RESEARCH PAPER

Distribution and Determinants of Functional Disability among Elderly in Rural Area of Kancheepuram District - A Cross Sectional Study

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ABSTRACT

Background Population ageing is a major public health concern, particularly in rural settings where healthcare access and social support are limited. Functional disability among the elderly, reflected through activities of daily living (ADL) and instrumental activities of daily living (IADL), is influenced by ageing, chronic diseases, and socioeconomic conditions. Understanding its burden and determinants is essential for planning targeted interventions.

Methods A community-based cross-sectional study was conducted among 350 elderly individuals aged ≥60 years from November 2025 to February 2026 in the rural field practice area of a tertiary care centre in Kancheepuram district, Tamil Nadu. A two-stage cluster sampling technique was employed. Data were collected using a pretested semi-structured questionnaire. Functional disability was assessed using the Katz Index of ADL and the Lawton–Brody IADL scale. Socioeconomic status was determined using the Modified BG Prasad scale (2025). Data were analysed using SPSS version 25 and binary and stepwise logistic regression were performed to identify determinants associated with functional disability.

Results The prevalence of ADL disability was 25%, with 24% having moderate and 1% having severe disability. IADL disability was higher, affecting 52% of participants, including 47% with moderate and 5% with severe disability. Age ≥75 years (AOR≈2.54), diabetes mellitus (AOR≈2.35), and hearing impairment (AOR≈2.32) were significantly associated with ADL disability. Financial dependence (AOR≈1.92), arthritis (AOR≈1.59), and visual impairment (AOR≈1.29) were significant predictors of IADL disability.

Conclusion Functional disability is common among the rural elderly, particularly in instrumental activities. Advancing age, chronic conditions, sensory impairments, and socioeconomic vulnerability significantly influence functional decline. Strengthening primary healthcare-based screening and improving social support systems are essential to promote healthy ageing and maintain independence.

Keywords: Activities of daily living, instrumental activities of daily living, Diabetes mellitus, Hypertension, Functional ability

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Introduction:

Functional disability in elderly refers to the limitations in performing daily activities. Physical, cognitive or sensory problems is the major cause that impedes an older adult's ability to do daily activities.(1) One of the most significant demographic shifts of the twenty-first century is population ageing; life expectancy has increased significantly in recent decades, and by 2023, the average life expectancy worldwide will have surpassed seventy years. Because of this, the proportion and absolute number of older persons are rising globally, and the illness burden is changing from acute infectious ailments to long-term, chronic, and incapacitating disorders.(2)

The key to healthy ageing is functional ability, or the ability to accomplish the things that people value. The World Health Organization stresses functional capacity (rather than illness count alone) as the primary objective for older people and defines healthy ageing as "the process of developing and maintaining the functional ability that enables well-being in older age." (3) People should have the chance to live a long healthy life; however our surroundings can either promote or detract from our health. There is a significant rise in population proportion whose age is 60 years and older. There will be rise in elderly population with 1.4 billion people by 2030 and by 2050 there will be 2.1 billion.(4) (5)

The assessment of functional disability is carried out through individual's ability to accomplish activities of daily living (ADL) such as feeding, dressing, bathing, transferring, toileting, continence and Instrumental activities of daily living(IADL) which includes tasks like grocery shopping, meal preparations, telephone usage, house cleaning, finance handling, own medications responsibility, modes of transportation, laundry; which are the two complementary constructs most frequently used to measure functional disability in older adults. The most popular and reliable tools for these areas are still the Lawton–Brody IADL scale and the Katz Index of ADL.(6) (7)

Rural populations may face additional vulnerabilities because of poorer access to health services, lower literacy and greater socioeconomic disadvantage which can increase the risk of functional decline.(8) Functional status of elderly population is vital, and their disabilities are found to be limited in existing literature done among rural people. Therefore, this present study aims to estimate the prevalence and identify the determinants associated with functional disability among the elderly.

