richest MPCE quintile with chronic disease are the least likely to work (AOR: 0.63; p-value<0.01; 95% CI: 0.55–0.72), followed by the

poorest older adults with chronic disease (AOR: 0.66; p-value<0.01; 95% CI: 0.57–0.77). Males, regardless of MPCE quintile, are highly likely to continue to work after age 60, whereas the probability of females working at that age is quite low regardless of economic status. Of all the interaction categories of gender and MPCE, males in the middle three MPCE quintiles have substantially higher odds of labor force participation.

Discussion

This paper present insights on the characteristics and determinants of the work status of older adults in India based on recently published data from the Longitudinal data from the Longitudinal Ageing Study in India (LASI, 2020), encompassing representative samples from each state (except Sikkim).

The employment profile of older adults clearly reflects the predominance of agricultural and unorganized work and low social security coverage. Although the propensity to work declines with age, 36% of older adults and almost half of the males work beyond age 60. The study reveals that older adults, across wealth quintiles, are highly likely to work in India when compared to the richest 20% of older adults. A major proportion of older adults are engaged in the unorganized sector: two-thirds work in the primary sector (agriculture and allied services), only 5% reported full-time jobs, and just 6% of older adults are covered by pensions or provident fund schemes. One in three 60+ older adults are engaged in work because the majority do not have retirement benefits or social security and thus need to work as long as possible.

Contrary to the popular belief that Indian adults generally leave the workforce during their early 60s, our study finds that Indian adults start withdrawing from the workforce in their 50s. A steep decline in participation occurring among 60–70-year-olds, as the official retirement age for those employed in the formal sector in India ranges from 58 to 65 (Dhar, 2014). This trend could be due to the unorganized nature of employment, scarcity of satisfactory jobs, economic support of adult children, health constraints faced by older adults, and many other factors that demand further research.

A larger proportion of men aged 60+ are engaged in work than 60+ women. Females are less likely to work in India because women's traditional duties confine them to the household. Furthermore, female labor force participation has an inverse relationship with urbanization and development in India (Lahoti & Swaminathan, 2016; Sikarwar et al., 2020). However, vulnerable (single, poor, or rural) females are significantly more likely to work than males of the same group, indicating a lack of social security for this population of older females. Women's economic vulnerability increases with age for several reasons. First, low labor force participation in prime working years leads to insufficient resources in old age for day-to-day maintenance (Bhalla & Kaur, 2011). Second, the incidence of poverty is higher among older widows as compared to their male counterparts (Chakraborti, 2004; Sen & Noon, 2007). Immediately after her husband's death, a woman may face financial problems,

including housing insecurity and loss of assets and cash (DiGiacomo et al., 2015), that force her to take up employment. Thus, poverty intensifies with age for women because they often outlive their spouses (Burn et al., 2020). Third, in the absence of a husband, if older women fail to contribute economically to their households in terms of wage earnings or real estate, they are likely to face neglect from household members (Chen, 1997). Due to the loss of an income earner of the household, many studies extensively document the higher chances of work among widows (Chen & Drèze, 1992; Jensen, 2005; Das, 2016). Owing to poverty shocks, widowed women go to work and earn for the household whereas the effect of widowhood is negative if the widow is living with by adult children in the household (Chen & Bhaduri, 2000; Reed, 2020). Hence, a complex interplay of multiple factors like poverty and neglect means that poor, rural, and widowed/separated/divorced women are more likely to work than their equivalent male counterparts.

Older adults who have more education and live with their children are less likely to work beyond age 60. They are almost equally likely to work across wealth categories, indicating a dire need for economic security across socioeconomic classes and a rejection of the hypothesis that only the poor work beyond age 60 in India. Interestingly, the tendency to work is highest in the middle class, especially among males. The lower propensity to work among the richest and most educated classes could be either due to declining job prospects of the well-educated in India (Vyas, 2020) or sufficient savings and social security pensions that they have.

The possible explanations for not willing to engage in work among older parents who co-reside with their children are: 1) taking care of older adults is still the responsibility of the family in India; 2) as evident from the LASI report, about 20% of older adults living with children look after their grandchildren as compared to 10% of the older adults who stay without children (LASI, 2020). Thus, older parents who are living with someone may contribute to household work or family care and therefore choose not to work outside.

