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Original Article

Prevalence and Correlates of Functional Disability among Community-Dwelling Older Adults in India: Results of a National Survey in 2017-2019

Supa Pengpid [1, 2], Karl Peltzer *[2, 3]

[1.] ASEAN Institute for Health Development, Mahidol University, Salaya, Phutthamonthon, Nakhon Pathom, Thailand
[2.] Department of Research Administration and Development, University of Limpopo, Polokwane, South Africa
[3.] Department of Psychology, College of Medical and Health Science, Asia University, Taichung, Taiwan

* **Corresponding Author:** Department of Research Administration and Development, University of Limpopo, Polokwane, South Africa. **Tel:** + 0852471427**, Email address**: kfpeltzer@gmail.com

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ABSTRACT

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Introduction: Aging may increase physical or functional limitations, and India has a rapidly aging population. This study aimed to assess the prevalence and correlates of difficulties with Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) among older adults in India.

Methods: The cross-sectional sample consisted of 31,477 individuals (≥ 60 years) from the Longitudinal Aging Study in India, Wave 1 in 2017-2019. Functional disability was measured with 6 items of ADL and 7 items of IADL.

Results: The prevalence of at least one ADL difficulty was 23.8%, at least one IADL difficulty was 48.4%, and at least one ADL/IADL difficulty was 52.0% (43.2% among men, and 60.0% among women). In the adjusted logistic regression analysis, older age, and food insecurity were positively and male sex and having a health insurance were negatively associated with both ADL and IADL difficulty. No formal education was positively and urban residence and married were negatively associated with IADL difficulty. Poor or faith self-rated health status, chronic conditions, insomnia symptoms, major depressive disorder, physical pain, poor distant vision, poor near vision and poor word recall were positively associated with both ADL and IADL difficulty. Body underweight and hearing or ear problem increased the odds for IADL difficulty. In univariate analysis, vigorous physical activity and higher social network were protective against both ADL and IADL difficulty.

Conclusion: Almost one in four older adults in India had ADL difficulty and almost half had IADL difficulty and several associated factors were identified that can be targeted in interventions.

Keywords: Functional Disability, Aged, India**,** Activities of Daily Living

Introduction

Difficulties with Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) are common among older adults (≥ 60 years). The World Health Survey in 57 countries found among men and women aged 50 years and older, the prevalence of functional disability (based on eight health and functioning domains) was 23.8% and 40.1% respectively, and for those 80 years and older, the prevalence was 45.5% among men and 68.9% among women (1). In six low- and middle-income countries, including India in 2007, the prevalence of ADL difficulty was 27.7% among 60-69 year-olds and 44% among those 70 years and older (2). Among older adults (≥ 65 years) in

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Ireland the prevalence of ADL difficulty was 13%, IADL difficulty 11% and combined ADL/IADL difficulties was 18% (3), in Southeastern Poland (≥ 60 years) the prevalence of ADL difficulty was 17.1% and IADL difficulty 35.8% (4), in seven provinces in China, the prevalence of ADL/IADL disability among 60 years and older persons was 7.0% (5), in Brazil (≥ 60 years) the prevalence of ADL difficulty and IADL difficulty was 7.3% and 17.3% (6), and in Malaysia (≥ 60 years) any limitations in ADL and IADL was 17.0% and 42.9% respectively (7). Among community dwellers (≥ 60 years, N = 400) in North India, the prevalence of ADL and IADL difficulty was 5.5% and 21.8%, respectively (8), and among 246 persons (≥ 60 years) in rural West Bengal, 32.4% and 59.3% had ADL and IADL difficulty, respectively (9). "Physical disability is a major adverse health outcome associated with aging and major underlying causes of physical disability are chronic diseases." (10). We are not aware of recent national prevalence data and correlates of ADL and IADL difficulty among older persons (≥ 60 years) in India.

Factors associated with ADL and IADL difficulty may include, as reviewed in Conolly et al. (3) and Phaswana et al. (11), female sex, increasing age, lower socioeconomic status, chronic conditions, high and low body mass index (BMI), poor self-rated health, smoking, low social activity, poor self-rated vision, physical pain, physical inactivity, cognitive impairment, poor mental health (such as depressive symptoms) (9, 12), and sleep disorders (12). Limitations of previous studies are that they were conducted a while ago and only assessed limited covariates. This study aimed to assess the prevalence and correlates of prevalence and various correlates of ADL and IADL difficulty among older adults in India in 2017-2019.