Methodology:

Study setting and population: Elderly individuals aged 60 years and older residing in rural areas of Kancheepuram district under the field practice of the Rural Health Training Centre (RHTC) Serapanancheri were selected for this cross-sectional study and study done from November 2025 to February 2026. Ethical approval was obtained from Institutional Ethics Committee of Tertiary Medical College in Chengalpattu district. RefNo.002/SBMCH/IHEC/2025/2571

Inclusion and Exclusion Criteria:

Elder persons aged ≥60 years who are permanent residents of Kancheepuram district were included. Elder individuals who reside in old age homes, terminally ill patients and patients with known psychiatric disorders were excluded.

Sample size calculation: Prevalence of functional disability among elderly in rural Goa done by Robin et al is 13.7% (9) , $N=Z^2pq/L^2$ where: Z= 1.96(confidence level of 95%), p=13.7%, q=86.3%, L=5% (allowable error). $N= (1.96)^2x13.7x86.3/5x5=182$.After adjusting for non-response of 25% and adding design effect of 1.5, the final sample size is 350.Therefore, data was collected from 350 participants.

Sampling technique:

A two-stage cluster sampling technique was employed for the selection of study participants. The sampling frame consisted of all villages under the seven panchayats served by the Rural Health Training Centre (RHTC), Serapanancheri, Kancheepuram district.

In the first stage, clusters (Villages) were selected using probability proportional to size. A total of 10 clusters were selected. In the second stage, within each selected cluster,35 elderly individuals aged ≥60 years were selected, making a total sample size of 350. A list of households in the selected cluster was obtained. The first household was selected using simple random sampling. Subsequently, households were selected using systemic random sampling until the required number of participants was achieved. In households with more than one eligible elderly individual, all eligible participants were included in the study.

Data collection tool:

Data were carried using a pretested, semi structured questionnaire by face-to-face interview method after receiving the informed consent. The data collection questionnaire included details of sociodemographic characteristics, comorbidities, lifestyle factors and functional status assessment.

Assessment of functional disability of Activity of Daily Living (ADL) using Katz Index of Activities of Daily Living scale (10) and Instrumental Activities of Daily Living (IADL) using Lawton-Brody Instrumental Activities of Daily Living scale (11). Socioeconomic status calculation was done using Modified BG Prasad Scale 2025.(12)

Katz Index of ADL:

The Katz Index of ADL looks at six area of independence: bathing, dressing, using the toilet(toileting), moving around (transferring), feeding and continence. Every task gets a score from 0 to 6, where 1 is “independent” and 0 is “dependent.” The participants were divided into three groups based on their scores: “severe ADL disability” (score of 0),” moderate ADL disability” (score of 1-5) and “no ADL disability” (score of 6). Severe ADL disability was characterised by the inability to execute any of the six activities, moderate ADL disability by the inability to execute fewer than six activities and no ADL disability by the capacity to execute all six activities.(13) (14)

Lawton Brody IADL Scale:

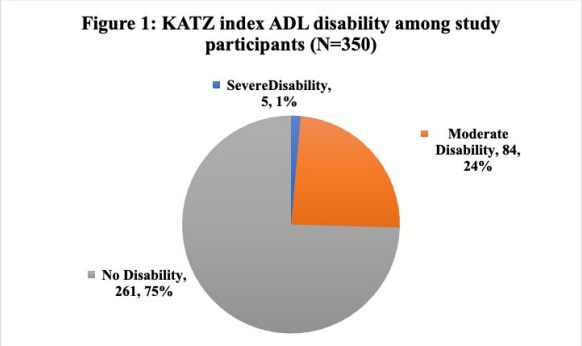
Lawton Brody IADL scale checks how well someone can do things on their own in eight area such as shopping, cooking housekeeping, laundry, transportation, medication management and financial management. For each domain, a score of 1 means "higher function" and a score of 0 means "lower function." For women, scores range from 0 to 8, and for men, scores range from 0 to 5. Women were evaluated in all eight domains, whereas men were generally evaluated in five, omitting food. (15) (16)