A negative association between poor health condition and labor force participation is well established (Schofield et al., 2008; Leijten et al., 2014; Giang & Nguyen, 2016; Schofield et al., 2017; Giang & Le, 2018). Those with at least one chronic disease (i.e., lung disease, heart disease, bone disease, or diabetes) are 39% less likely to work in India. Interestingly, disease condition in rural areas is a major predictor of work status, i.e., the rural older adults who suffer from chronic ailments are 43% less likely to work than their disease-free rural counterparts, whereas the urban older adults with chronic ailments are 31% less likely to work than their disease-free rural counterparts. This rural-urban difference could be due to the rural population's limited access to health facilities, resulting in untreated ailments that prevent the rural population from engaging in work. The rural-urban disparity might also be due to the high cost of urban living, which may push urban older adults to keep engaged in work. In general, rural older adults are more likely to work as compared to their urban counterparts, due to the opportunity to be engaged in farming and allied activities as long as possible. However, deeper analysis of the study indicates that older adults in urban areas are highly likely to work across wealth categories when compared with rural counterparts. This trend reflects the higher cost of living in urban areas (Schofield et al., 2017). In fact, older adults living in rural areas have worse

self-rated health compared with those in cities (Chen et al., 2015; Patel et al., 2021; Srivastava et al., 2021). Another possible explanation is the better subjective health of urban population. For instance, 42.2% of older adults residing in urban areas consider their self-rated health to be good compared to 37.2% of their rural counterparts (LASI, 2020). In addition, older adults who are engaged in unskilled, manual occupations in rural agrarian economy are more susceptible to poor health (Wise, 1997; Case & Deaton, 2007; Maurya et al., 2020; Patel et al., 2020; Tipayamongkholgul et al., 2021), which might adversely affect their ability to work as they age.

A key question is whether work in old age indicates deprivation in India. The answer is both 'yes' and 'no.' The affirmative response is mainly due to the engagement of older Indian adults in part-time jobs, in agriculture, and in the unorganized sector. Further, working older adults earn much less than the average monthly pension received by the officially retired population. In addition, with educational improvement, familial support and social security, people are generally less likely to work in old age, indicating that working in India is perhaps due to financial insecurity. However, it should also be noted that healthy older adults are highly likely to work beyond the age of 60, possibly indicating a desire to work. Further, older adults are almost equally likely to work across wealth levels in urban India, rejecting the hypothesis that only the poor work beyond age 60. The propensity to work decreases with age at similar rates across wealth levels, suggesting that age dominates economic status in determining the propensity to work. So, older adults in India continue to work subject to their physical capacity, which is highly age-dependent. This practice is very much in tune with the healthy and active ageing promoted by the World Health Organization. Evidence suggests that elderly employment has positive effects on youth employment, on the wellbeing of older workers, and on economies and societies (Jasmin & Rahman, 2021).

This paper has some limitations. As LASI avoids direct inquiry into motivations to work, as highlighted in Fasbender et al. (2016), the paper could not explore the employment decision-making process (Fasbender et al., 2016). Further, MPCE status in LASI could be an endogenous factor, as people in higher MPCE quintiles are likely to be highly educated, with higher insurance coverage, and greater access to health care. However, exploration of that endogeneity is beyond the scope of the study.

Conclusion

This paper explores the important issue of the labor force participation of older adults in India via recently released data from the large-scale nationally representative Longitudinal gitudinal Ageing Study in India (LASI, 2020). The paper reaffirms that economic participation and good health are highly associated in India and finds that a large proportion of the older adult population is working, irrespective of overall economic condition. Support for active ageing through investment in geriatric care services and health promotion policies could improve the health of older adults and help them to continue working as long as they want to or need to. To achieve this goal, key policy interventions relating to employment and health care should

be interconnected. Though the Government of India recently implemented policy initiatives to expand health insurance and other social security benefits, special consideration is needed for the wellbeing of the vulnerable older adult populations, such as widowed/separated women, older adults who live alone, and ailing older adults. Additionally, in order to encourage older adults to remain in the labor market, much greater support is needed, like reducing inequalities in access to healthcare systems, affordable health care, dealing with ageism, training older adults with new technologies for upskilling and reskilling, creating jobs to harness the economic potential of the older population, etc. Our results provide evidence for the pursuit of an older adult policy that focuses on healthy and economically active ageing, particularly in the context of poor social security coverage and the unorganized nature of work, as healthy populations continue to engage in work.

Acknowledgments We would like to express our sincere gratitude to Tora Thurisaz, Arunika Agarwal and Leo Zucker for their edits and comments that helped us to improve the paper. Thanks to all coordinators, research officers, state agencies, investigators of LASI and every respondent for their incredible efforts in generating the wealth of data.