Methods

Design and participants

This secondary data analysis utilized data from the cross-sectional and nationally representative Longitudinal Aging Study in India (LASI) Wave 1, 2017-2019; "the overall household response rate is 96%, and the overall individual response rate is 87%" (13). In a household survey, "interview, physical measurement and biomarker data were collected from individuals aged 45 and above and their spouses, regardless of age." (13). In this analysis, we restricted our sample to participants 60 years and older. Specific details on the sampling approach are found elsewhere (13).

Measures

Outcome measure

Functional disability was measured with 6 items of ADL and 7 items of IADL (14, 15). ADL and IADL instruments have been found to have acceptable validity with reference to Indian geriatric population (16). Cronbach alpha for the ADL measure was 0.86 and for the IADL measure 0.88. Responses were "Yes/No."

Exposure variables

Sociodemographic variables consisted of education (none and ≥ 1 years), age group (60 - 69, 70-79 and 80 or more years), sex (male, female), marital status (currently married vs. widowed / divorced/separated / deserted / live-in relationship / never married), residence (rural, urban) and receipt of health insurance. Social network was measured with 11 items, e.g., "Eat-out-of-house (restaurant/hotel)" (13). Responses were coded 1 = daily to at least once a month and 0 = rarely/once a year or never (Cronbach's alpha 0.66).

Food insecurity was sourced from four items, 1) "In the last 12 months, did you ever reduce the size of your meals or skip meals because there was not enough food at your household? (Yes/No), 2) In the last 12 months, were you hungry but didn't eat because there was not enough food at your household? (Yes/No), 3). In the past 12 months, did you ever not eat for a whole day because there was not enough food at your household?, 4) Do you think that you have lost weight in the last 12 months because there was not enough food in your household?" (13). Any positive response to the four questions was scored as one.

Health status variables

Self-rated health status was sourced from the question, "In general, would you say your health is excellent, very good, good, fair, or poor?" (13).

Chronic conditions were sourced from the question, "Has any health professional ever told you that you have…?": 1) " Hypertension or high blood pressure (Yes/No); 2) Diabetes or high blood sugar; 3) Cancer or malignant tumor; 4) Chronic lung disease such as asthma, chronic obstructive pulmonary disease/chronic bronchitis or other chronic lung problems; 5) Chronic heart diseases such as coronary heart disease (heart attack or myocardial infarction), congestive heart failure, or other chronic heart problems; 6) Stroke; 7) Arthritis or rheumatism, Osteoporosis or other bone/joint diseases, and 8) High cholesterol (Yes/No)." (13). Summed responses were trichotomized into 0, 1, or 2 or more chronic conditions.

Insomnia symptoms were assessed with four questions: (1) "How often do you have trouble falling asleep?" (2) "How often do you have trouble with waking up during the night?" (3) "How often do you have trouble with waking up too early and not being able to fall asleep again?" (4) "How often do you feel really rested when you wake up in the morning?". Responses options were "never, rarely (1-2 nights per week), occasionally (3-4 nights per week), and frequently (5 or more nights per week)" (13). Insomnia symptoms were

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coded as "frequently" for the first three symptoms and "never or rarely" for the fourth symptom as one. Participants who reported any of these four symptoms were classified as having sleep problems (17).

Major depressive disorder (MDD) in the past 12 months was assessed with the Health and Retirement Study (HRS) Composite International Diagnostic Interview Short Form (CIDI-SF) (18), using criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM); American Psychiatric Association (19). Study respondents were required to "endorse either anhedonia or depressed mood for most of the day for most of a 2-week period or more," and those who fulfilled this criterion "completed an additional seven symptoms: lost interest, feeling tired, change in weight, trouble with sleep, trouble concentrating, feeling down, and thoughts of death." (20). "Those with a score ≥3 were considered to meet the criteria for having MDD in the previous 12 months; MDD symptomology scores ranged from 0 to 7." (20).

Anthropometry: "Height and weight of adults were measured using the Seca 803 digital scale." (13). BMI was calculated according to Asian criteria: underweight (< 18.5 kg/m^2), normal weight (18.5-22.9 kg/m^2), overweight (23.0-24.9 kg/m^2), class I obesity (25.0-29.9 kg/m^2), and class II obesity (≥ 30.0 kg/m^2)" (21).