Data Analysis:

The data analysis was done using the Microsoft Excel (V2510) and IBM SPSS Statistics for Windows V25.0. The prevalence of ADL and IADL were measured using descriptive statistics. The association between various risk factors and ADL, IADL done using binary logistic regression. Then, stepwise logistic regression models were carried out with all sociodemographic variables in the first step and all clinical variables in the second step. All the analysis was performed using IBM SPSS statistics for windows Version 25.0

Results:

A total of 350 elderly participants were included in the study. Based on the Katz Index of Activities of Daily Living (ADL), 75% (n=261) of the participants had No Disability, 24%(n=84) had Moderate Disability and 1%(n=5) had Severe Disability as shown in Figure 1.



According to the Lawton -Brody Instrumental Activities of Daily Living (IADL) scale,48% (n=167) had no disability, 47% (n=164) had moderate disability and 5%(n=19) had severe disability as shown in Figure 2.

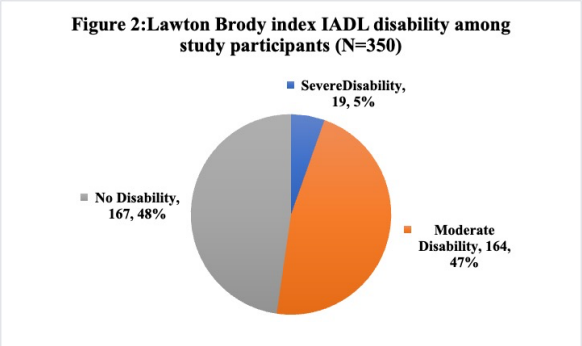


Table 1: Logistic Regression Analysis Showing Stepwise Models for Factors Associated with Functional Disability (ADL) among the Elderly in Rural Kancheepuram District (N=350)

Variables	KATZ INDEX ADL			Adjusted odds Ratio(AOR)	
	Disability Present	No Disability	Unadjusted OR (95% CI)	Model I AOR (95%CI)	Model II AOR (95%CI)
Age					
≥75 years	28	40	2.536(1.449-4.440) 0.001**	2.543(1.431-4.521)**	
<75 years	61	221		Ref.	
Sex					

Male	44	136	1.113(0.688-1.801)	0.927(0.549-1.565)	
Female	45	125		Ref.	
Education					
Illiterate	40	99	0.749(0.460-1.218)	1.127(0.674-1.882)	
Literate	49	162		Ref.	
Financial Dependence					
Yes	57	148	0.735(0.447-1.209)	1.351(0.793-2.302)	
No	32	113		Ref.	
Diabetes Mellitus					
Yes	16	83	2.127(1.167-3.878)*		2.356(1.189-3.670)**
No	73	178			Ref.
Hypertension					
Yes	5	56	4.589(1.776-11.859)*		0.152(0.056-0.411) 0.000
No	84	205			Ref.
Arthritis					
Yes	12	15	0.391(0.176-0.872) 0.022		1.528(0.657-3.555) 0.325
No	77	246			Ref.
Visual Impairment					
Yes	30	78	0.838(0.502-1.400)		0.864(0.422-1.768) 0.688
No	59	183			Ref.
Hearing Impairment					
Yes	29	56	0.565(0.332-0.963) 0.036		2.320(1.120-4.805)*
No	60	205			Ref.

Footnote: OR: Odds Ratio; AOR: Adjusted Odds Ratio; CI: Confidence Interval; Ref. Reference category.

*Significant at p<0.05. **Significant at p<0.01. ***Significant at p<0.001.

Adjusted Model 1 includes sociodemographic variables; Adjusted Model II includes clinical variables.