Declarations

Competing Interests The authors declare that they have no competing interests.

References

Adhikari, R., Soonthorndhada, K., & Haseen, F. (2011). Labor force participation in later life: Evidence from a cross-sectional study in Thailand. *BMC geriatrics,* ***11***(1), 15.

Angel, R. J., Frisco, M., Angel, J. L., & Chiriboga, D. A. (2003). Financial strain and health among elderly Mexican-origin individuals. *Journal of health and Social Behavior*, 536–551.

Asher, M. (2009). Pension plans, provident fund schemes and retirement policies: India's social security reform imperative. *ASCI Journal of Management,* ***39***(1), 1–18.

Bang, K.-S., Tak, S. H., Oh, J., Yi, J., Yu, S.-Y. and Trung, T. Q. (2017). "Health status and the demand for healthcare among the elderly in the rural Quoc-Oai District of Hanoi in Vietnam." BioMed research international **2017**.

Bass, S. A. (2009). Toward an integrative theory of social gerontology. *Handbook of theories of aging,* ***2***, 347–374.

Bhalla, S. and Kaur, R. (2011). "Labour force participation of women in India: Some facts." Some Queries, LSE Asia Research Center Working Paper **40**.

Bloom, D. E., Mahal, A., Rosenberg, L., & Sevilla, J. (2010). Economic security arrangements in the context of population ageing in India. *International Social Security Review,* ***63***(3-4), 59–89.

Börsch-Supan, A., & Ferrari, I. (2020). *Old-Age Labor Force Participation in Germany: What Explains the Trend Reversal among Older Men and the Steady Increase among Women?* (Vol. 5). University of Chicago Press.

Bowler, M. (1999). Women's earnings: An overview. *Monthly Lab. Rev.,* ***122***, 13.

Brinda, E., Rajkumar, A., Enemark, U., Prince, M., & Jacob, K. (2012). Nature and determinants of out-of-pocket health expenditure among older people in a rural Indian community. *International Psychogeriatrics,* ***24***(10), 1664.

Burn, I., Button, P., Figinski, T. F., & McLaughlin, J. S. (2020). Why retirement, Social Security, and age discrimination policies need to consider the intersectional experiences of older women. *Public Policy & Aging Report,* ***30***(3), 101–106.