Physical pain was defined as "troubled by pain and required some form of medication or treatment for relief of pain." (13).

Vision was assessed with two questions, 1) "How good is your eyesight for seeing things at a distance, like recognizing a person across the street (or 20 meters away), whether or not you wear glasses, contacts, or corrective lenses?" and 2) "How good is your eyesight for seeing things up close, like reading an ordinary newspaper print whether or not you wear glasses, contacts, or corrective lenses?" (13). Response options ranged from very good (1) to very poor (5) and poor near or far vision as defined as "poor or very poor"

Hearing problem was measured with the item. "Have you ever been diagnosed with any hearing or ear-related problem or condition?" (Yes/No) (13).

Falls were assessed with the item, "How many times have you fallen in the last 2 years?" (number) (13).

Vigorous physical activity. "For vigorous activity, respondents were asked about their involvement in running or jogging, swimming, going to a health centre/gym, cycling, digging with a spade or shovel, heavy lifting, chopping, farm work, fast bicycling, and cycling with loads." (13). Responses were trichotomized into 1 = hardly ever/never, 2 = less than twice a week, and 3 = more than once a week (22).

Verbal recall was based on memory functioning of a list of 10 words and defined as 7-10 words good, 4-7 words medium and 0-3 words poor (23).

Data analysis

Descriptive statistics were applied to describe health status, sociodemographic information, and functional disability. Unadjusted and adjusted logistic regression was utilized to assess the predictors of ADL and IADL difficulty, separately. $P < 0.05$ was accepted as significant, missing values were excluded, and no multi-collinearity was found. Statistical analyses were conducted using STATA software version 15.0 (Stata Corporation, College Station, TX, USA), taking the complex study design into account.

Ethical considerations

The study was approved by the "Indian Council of Medical Research (ICMR) Ethics Committee and written informed consent was obtained from the participants" (13).

Results

Participant characteristics

The sample consisted of 31,477 individuals aged 60 years and older from India. Table 1 shows the detailed participant characteristics. The prevalence of at least one ADL difficulty was 23.8%, at least one IADL difficulty was 48.4%, and at least one ADL/IADL difficulty was 52.0% (43.2% among men, and 60.0% among women) (see Table 1).

Functional disability components

The highest ADL difficulty prevalence was using the toilet (17.5%) and getting in or out of bed (12.1%) and the highest IADL difficulty was getting around (29.8%), making telephone calls (28.6%) and managing money (27.6%). All other ADL and IADL items were higher in women than in men (see Table 2).

Associations with ADL and IADL

In the adjusted logistic regression analysis, older age, and food insecurity were positively and male sex and having a health insurance were negatively associated with both ADL and IADL difficulty. No formal education was positively and urban residence and married were negatively associated with IADL difficulty.

Poor or faith self-rated health status, chronic conditions, insomnia symptoms, major depressive disorder, physical pain, poor distant vision, poor near vision and poor word recall were positively associated with both ADL and IADL difficulty. Body underweight and hearing or ear problem increased the odds for IADL difficulty. In univariate analysis, vigorous physical activity and higher social network were protective against both ADL and IADL difficulty (see Table 3).

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Table 1. Sample and functional disability characteristics of older adults (≥ 60 years) in India, 2017-2019