Logistic regression analysis was performed to identify factors associated with functional disability (KATZ ADL) among the elderly in rural Kancheepuram district in Table 1. In the unadjusted analysis, elderly individuals aged ≥75 years had significantly higher odds of functional disability compared to those aged <75 years (OR = 2.536; 95% CI: 1.449–4.440; p = 0.001). This association remained significant after adjustment for sociodemographic variables in Model I (AOR = 2.543; 95% CI: 1.431–4.521), indicating that advanced age is an independent predictor of functional disability. Sex, education status, and financial dependence were not significantly associated with functional disability in both unadjusted and adjusted analyses.

Among clinical variables, diabetes mellitus was significantly associated with functional disability in both unadjusted (OR = 2.127; 95% CI: 1.167–3.878; p < 0.05) and adjusted Model II analyses (AOR = 2.356; 95% CI: 1.189–3.670; p < 0.01), suggesting that elderly individuals with diabetes had more than twice the odds of disability compared to non-diabetics. Hypertension showed a significant association in unadjusted analysis (OR = 4.589; 95% CI: 1.776–11.859; p < 0.05). However, in the adjusted Model II, the association reversed and remained statistically significant (AOR = 0.152; 95% CI: 0.056–0.411; p < 0.001), indicating a potential confounding effect or interaction with other clinical variables.

Arthritis was significantly associated with lower odds of disability in unadjusted analysis (OR = 0.391; 95% CI: 0.176–0.872; p = 0.022), but this association lost significance after adjustment (AOR = 1.528; 95% CI: 0.657–3.555; p = 0.325). Visual impairment was not significantly associated with functional disability in either unadjusted or adjusted models.

Hearing impairment showed a significant association in unadjusted analysis (OR = 0.565; 95% CI: 0.332–0.963; p = 0.036), but after adjustment in Model II, it became a significant risk factor (AOR = 2.320; 95% CI: 1.120–4.805; p < 0.05), suggesting the presence of confounding factors. Overall, increasing age (≥75 years), diabetes mellitus, and hearing impairment emerged as significant independent predictors of functional disability among the elderly after adjustment, while other variables did not show a statistically significant association.

Table 2 : Logistic Regression Analysis Showing Stepwise Models for Factors Associated with

Functional Disability (IADL) among the Elderly in Rural Kancheepuram District(N=350)					
Variables	LAWTON BRODY IADL			Adjusted odds Ratio(AOR)	
	Disability Present	No Disability	Unadjusted OR (95% CI)	Model I AOR (95% CI)	Model II AOR (95% CI)
Age					
≥75 years	41	27	0.668 (0.390-1.145)	1.529 (0.857-2.725)	
<75 years	142	140		Ref.	
Sex					
Male	74	106	2.560 (1.662-3.941)**	0.522 (0.322-0.846)0.008	
Female	109	61		Ref.	
Education					
Illiterate	80	59	0.703 (0.457-1.083)	1.023 (0.641-1.632)	
Literate	103	108		Ref.	
Marital status					
Divorced /Widowed	64	33	0.244 (0.100-0.599)	1.518 (0.893-2.580)	
Single	9	19	0.493 (0.301-0.809)	0.459 (0.193-1.091)	
married	110	115		Ref.	
Financial Dependence					
Yes	124	81	0.448 (0.290-0.692) 0.000	1.923 (1.197-3.089)**	
No	59	86		Ref.	
Diabetes Mellitus					
Yes	56	43	0.786 (0.492-1.256)		1.296(0.783-2.145) 0.313
No	127	124			Ref.
Hypertension					
Yes	28	33	1.363 (0.783-2.373)		0.768(0.418-1.412) 0.396
No	155	134			Ref.
Arthritis					
Yes	17	10	0.622 (0.276-1.400)		1.597(1.285-2.725) 0.041*
No	166	157			Ref.
Visual Impairment					
Yes	61	47	0.783 (0.496-1.236)		1.286(1.021-2.292) 0.033*
No	122	120			Ref.
Hearing Impairment					
Yes	48	37	0.800 (0.490-1.309)		1.106(0.604-2.024) 0.744
No	135	130			Ref.

Footnote: OR: Odds Ratio; AOR: Adjusted Odds Ratio; CI: Confidence Interval; Ref. Reference category.