Case, A., & Deaton, A. (2007). *Broken Down by Work and Sex: How Our Health Declines* (Vol. 6). University of Chicago Press.
Chakraborti, R. D. (2004). *The Greying of India: Population Ageing in the Context of Asia*. Sage Publications India Pty Ltd.
Chattopadhyay, A. (2004). Population policy for the aged in India. *Economic and Political Weekly*, 4694–4696.
Chaudhary, R. and Verick, S. (2014). Female labour force participation in India and beyond, ILO New Delhi.
Chen, M. and Drèze, J. (1992). "Widows and health in rural north India." Economic and Political weekly: WS81-WS92.
Chen, M. A. (1997). Listening to widows in rural India. *Women: A cultural review,* ***8***(3), 311–318.
Chen, M. A., & Bhaduri, A. (2000). *Perpetual mourning: Widowhood in rural India*. Oxford University Press.
Chen, S. H., Cheng, H. Y., Chuang, Y. H., & Shao, J. H. (2015). Nutritional status and its health-related factors among older adults in rural and urban areas. *Journal of advanced nursing,* ***71***(1), 42–53.
Clark, R. L., & Anker, R. (1993). Cross-national analysis of labor force participation of older men and women. *Economic Development and Cultural Change,* ***41***(3), 489–512.
Das, D. (2016). Enrollment, educational expenditures and work among one-parent children in India. *Marriage & Family Review,* ***52***(1-2), 196–215.
Das, M., & Desai, S. (2003). *Why are educated women less likely to be employed in India?: Testing competing hypotheses*. Social Protection.
Dhar, A. (2014). Workforce participation among the elderly in India: Struggling for economic security. *The Indian Journal of Labour Economics,* ***57***(3), 221–245.
Dhillon, P., & Ladusingh, L. (2013). Economic activity in post retirement life in India. *Asia-Pacific Population Journal,* ***26***(3), 55–71.
DiGiacomo, M., Lewis, J., Phillips, J., Nolan, M., & Davidson, P. M. (2015). The business of death: a qualitative study of financial concerns of widowed older women. *BMC women's health,* ***15***(1), 36.
Fasbender, U., Wang, M., Voltmer, J.-B., & Deller, J. (2016). The meaning of work for post-retirement employment decisions. *Work, aging and retirement,* ***2***(1), 12–23.
Giang, L. T., & Le, D. D. (2018). Working beyond the traditional retirement ages: How does chronic health condition influence older workers in Vietnam. *Ageing International,* ***43***(2), 158–173.
Giang, T. L., & Nguyen, T. H. D. (2016). Determinants of work decisions among older people in rural Vietnam. *Journal of Population Ageing,* ***9***(4), 289–303.
Gupta, I., Dasgupta, P., & Sawhney, M. (2001). *Health of the elderly in India: Some aspects of vulnerability*. Institute of Economic Growth.
Haider, S. J., & Loughran, D. S. (2011). *Elderly Labor Supply: Work Or Play?* (Vol. 6). Cornell University Press.
Hao, Y. (2008). Productive activities and psychological well-being among older adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences,* ***63***(2), S64–S72.
India, S. S.-E. S. (2011). *Government of India*. Ministry of Statistics and Programme Implementation Central Statistics Division.
Jasmin, A. F. and Rahman, A. A. (2021). "Does Elderly Employment Reduce Job Opportunities for Youth?".
Jensen, R. T. (2005). "Caste, Culture, and the Status and Well-Being of Widows."
Jeon, C. Y., Lokken, R. P., Hu, F. B., & Van Dam, R. M. (2007). Physical activity of moderate intensity and risk of type 2 diabetes: a systematic review. *Diabetes care,* ***30***(3), 744–752.
Kanfer, R., Beier, M. E., & Ackerman, P. L. (2013). Goals and motivation related to work in later adulthood: An organizing framework. *European Journal of Work and Organizational Psychology,* ***22***(3), 253–264.
Kumar, S., & Kumar, K. A. (2019). Living arrangement and economic dependency among the elderly in India: a comparative analysis of EAG and non EAG states. *Ageing International,* ***44***(4), 352–370.
Kumar, S. V. (2003). Economic security for the elderly in India: An overview. *Journal of aging & social policy,* ***15***(2-3), 45–65.
Kwak, Y., & Kim, Y. (2019). Quality of life and subjective health status according to handgrip strength in the elderly: a cross-sectional study. *Aging & mental health,* ***23***(1), 107–112.
Lahoti, R., & Swaminathan, H. (2016). Economic development and women's labor force participation in India. *Feminist Economics,* ***22***(2), 168–195.
Larsen, M., & Pedersen, P. J. (2017). Labour force activity after 65: what explain recent trends in Denmark, Germany and Sweden? *Journal for labour market research,* ***50***(1), 15–27.

LASI, I (2020). Longitudinal Ageing Study in India (LASI) Wave 1, 2017-18, India Report, International Institute for Population Sciences, Mumbai. International Institute for Population Sciences (IIPS), Mumbai, India.

Leijten, F. R., van den Heuvel, S. G., Ybema, J. F., van der Beek, A. J., Robroek, S. J. and Burdorf, A. (2014). "The influence of chronic health problems on work ability and productivity at work: a longitudinal study among older employees." Scandinavian journal of work, environment & health: 473-482.

Lena, A., Ashok, K., Padma, M., Kamath, V., & Kamath, A. (2009). Health and social problems of the elderly: A cross-sectional study in Udupi Taluk, Karnataka. *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine, **34***(2), 131.

Maurya, P., Sinha, D., & Chattopadhyay, A. (2020). Non-Communicable Disease among Men in India: How far Occupation and Health Behaviour Matter? *Demography India, **49***(2), 76–88.

Mohanty, S. K., Chauhan, R. K., Mazumdar, S., & Srivastava, A. (2014). Out-of-pocket expenditure on health care among elderly and non-elderly households in India. *Social indicators research, **115***(3), 1137–1157.

Patel, R., Marbaniang, S. P., Srivastava, S., Kumar, P., Chauhan, S., & Simon, D. J. (2021). Gender differential in low psychological health and low subjective well-being among older adults in India: With special focus on childless older adults. *Plos one, **16***(3), e0247943.

Patel, S., Ram, U., Ram, F., & Patel, S. K. (2020). Socioeconomic and demographic predictors of high blood pressure, diabetes, asthma and heart disease among adults engaged in various occupations: evidence from India. *Journal of biosocial science, **52***(5), 629–649.

Peracchi, F., & Welch, F. (1994). Trends in labor force transitions of older men and women. *Journal of Labor Economics, **12***(2), 210–242.