Variable		Sample N (%)	≥ 1 difficulties in ADL* %	≥ 1 difficulties in IADL* %
Sociodemographic factors				
All		31477	23.8	48.4
Age in years	60-69	18979 (58.5)	17.7	40.9
	70-79	9108 (30.2)	27.9	55.1
	80 or more	3390 (11.3)	44.1	69.5
Sex	Female	16371 (52.5)	26.4	56.9
	Male	15106 (47.5)	20.9	38.8
Education	≥ 1 years	14583 (43.5)	20.6	37.4
	No schooling	16894 (56.5)	26.2	56.7
Food insecurity	No	28355 (89.5)	22.4	46.8
	Yes	2747 (10.5)	35.0	61.4
Marital status	Married	19926 (61.6)	20.8	41.5
	Widowed/separated/never married	11545 (38.4)	28.6	59.3
Residence	Rural	20730 (70.5)	24.4	51.6
	Urban	10747 (29.5)	22.2	40.5
Social network	Low	13047 (44.4)	28.2	54.2
	Medium	9096 (28.2)	22.4	47.4
	High	8871 (27.4)	17.9	39.8
Has health insurance		6573 (18.2)	19.5	43.4
Health status	Self-rated health status (poor or fair)	14379 (48.6)	31.6	58.8
Chronic conditions	0	14538 (47.3)	18.7	42.9
	1	9306 (29.5)	25.4	50.1
	2 or more	7536 (23.2)	32.2	57.2
Insomnia symptoms		4357 (14.8)	36.7	61.9
Major depressive disorder		2029 (8.2)	40.9	66.7
Body mass index	Normal	10560 (37.9)	20.4	45.6
	Underweight	6524 (26.9)	24.8	52.9
	Overweight/obesity	10706 (35.3)	21.5	44.6
Physical pain		3858 (13.9)	36.6	63.8
Poor distant vision		6479 (21.2)	36.7	64.2
Poor near vision		6424 (20.7)	35.5	62.2
Hearing/ear problem		3155 (9.6)	33.3	63.8
Falls in past 2 years		3270 (12.6)	27.6	53.0
Vigorous physical activity	Hardly ever/never	69.4 (68.9)	27.2	52.8
	≤ Once a week	7.4 (7.8)	15.6	41.2
	> Once a week	23.2 (23.3)	16.5	38.0
Word recall	Low (0-3)	7575 (25.6)	31.5	58.5
	Medium (4-6)	17917 (59.4)	20.7	46.7
	High (7-10)	4863 (14.9)	15.7	31.6

*ADL=Activities of Daily Living; IADL=Instrumental Activities of Daily Living

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Table 2. Difficulties with Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL)

Variable		All (%)	Male (%)	Female (%)
ADL	Dressing	7.1	6.2	8.0
	Walking across a room	7.5	6.4	8.5
	Bathing	7.4	6.5	8.2
	Eating, difficulties	8.4	7.1	9.5
	Getting in or out of bed	12.1	10.2	13.8
	Using the toilet	17.5	15.4	19.4
IADL	Preparing a hot meal	18.4	16.4	20.3
	Shopping for groceries	23.7	17.8	28.9
	Making telephone calls	28.6	21.5	34.9
	Taking medications	15.7	11.5	19.4
	Doing work around the house or garden	26.5	20.5	31.9
	Managing money	27.6	17.5	36.7
	Getting around	29.8	19.3	39.1

Discussion

In this nationally representative sample of older adults (≥ 60 years) in India in 2017-2019, the prevalence of ADL difficulty (23.8%), IADL difficulty (48.4%) and ADL/IADL difficulty (52.0 %), was higher than in Ireland (≥ 65 years, 13% ADL, 11% IADL, and 18% ADL/IADL) (3), in Southeastern Poland (≥ 60 years, 17.1% ADL and 35.8% IADL) (4), in China (≥ 60 years, 7.0% ADL/IADL disability) (5), in Brazil (≥ 60 years, 7.3% ADL and 17.3% IADL) (6), and in Malaysia (≥ 60 years, 17.0% ADL and 42.9% IADL) (7). Functional disability rates are also higher than in community dwellers in North India (≥ 60 years, 5.5% ADL and 21.8% IADL) (8), but lower than and among 246 persons in rural West Bengal (≥ 60 years, 32.4% ADL and 59.3% IADL) (9), and in the six low- and middle-income countries SAGE study (60-69 years, 27.7% vs 17.7% in this study) (2). This study confirms that ADL/IADL difficulties are significant issues in older Indians, calling for integrating geriatric assessment and care into primary care as well as increased social security measures (9, 24).

While in a study in Northern India, bathing was the most difficult ADL task (20%) and transportation (32%) and shopping (29%) were the most difficult IADL task (8), in this study use of toilet was the most difficult ADL task (17.5), and transportation (getting around) (29.8%) and making telephone calls (28.6%) were the most difficult IADL tasks. In Ireland dressing (9%) was the most difficult ADL (3), while in this study dressing was the least difficult ADL (7.1%), and the most difficult IADL in Ireland was doing household chores (7%) (3), while in this study household or garden work (26.5%) was the fourth difficult IADL. Similarly to our study, in Brazil the two most difficult IADL were transfer (23.0%) and using the toilet (22.1%) (6).