*Significant at p<0.05. **Significant at p<0.01. ***Significant at p<0.001.

Adjusted Model 1 includes sociodemographic variables; Adjusted Model II includes clinical variables.

Logistic regression analysis was conducted to identify factors associated with functional disability based on Lawton–Brody IADL among the elderly in rural Kancheepuram district in table 2. In the unadjusted analysis, sex and financial dependence showed

significant associations with IADL disability. Males had significantly higher odds of disability compared to females (OR = 2.560; 95% CI: 1.662–3.941; p < 0.01). However, after adjustment for sociodemographic variables in Model I, male sex was associated with significantly lower odds of disability (AOR = 0.522; 95% CI: 0.322–0.846; p = 0.008), indicating the presence of confounding factors.

Financial dependence was significantly associated with IADL disability in both unadjusted (OR = 0.448; 95% CI: 0.290–0.692; p < 0.001) and adjusted Model I analyses (AOR = 1.923; 95% CI: 1.197–3.089; p < 0.01). After adjustment, financially dependent individuals had nearly twice the odds of disability compared to those who were financially independent. Age and education were not significantly associated with IADL disability in either unadjusted or adjusted analyses.

Regarding marital status, divorced/widowed individuals showed a significant association in unadjusted analysis (OR = 0.244; 95% CI: 0.100–0.599), but this association lost statistical significance after adjustment. Similarly, single individuals had lower odds of disability in unadjusted analysis (OR = 0.493; 95% CI: 0.301–0.809), but the association was not significant in the adjusted model.

Among clinical variables in Model II, arthritis and visual impairment were found to be significant predictors of IADL disability. Elderly individuals with arthritis had higher odds of disability (AOR = 1.597; 95% CI: 1.285–2.725; p = 0.041), and those with visual impairment also had increased odds (AOR = 1.286; 95% CI: 1.021–2.292; p = 0.033).

Diabetes mellitus, hypertension, and hearing impairment were not significantly associated with IADL disability in the adjusted model.

Overall, male sex (protective after adjustment), financial dependence, arthritis, and visual impairment emerged as significant factors associated with IADL disability, while other variables did not show statistically significant associations after adjustment.

Discussion:

The present study assessed the prevalence and determinants of functional disability among elderly individuals in a rural field practice area of Kancheepuram district. Functional disability, assessed using both Katz ADL and Lawton IADL scales, reflects the combined influence of ageing, chronic morbidity, and socioeconomic vulnerabilities.

The overall findings of this study are consistent with global evidence indicating that functional disability among elderly individuals is multifactorial, with contributions from advancing age, chronic diseases, sensory impairments, and socioeconomic factors. A recent global meta-analysis done by Amlak.B.T et.al reported pooled prevalence estimates of 26.07% for ADL disability and 45.15% for IADL disability, highlighting the substantial global burden of functional limitation. (17)

In the present study, advancing age (≥75 years) was identified as a significant predictor of ADL disability (AOR=2.54; 95% CI: 1.43–4.52; p<0.05). This finding is in agreement with a longitudinal cohort study conducted in Korea by Nguyen et al. (18), which demonstrated a marked increase in ADL disability with advancing age, particularly among individuals aged ≥75 years. Similarly, a study from rural Manipur by Singh et al. (19) reported a significant increase in dependency with each incremental rise in age (AOR=1.10; 95% CI: 1.04–1.16). Medhi et al. (20), in a study from Northeast India, also observed a higher risk of disability among individuals aged ≥80 years (OR=3.0). These findings collectively emphasize the progressive decline in physical functioning with advancing age, likely due to physiological ageing, reduced muscle strength, and increasing comorbidities.

