

Assessment of Poor Functional Status and its Predictors among the Elderly in a Rural Area of West Bengal

Jayeeta Burman, Sembagamuthu Sembiah¹, Aparajita Dasgupta, Bobby Paul, Neeraj Pawar¹, Adrija Roy¹

Department of Preventive and Social Medicine, All India Institute of Hygiene and Public Health, Kolkata, West Bengal, ¹Department of Community and Family Medicine, All India Institute of Medical Sciences, Bhopal, Madhya Pradesh, India

ABSTRACT

Context: Functional ability considered a proxy for healthy aging, not only related to mental and physical health but it also determines social well-being. Eliciting the determinants of functionality components among the elderly will assist in evolving with appropriate plans at both domiciliary and facility level to eliminate their sufferings and disabilities. **Aim:** The aim of this study is to find out the magnitude of poor functional status among the elderly and its predictors. **Materials and Methods:** This is a community-based cross-sectional study conducted among 246 geriatric people in a rural area of West Bengal from August 2017 to December 2017; data were analyzed using the SPSS software (version 16.0. Chicago, SPSS Inc.). Logistic regression analysis was performed to find out the factors associated with poor functional status (activities of daily living [ADL] and instrumental ADL [IADL]). **Results:** The study concluded that 32.4% and 59.3% were dependent for basic ADL and IADL, respectively. Binary logistics showed people aged >70 years, female gender, less than primary level education, widowed/separated, who lived in the joint family, poorest percentile of economic status, who were depressed and who suffered from multimorbidity had increased odds of dependency for ADL and IADL. In multivariate logit regression, age >70 years and depression remained significant for ADL; in addition, marital status, education, and family type remained significant for IADL. **Conclusion:** There should be a provision for community-based comprehensive geriatric health and disability assessment, as it enables older people to avert the illness at the early stage, to delay the onset of disabling diseases. This will ensure their participation in the upliftment of the society, and they thus will be less dependent on their progeny.

KEYWORDS: Elderly people, functional status, predictors, rural area

INTRODUCTION

Aging is not uniformly experienced among aging adults. Some persons achieve a sense of fulfillment and satisfaction in their old age, while others turn vicious and get weakened due to the decline of their physical abilities and social significance.^[1] With life expectancy has increased from 40 years in 1951–1967 years in 2015, a person has 25 years more to live than he would have 50 years back.^[2] According to SRS 2015, the percentage of the elderly population in the rural area is 8.3, and in the urban area, it is 8.4.^[3] Due to globalization, most of the people migrate from the villages and towns to cities,

resulting in breaking up of traditional families into nuclear families which made the elderly to live in their own without any support.

As the evidence shows, the loss of ability typically associated with aging is only loosely related to a

Address for correspondence: Dr. Sembagamuthu Sembiah, Department of Community and Family Medicine, All India Institute of Medical Sciences, Room No 96, PG Boys Hostel, Saket Nagar, Bhopal - 462 020, Madhya Pradesh, India. E-mail: semba9.ss@gmail.com

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person's chronological age. There is no "typical" older person.^[4] Healthy aging is more than just the absence of disease. For most of the older people, the maintenance of functional ability has the highest importance.^[4] Functional status is usually defined in terms of restrictions on the ability to function independently in terms of basic ADL (ability to perform tasks of daily living) and instrumental ADL (IADL).^[5] Not only is the performance in this area related to mental and physical health; but it may also determine social well-being.^[6]

Longevity results in chronic diseases which affect functionality compromising the ability to pursue the daily routine, creating a need for assistance. Reducing severe disability is one key to holding down health and social costs as well as improve the quality of life.^[4] The developed world has evolved many models for elderly care, for example, nursing home care, health insurance, etc. As no such model for older people exists in India, it may be an opportunity for an initiative in health system development, to set up high-quality health-care (both physical and mental) service. Eliciting the determinants of functionality components among the elderly will assist in evolving with appropriate plans at both domiciliary and facility level to eliminate their sufferings and disabilities.