In line with previous research (increasing age (3, 8); female sex (1, 5), rural residence (5, 25), lower education (1, 26), this study showed that increasing age, female sex, lower education and rural residence were associated with ADL and/or IADL difficulty. Possible reasons for the high prevalence of IADL in rural areas may be related to higher rates of no education (56.0% rural and 27.7% urban areas), poor verbal recall (20.6% vs. 11.5%), poor distant vision (15.5% vs 10.0%), food insecurity (9.5% vs. 5.6%) and major depressive disorder (6.9% in rural and 4.7% in urban areas). Receipt of health insurance and in univariate analysis social network were protective against ADL and IADL difficulty, which is consistent with previous research (social contacts) (4). It is of importance to increase membership of health insurance and to facilitate older person's social participation to strengthen their psychophysical condition (4).

Consistent with previous research (poor self-rated health (8), chronic condition (3), pain (3), poor or fair self-rated health and chronic conditions, physical pain, poor distant and near vision were associated with both ADL and IADL difficulty, and hearing or ear problems were associated with IADL difficulty. It is possible that as a result pain, poor self-rated health status, and chronic conditions older adults are limited in performing ADL and/or IADL (8). Exercise and pain and chronic disease management may reduce some of the functional disability (3, 8).

The study found a positive association between insomnia symptoms, MDD, and ADL and IADL difficulty, which is consistent with previous research findings (9, 12), including a longitudinal study (27). However, it is also possible that the relationship between insomnia symptoms, MDD, and functional disability is bidirectional (3).

Nevertheless, early diagnosis and management of sleep and depressive disorders are indicated to reduce their effects (3). In agreement with former investigations (6), falls were in univariate analysis found to increase the odds of ADL and IADL difficulty. In addition, poor memory function was associated with ADL and IADL difficulty which is consistent with former investigations (3). Screening of cognitive status may be indicated to delay the process of disability (3).

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Table 3. Logistic regression with difficulties with Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL)