Diabetes mellitus emerged as another significant determinant of ADL disability in the present study (AOR=3.35; 95% CI: 1.53–7.36; p<0.01). This observation aligns with findings from a population-based analysis by Das et al. (21), which reported significantly higher odds of ADL disability among elderly individuals with diabetes (OR=3.92; 95% CI: 1.10–14.03). Furthermore, longitudinal evidence from MacNeil et al. (22) suggests that older adults with diabetes are approximately 1.28 times more likely to develop functional limitations. Fong et al. (23) also demonstrated that chronic diseases are associated with earlier onset and faster progression of functional decline. Additionally, findings from LASI data analysis by Halder et al. (24) highlight that chronic conditions are among the strongest predictors of functional disability in rural India. These associations may be attributed to complications such as neuropathy, reduced mobility, and associated sensory impairments.

Hearing impairment was found to be significantly associated with ADL disability (AOR=2.32; 95% CI: 1.20–4.49; p<0.05). Sensory impairments are often under-recognized but play a critical role in maintaining independence among elderly individuals. Hearing loss can impair communication, increase social isolation, and indirectly contribute to functional dependence. Similar findings have been reported by Fong et al. (23), Gopinath et al. (25), and Yévenes-Briones et al. (26),

where sensory deficits were associated with increased disability and reduced quality of life. A systematic review by Lin et al. (27) further confirmed that hearing impairment significantly increases the likelihood of both ADL and IADL dependency.

With respect to IADL disability, financial dependence emerged as a significant factor (AOR=1.92; 95% CI: 1.19–3.09; p<0.01). Financial dependence reflects underlying socioeconomic vulnerability, which may limit access to healthcare, nutrition, and supportive environments. Singh et al. (28), in a study from rural Uttar Pradesh, similarly reported that economically dependent elderly individuals had significantly higher odds of functional disability. National data from the NSS 76th round (29) also indicate that a substantial proportion of elderly individuals with disabilities lack adequate financial and social support systems, underscoring the importance of social determinants in functional health.

Arthritis was significantly associated with IADL disability (AOR=1.59; 95% CI: 1.27–2.75; p<0.05). Musculoskeletal disorders directly affect mobility, dexterity, and the ability to perform complex daily activities such as cooking, shopping, and transportation. Comparable findings have been reported by Halder et al. (24), where arthritis and related conditions were identified as major contributors to functional limitation among elderly individuals.

Visual impairment was also identified as a significant predictor of IADL disability (AOR=1.29; 95% CI: 1.02–2.29; p<0.05). Vision is essential for performing instrumental activities, and its impairment can significantly compromise independence. Similar associations have been reported by Robin et al. (9) in a rural Goa study, where visual impairment was significantly linked to increased functional dependence.

Limitations:

The present study has certain limitations that should be considered while interpreting the findings. Being a cross-sectional study, it does not establish temporal or causal relationships between the identified risk factors and functional disability. The assessment of comorbid conditions relied on self-reported information, which may be affected by recall bias and underreporting, particularly among the elderly. The study was conducted in a single rural field practice area, which may limit the generalizability of the results to other rural or urban populations with different sociodemographic characteristics. In addition, cognitive function and mental health status, which are important determinants of functional ability, were not assessed in this study. The gender-specific scoring differences in the IADL scale may also have influenced comparability between males and females. Despite these limitations, the study provides valuable insights into the burden and determinants of functional disability in a rural elderly population.

Conclusion:

The present study demonstrates a substantial burden of functional disability among the elderly in rural Kancheepuram district. Increasing age, diabetes mellitus and hearing impairment were found to be statistically associated with functional disability in activities of daily living, while financial dependence, arthritis and visual impairment were associated with limitations in instrumental activities.

These findings highlight the need for routine screening and early identification of functional limitations at the primary healthcare level. Addressing chronic conditions and secondary impairments along with improving social and family support, may help in maintaining functional independence and improving the overall quality of life among the elderly.

Conflict of Interest: The author(s) do not have any conflict of Interest

Informed Consent Statement:

Informed consent was collected from all study participants. Participation was purely voluntary and all participants were explained about the objectives, potential implications of research prior to inclusion.