Quinlan, M. and Mayhew, C. (1998). The implications of changing labour market structures for occupational health and safety management. Policies for OHSMS and Workplace Change Conference, Amsterdam.

Rajan, S. I. (2010). "Demographic ageing and employment in India." Bangkok: International Labour Organization, Regional Office for Asia and the Pacific.(ILO Asia-Pacific Working paper series).

Reddy, A. B. (2016). Labour force participation of elderly in India: patterns and determinants. *International Journal of Social Economics, **43***(5), 502–516.

Reed, M. N. (2020). The labor force participation of Indian women before and after widowhood. *Demographic Research, **43***, 673–706.

Schirle, T. (2008). Why have the labor force participation rates of older men increased since the mid-1990s? *Journal of labor economics, **26***(4), 549–594.

Schofield, D. J., Callander, E. J., Kelly, S. J., & Shrestha, R. N. (2017). Working beyond the traditional retirement age: the influence of health on Australia's older workers. *Journal of aging & social policy, **29***(3), 235–244.

Schofield, D. J., Shrestha, R. N., Passey, M. E., Earnest, A., & Fletcher, S. L. (2008). Chronic disease and labour force participation among older Australians. *Medical Journal of Australia, **189***(8), 447–450.

Schwingel, A., Niti, M. M., Tang, C., & Ng, T. P. (2009). Continued work employment and volunteerism and mental well-being of older adults: Singapore longitudinal ageing studies. *Age and ageing, **38***(5), 531–537.

Selvaraj, S., Karan, A. and Madheswaran, S. (2014). Elderly Workforce Participation, Wage Differentials and Contribution to Household Income. Population Ageing in India. G. Giridhar, K. M. Sathyanarayana, K. S. James, M. Alam and S. Kumar. Cambridge, Cambridge University Press**:** 42-73.

Sen, M., & Noon, J. (2007). *Living arrangement: How does it relate to the health of the elderly in India*. Annual Meeting of the Population Association of America.

Sikarwar, A., A. Chattopadhyay, A. K. Jaiswal and R. Rani (2020). "Devaluation of female work participation with urbanization: a case of peri-urban Ahmedabad." GeoJournal.

Silver, M. P., Dass, A. R., & Laporte, A. (2020). The effect of post-retirement employment on health. *The Journal of the Economics of Ageing, **17***, 100180.

Srivastava, S., Chauhan, S., & Patel, R. (2021). Socio-economic inequalities in the prevalence of poor self-rated health among older adults in India from 2004 to 2014: a decomposition analysis. *Ageing International, **46***(2), 182–199.

Statistics, M. o. and C. S. O. Programme Implementation. (2016). *Elderly in India-Profile and Programmes 2016*. Delhi.

Tipayamongkholgul, M., Kongtip, P., & Woskie, S. (2021). Association between occupations and selected noncommunicable diseases: A matched case-control among Thai informal workers. *Journal of Occupational Health, **63***(1), e12249.

UNDESA (2017). "World Population Prospects: the 2017 revision, key findings and advance tables." Working Paper No. ESA/P/WP/248.

Vyas, M. (2020). "Labour force shrinks in September." Retrieved 4th June, 2021, from https://www.cmie.com/kommon/bin/sr.php?kall=warticle&dt=2020-10-02%2018:46:31&msec=080.

Wise, J. (1997). Plague case shows signs of multidrug resistance, British Medical Journal Publishing Group.

Authors and Affiliations

Aparajita Chattopadhyay[1] · Junaid Khan[1] · David E. Bloom[2] · Debashree Sinha[1] · Itishree Nayak[3] · Sangeeta Gupta[1] · Jinkook Lee[4] · Arokiasamy Perianayagam[1]

Aparajita Chattopadhyay
aparajita@iipsindia.ac.in

Junaid Khan
junstatiips@gmail.com

David E. Bloom
dbloom@hsph.harvard.edu

Itishree Nayak
itishreenayak1690@gmail.com

Sangeeta Gupta
sangeetagupta.lasi@gmail.com

Jinkook Lee
jinkookl@usc.edu

Arokiasamy Perianayagam
parokiasamy@gmail.com

1 International Institute for Population Sciences, Mumbai, India

2 Harvard T.H. Chan School of Public Health, Boston, MA, USA

3 National Institute of Medical Statistics (NIMS), Indian Council of Medical Research, New Delhi, India

4 University of Southern California, Los Angeles, CA, USA