With this background, an attempt was made to assess the functional status and the factors associated with it, among the elderly population in a rural area of Singur, West Bengal.

MATERIALS AND METHODS

This is a community-based cross-sectional study conducted among the geriatric population (60 years and above) in the service area of Rural Health Unit and Training Centre Singur, Kolkata, which consists of 2 Urban Primary Health Centers (UPHCs), each UPHC consists of 6 health units, 3 units were selected randomly from each UPHC. Each of the units had 6 villages, which make a total of 18 villages from which 6 villages were randomly selected, during the period of

5 months from August to December 2017. In a similar study, there is 20% prevalence (p) for impairment in activities of daily living (ADL), with an absolute precision (d) of 5% and 95% confidence level with formula = z^2pq/d^2 (z = standard normal deviate at 95% confidence interval [CI]; $q = 100 - p$), the estimated sample size was 246.^[7] If there was no response or consent could not be obtained from the study participant in the sampled household, the next household was considered for data collection. Furthermore, if one household had two or more elderly persons, then a simple random sampling was applied to select the study participant to be included. If only one elderly person was staying in the house, and no other family members were available, and he was independently able to answer the interview schedule, he was included or else next household was chosen.

The study participants were selected through probability proportional to size sampling from each village line listing of the geriatric population from each village was done with the help of Voter's list and simple random sampling was done to select the study participants [Table 1].

The data were collected using a pre-designed, pre-tested, structured schedule for the following:

Outcome variable

Functional status was assessed in terms of:

1. ADL: Refers to people's daily self-care activities. There are six domains of function: bathing, dressing, toileting, transferring, continence and feeding, adapted from Katz index questionnaire.^[8] Cronbach's alpha for the Bengali version was 0.91
2. IADL: Activities that are not necessary for fundamental functioning, but they let an individual live independently in a community, comprises six domains: food preparation (female)/shopping (male), housekeeping, laundry, mode of transportation, responsibility of own medications and ability to handle finances, adapted from Lawton IADL Scale.^[9] Cronbach's alpha for the Bengali version was 0.87.

Table 1: Selection of study participants through Probability Proportional to Size (PPS) sampling from selected villages

Serial number	Village name	Total elderly population (n)	Study participants selected by PPS (n)
1	Anandnagar	313	71
2	Balitipa	65	15
3	Baghdanga	165	38
4	Diara	183	42
5	Chinnamore	272	61
6	Paltagarh	86	19
Total		1084	246

PPS: Probability proportional to size

Independent variables

1. Sociodemographic characteristics such as age, sex, religion, caste, literacy, marital status, number of children, economic status, and type of family were considered. The elderly people who belong to lower social economic status, who are illiterates or are females are more likely to be neglected in aspects such as optimal care, nutrition, and health-care utilization; this leads to chronic illness which results in increased dependence for ADL. Furthermore, cultural and religious factors play a significant role in taking care of the elderly
2. Self-reported morbidity profile (chronic diseases or any illness for 3 months as self-reported by participants.)
3. Depression: assessed using questions used to elicit depressive symptoms in a study by Tamakoshi and Ohno.^[10] Cronbach's alpha for the Bengali version was 0.73.

Face and content validity of the instrument was checked. The tool was translated into the local language (Bengali) maintaining semantic equivalence and pretesting of the questionnaire was done among 30 geriatric people residing in a village of Singur other than the study area. It was revised based on the responses obtained in pre-testing and finalized for use in this study. The study was conducted in accordance with the Declaration of Helsinki for ethical consideration. Every participant had given written informed consent, after explaining to them the purpose of the study and after ensuring confidentiality.