References:

1. Fong JH. Disability incidence and functional decline among older adults with major chronic diseases. BMC Geriatr. 2019 Nov 21;19:323. doi:10.1186/s12877-019-1348-z PubMed PMID: 31752701; PubMed Central PMCID: PMC6873710.
2. Our World in Data [Internet]. [cited 2026 Feb 20]. Life expectancy. Available from: https://ourworldindata.org/grapher/life-expectancy?utm_source=chatgpt.com
3. Healthy ageing and functional ability [Internet]. [cited 2026 Feb 20]. Available from: https://www.who.int/news-room/questions-and-answers/item/healthy-ageing-and-functional-ability
4. Ageing [Internet]. [cited 2026 Feb 20]. Available from: https://www.who.int/health-topics/ageing
5. McMaughan DJ, Oloruntoba O, Smith ML. Socioeconomic Status and Access to Healthcare: Interrelated Drivers for Healthy Aging. Front Public Health. 2020 Jun 18;8:231. doi:10.3389/fpubh.2020.00231 PubMed PMID:

32626678; PubMed Central PMCID: PMC7314918.

6. Shelkey M, Wallace M. Katz Index of Independence in Activities of Daily Living. J Gerontol Nurs. 1999 Mar;25(3):8–9. doi:10.3928/0098-9134-19990301-05 PubMed PMID: 10362969.
7. Graf C. The Lawton instrumental activities of daily living scale. Am J Nurs. 2008 Apr;108(4):52–62; quiz 62–3. doi:10.1097/01.NAJ.0000314810.46029.74 PubMed PMID: 18367931.
8. Banerjee S. Determinants of rural-urban differential in healthcare utilization among the elderly population in India. BMC Public Health. 2021 May 17;21(1):939. doi:10.1186/s12889-021-10773-1
9. Robin R, Silva VGPD. Prevalence and Determinants of Functional Disability Among Elderly in Rural Goa, India. National Journal of Community Medicine. 2025 Jan 1;16(01):01. doi:10.55489/njcm.160120254656
10. McCabe D. Katz Index of Independence in Activities of Daily Living (ADL).
11. Graf C. The Lawton Instrumental Activities of Daily Living (IADL) Scale.
12. Anand A, Mandal I, Hossain S. B.G. Prasad Scale 2025: An Updated Framework for Socioeconomic Assessment in India. National Journal of Community Medicine. 2025 May 1;16(05):555–8. doi:10.55489/njcm.160520255339
13. Burman J, Sembiah S, Dasgupta A, Paul B, Pawar N, Roy A. Assessment of Poor Functional Status and its Predictors among the Elderly in a Rural Area of West Bengal. Journal of Mid-life Health. 2019 Sep;10(3):123. doi:10.4103/jmh.JMH_154_18
14. Arentsen TJ, Stubbs WJ, Lease SH, Adler MC, Ovrebo E, Jacobson JL. The relationship of the clinician-rated Functional Status Interview with executive functioning. Applied Neuropsychology: Adult. 2024 Sep 2;31(5):879–91. doi:10.1080/23279095.2022.2084619 PubMed PMID: 35694761.
15. Chauhan S, Kumar S, Bharti R, Patel R. Prevalence and determinants of activity of daily living and instrumental activity of daily living among elderly in India. BMC Geriatr. 2022 Jan 19;22:64. doi:10.1186/s12877-021-02659-z PubMed PMID: 35045809; PubMed Central PMCID: PMC8772104.
16. Severity of age-related hearing loss is associated with impaired activities of daily living | Age and Ageing | Oxford Academic [Internet]. [cited 2026 Mar 30]. Available from: https://academic.oup.com/ageing/article-abstract/41/2/195/46839
17. Amlak BT, Getinet M, Getie A, Kebede WM, Tarekegn TT, Belay DG. Functional disability in basic and instrumental activities of daily living among older adults globally: a systematic review and meta-analysis. BMC Geriatr. 2025 Jun 6;25:413. doi:10.1186/s12877-025-06056-8 PubMed PMID: 40481440; PubMed Central PMCID: PMC12142940.
18. Nguyen VC, Hong GRS. Change in functional disability and its trends among older adults in Korea over 2008–2020: a 4-year follow-up cohort study. BMC Geriatr. 2023 Apr 6;23:219. doi:10.1186/s12877-023-03867-5 PubMed PMID: 37024826; PubMed Central PMCID: PMC10080827.
19. (PDF) Morbidity and functional ability in the elderly: a cross sectional study in a rural population of Manipur [Internet]. [cited 2025 Aug 1]. Available from: https://www.researchgate.net/publication/340910557_Morbidity_and_functional_ability_in_the_elderly_a_cross_sectional_study_in_a_rural_population_of_Manipur
20. Medhi GK, Visi V, Bora PJ, Sarma J, Borah P, Mahanta J, et al. A Community-Based Study on Functional Disability and Its Associated Factors Among Elderly Individuals in a Rural Setting in Northeastern India. Cureus. 2021 Feb 12. doi:10.7759/cureus.13309
21. Das U, Kar N, Riba T, Rout NR. Prevalence of diabetes and disability among older adults in West Bengal and India: A comparative analysis. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2025 Apr 1;19(4):103236. doi:10.1016/j.dsx.2025.103236
22. MacNeil A, Cottagiri SA, Villeneuve PJ, Jiang Y, Groh M de, Fuller-Thomson E. Incident Functional Limitations Among Older Adults With Diabetes During the COVID-19 Pandemic: An Analysis of Prospective Data From the Canadian Longitudinal Study on Aging. Canadian Journal of Diabetes. 2024 Jul 1;48(5):290-298.e2. doi:10.1016/j.jcjd.2024.02.005 PubMed PMID: 38639706.
23. Fong JH. Disability incidence and functional decline among older adults with major chronic