Variable		ADL 1 plus		IADL 1 plus	
		CrOR (95% CI)	AOR (95% CI)	CrOR (95% CI)	AOR (95% CI)
Sociodemographic factors					
Age in years	60-69	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	70-79	1.80 (1.61, 2.01)***	1.56 (1.36, 1.80)***	1.78 (1.60, 1.97)***	1.45 (1.28, 1.63)***
	80 or more	3.66 (3.14, 4.26)***	2.22 (1.78, 2.76)***	3.29 (2.81, 3.87)***	2.23 (1.74, 2.86)***
Sex	Female	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Male	0.74 (0.67, 0.82)***	0.86 (0.74, 0.99)*	0.48 (0.44, 0.53)***	0.62 (0.55, 0.70)***
No education (base: some)		1.37 (1.24, 1.52)***	0.97 (0.83, 1.13)	2.20 (1.98, 2.44)***	1.56 (1.38, 1.77)***
Food insecurity		1.87 (1.63, 2.14)***	1.56 (1.30, 1.88)***	1.80 (1.59, 2.05)***	1.33 (1.14, 1.56)***
Marital status	Widowed/separated/never married	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Married	0.65 (0.59, 0.73)***	0.97 (0.84, 1.11)	0.49 (0.44, 0.53)***	0.77 (0.68, 0.88)***
Residence	Rural	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Urban	0.88 (0.78, 1.00)	0.91 (0.78, 1.07)	0.64 (0.56, 0.73)***	0.68 (0.60, 0.77)***
Social network	Low	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Medium	0.74 (0.66, 0.82)***	0.99 (0.87, 1.13)	0.76 (0.70, 0.83)***	1.06 (0.95, 1.18)
	High	0.56 (0.48, 0.65)***	0.94 (0.79, 1.12)	0.56 (0.48, 0.65)***	0.98 (0.84, 1.13)
Has health insurance		0.74 (0.65, 0.84)***	0.75 (0.65, 0.96)***	0.78 (0.71, 0.86)***	0.83 (0.74, 0.94)**
Health status					
Self-rated health status (poor or fair)		2.71 (2.41, 3.04) ***	1.78 (1.06, 2.03)***	2.43 (2.21, 2.68)***	1.80 (1.60, 2.02)***
Chronic conditions	0	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	1	1.48 (1.31, 1.67)***	1.17 (1.01, 1.35)*	1.34 (1.22, 1.47)***	1.21 (1.07, 1.35)**
	2 or more	2.07 (1.81, 2.37)***	1.66 (1.41, 1.89)***	1.77 (1.56, 2.02)***	1.70 (1.48, 1.96)***
Insomnia symptoms		2.11 (1.90, 2.36)***	1.40 (1.22, 1.61)***	1.91 (1.72, 2.11)***	1.32 (1.16, 1.50)***
Major depressive disorder		2.56 (2.21, 2.97)***	1.48 (1.20, 1.83)***	2.36 (2.03, 2.74)***	1.38, 1.15, 1.66)***
Body mass index	Normal	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Underweight	1.29 (1.14, 1.46)***	1.14 (0.98, 1.31)	1.34 (1.21, 1.48)***	1.13 (1.00, 1.27)*
	Overweight/obesity	1.07 (0.93, 1.22)	1.06 (0.92, 1.25)	0.96 (0.85, 1.09)	1.02 (0.90, 1.15)
Physical pain		2.08 (1.85, 2.34)***	1.63 (1.41, 1.89)***	2.08 (1.86, 2.33)***	1.60 (1.39, 1.84)***
Poor distant vision		2.28 (2.05, 2.54)***	1.30 (1.13, 1.50)***	2.27 (2.05, 2.51)***	1.23 (1.08, 1.40)**
Poor near vision		2.11 (1.89, 2.35)***	1.24 (1.07, 1.43)**	2.03 (1.83, 2.24)***	1.23 (1.07, 1.40)**
Hearing/ear problem		1.70 (1.40, 2.06)***	1.16 (0.91, 1.46)	2.01 (1.68, 2.40)***	1.40 (1.18, 1.66)***
Falls in the past 2 years		1.38 (1.55, 1.57)***	1.13 (0.98, 1.31)	1.33 (1.19, 1.49)***	1.03 (0.90, 1.17)
Vigorous physical activity	Hardly ever/never	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	≤Once a week	0.50 (0.40, 0.62)***	0.76 (0.56, 1.04)	0.63 (0.54, 0.73)***	0.90 (0.74, 1.10)
	>Once a week	0.53 (0.46, 0.61)***	0.88 (0.76, 1.03)	0.55 (0.49, 0.61)***	0.90 (0.80, 1.02)
Word recall	High (7-10)	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
	Medium (4-6)	1.41 (1,21, 1.63)***	1.14 (0.96, 1.35)	1.90 (1.68, 2.14)***	1.42 (1.23, 1.64)***
	Low (0-3)	2.47 (2.12, 2.89)***	1.60 (1.31, 1.95)***	3.06 (2.70, 3.46)***	1.67 (1.42, 1.96)***

CrOR = Crude Odds Ratio; CI = Confidence Interval; AOR = Adjusted Odd Ratio; ***p < 0.001; **p < 0.01; *p < 0.05

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Participation in vigorous physical activity was found in univariate analysis protective against ADL and IADL difficulty, which is consistent with previous research (3, 4), and shows the importance of promoting physical activity. In line with previous research (26), this study showed that being married was protective against IADL difficulty, and underweight increased the odds of IADL difficulty, which is consistent with some former research (28).

Conclusions

Almost one in four older adults in India had ADL difficulty and almost half had IADL difficulty. Sociodemographic factors (older age, female sex, no education, food insecurity and rural residence), and health status factors (poor or fair self-rated health status, chronic conditions, insomnia symptoms, major depressive disorder, physical pain, poor distant vision, poor near vision, hearing or ear problems, underweight and poor word recall) were identified for ADL and/or IADL difficulty, which can be utilized in targeting interventions.

Study limitations

The study was limited by its cross-sectional design and the self-report of most data collected. Some variables, such as barriers and obstacles in the environment (4), were not assessed in this study but since they influence functional disability, should be included in future research. Since this study only included community-dwelling older adults, persons under institutional care were excluded, the prevalence of functional disability may have been underestimated.

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Availability of data and materials

“The data are available at the Gateway to Global Aging Data (www.g2aging.org).”

Conflict of interests

The authors declare that they have no competing interests.

Authors’ contributions

“All authors fulfill the criteria for authorship. SP and KP conceived and designed the research, performed statistical analysis, drafted the manuscript, and made critical revisions of the manuscript for key intellectual content. All authors read and approved the final version of the manuscript and have agreed to the authorship and order of authorship for this manuscript.”

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