Operational definitions

The outcome variable (functional status) was assessed in terms of ADL and IADL which consists of six domains each. Participants were scored YES/NO for dependence in each of the six functions, if Yes (i.e.) activity needs supervision, direction, personal assistance or total care, they were given 1 point in that domain and if No, they were given 0 point (no assistance). The score ranks adequacy of performance in the six functions. The summary score of 6 indicates severe functional impairment, were fully dependent on others and 0 indicates full function.

Study participants were categorized into two groups according to their highest level of functioning as:

1. Dependent (scores of 1–6, who needs assistance in at least one of the activities) and
2. Independent (score 0, no assistance).

Data analysis

Data were analyzed using the SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, Illinois,

US. Appropriate descriptive statistics, univariate and multivariate logistic regression analysis was performed to assess Functional status (ADL and IADL) and elicit its predictors with 95% CI ($P < 0.05$).

RESULTS

The mean age of the study participants was 71.82 with the range of 60–102. About 42.3% were females. 17.1% were scheduled caste. 43.1% of the study participants were illiterates. 43.5% of the study participants were widow/widowers. 73.2% lived in the joint family. About 48.7% of the study participants belonged to class IV socioeconomic status. Mean per capita income was Rs. 1823.

Tables 2 and 3 depicts the pattern of dependency for basic ADL and IADL and its relationship with gender showing significant association between gender with ADL ($\chi^2 = 22.4$; d.f. = 1; $P \leq 0.05$) and IADL ($\chi^2 = 20.6$; d.f. = 1; $P \leq 0.05$). The prevalence of dependency (at least one of the activities) for ADL was 32.5% among which 19 (7.7%) participants were highly dependent, i.e., need assistance to pursue all the six basic daily ADL, among which most, 18 (94.8%) participants were females. About 59.3% were dependent among which 31.3% were highly dependent for IADL.

Univariate logistic regression showed people aged >70 years, female gender, less than primary

Table 2: Distribution of study participants according to their functional status (n=246)

Activities	Dependence*		
	Male	Female	Total
ADL items			
Toilet	1 (0.7)	21 (20.2)	22 (8.9)
Bathing	3 (2.1)	20 (19.2)	23 (9.3)
Feeding	14 (9.9)	27 (26)	41 (16.7)
Dressing	19 (13.4)	36 (34.6)	55 (22.4)
Continence [#]	17 (12)	30 (28.8)	47 (19.1)
Transfer within home	29 (20.4)	51 (49)	80 (32.5)
IADL items			
Food preparation/shopping [^]	42 (29.6)	54 (51.9)	96 (39)
Housekeeping	51 (35.9)	54 (51.9)	105 (42.7)
Laundry	51 (35.9)	57 (54.8)	108 (43.9)
Responsibility for own medication	35 (24.6)	51 (49)	86 (35)
Transport (moving out of home)	51 (35.9)	67 (64.4)	118 (48)
Ability to handle finance	55 (38.7)	79 (76)	134 (54.5)

*With supervision, direction, personal assistance or total care,

[#]Partially or totally incontinent of bowel or bladder, [^]Food preparation for female; shopping for male. ADL: Activities of daily living, IADL: Instrumental activities of daily living

Table 3: Distribution of the study participants according to their functional status
(3a) Distribution of the study participants according to their activities of daily living (n=246)

Number of activities	Male, n (%)	Female, n (%)	Total, n (%)	Mean±SD, median (range)	χ^2 test, df, P
6 (highly dependent)	1 (5.2)	18 (94.8)	19 (7.7)	4.91±1.9, 6 (0-6)	22.4, 1, <0.05
5	2 (50)	2 (50)	4 (1.6)		
4	7 (53.8)	6 (46.2)	13 (5.3)		
3	9 (52.9)	8 (47.1)	17 (6.9)		
2	2 (50)	2 (50)	4 (1.6)		
1	8 (34.7)	15 (65.3)	23 (9.3)		
0 (independent)	113 (68)	53 (32)	166 (67.5)		

(3b) Distribution of the study participants according to their instrumental activities of daily living (n=246)