diseases. BMC Geriatr. 2019 Nov 21;19:323. doi:10.1186/s12877-019-1348-z PubMed PMID: 31752701; PubMed Central PMCID: PMC6873710.

24. Halder M, Saha J, Roy A, Roy D, Chouhan P. Functional disability and its associated factors among the elderly in rural India using LASI Wave 1 data. J Public Health (Berl). 2024 Jun 1;32(6):1069–81. doi:10.1007/s10389-023-01890-9
25. Gopinath B, Schneider J, McMahon CM, Teber E, Leeder SR, Mitchell P. Severity of age-related hearing loss is associated with impaired activities of daily living. Age Ageing. 2012 Mar;41(2):195–200. doi:10.1093/ageing/afr155 PubMed PMID: 22130560.
26. Yévenes-Briones H, Caballero FF, Struijk EA, Rey-Martinez J, Montes-Jovellar L, Graciani A, et al. Association Between Hearing Loss and Impaired Physical Function, Frailty, and Disability in Older Adults: A Cross-sectional Study. JAMA Otolaryngol Head Neck Surg. 2021 Nov 1;147(11):951–8. doi:10.1001/jamaoto.2021.2399
27. Lin TC, Yen M, Liao YC. Hearing loss is a risk factor of disability in older adults: A systematic review. Archives of Gerontology and Geriatrics. 2019 Nov 1;85:103907. doi:10.1016/j.archger.2019.103907
28. Singh A, Bairwa M, Goel S, Bypareddy R, Mithra P. Prevalence and Predictors of Unmet Needs among the Elderly Residents of the Rural Field Practice Area of a Tertiary Care Centre from Northern India. Malays J Med Sci. 2016 Sep;23(5):44–50. doi:10.21315/mjms2016.23.5.6 PubMed PMID: 27904424; PubMed Central PMCID: PMC5101985.
29. Persons with Disabilities in India: NSS 76th round (July-December 2018) [Internet]. 2019 [cited 2025 Nov 21]. Available from: https://ruralindiaonline.org/en/library/resource/persons-with-disabilities-in-india-nss-76th-round-july-december-2018/