Number of activities	Male, n (%)	Female, n (%)	Total, n (%)	Mean±SD, median (range)	χ^2 test, df, P
6 (highly dependent)	26 (33.7)	51 (66.3)	77 (31.3)	3.36±2.6, 5 (0-6)	20.6, 1, <0.05
5	11 (78.6)	3 (21.4)	14 (15.7)		
4	9 (100)	0	9 (3.7)		
3	8 (72.7)	3 (27.3)	11 (4.5)		
2	1 (9.1)	10 (90.9)	11 (4.5)		
1	12 (50)	12 (50)	24 (9.3)		
0 (independent)	75 (75)	25 (25)	100 (40.7)		

SD: Standard deviation

level education, widowed/separated, who lived in joint family, poorest percentile of economic status, who were depressed and who suffered from multimorbidity (more than two chronic diseases) had increased odds of dependency for ADL. In multivariate logit regression, after adjustment with significant variables, age adjusted odd's ratio (AOR) (CI) (95% CI) - 20.6 (8–53.1) and depression AOR (CI) - 13 (4.5–37) remained significant. As the Hosmer–Lemeshow statistic (goodness of fit test) is nonsignificant, the model is fit to explain the factors determining dependency for ADL. These factors explain about 51.8% variation in dependency for ADL (Nagelkerke $R^2 = 0.518$) [Table 4].

For IADL, bivariate analysis showed every variable considered were significant except economic status (poorest percentile), whereas multivariable analysis showed people aged 70 years 5.2 (2.3–11.4), widowed/separated 2.3 (1.1–5.2), less than primary level education 3.4 (1.5–7.7), joint family 2.6 (1.1–5.9), depression 2.8 (1.2–6.4) were significant. The model is fit (Hosmer–Lemeshow statistic: nonsignificant) and it explains 53.5% variation in dependency for IADL [Table 5].

DISCUSSION

The present study was conducted to assess the ADL, which is an index of physical and social well-being of elderly people. Most of the studies on the elderly concentrate on morbidity and nutritional status, the ability to pursue basic activities is important yet has been neglected, and very few studies have been conducted in this particular domain.

Prevalence of dependency

In the present study, dependency (for at least one of the ADL activities) was 32.4%, similar to study in rural Bengaluru (32.4%), whereas studies in rural Haryana (17.6%) and coastal Karnataka (6.5%) showed much less prevalence, it may be due to different study area and instrument used.^[11-13] In the present study, among the highly dependent (score 6), most of them were females, whereas in a study in Puducherry showed males were highly dependent.^[14] The studies carried out in developed countries such as Malaysia (14.4%), the USA (15%), and Japan (20%) showed lesser prevalence of ADL disability than in the present study because of their social security system, including institution based unpaid care.^[15-17] In the present study, 31.3% were highly dependent (all six activities) for IADL, whereas a study in Shimla showed 21.8% as in our country elderly people handover all the tasks, especially monetary issues, housekeeping to their sons/daughter.^[18] As most of the elders become physically weak, even to move outside the home, they seek help. In the present study, IADL dependency (at least one of the IADL activities) was 59.3%, whereas studies done in Poland and Norway showed lesser prevalence of at least one problem with IADL reported to be 43.19% and 19.9%, respectively.^[19,20] In a study conducted in Spain showed 34.6% were categorized as dependent for at least one ADL and 53.5% for IADL which is similar to the present study, whereas a study conducted on oldest-old Brazilians showed less prevalence (28.7%) poor functional status which is due to the variation in measurement tool of functional status.^[21,22]

Table 4: Factors associated with functional dependency (activities of daily living) among the elderly in a rural area of West Bengal (n=246)

Variables	Total, n (%)	ADL (dependent), n (%)	OR (95% CI)	AOR (95% CI)
Age				
60-70	139 (56.5)	12 (8.6)	1	
>70	107 (43.5)	68 (63.6)	18.4 (9-37.5)***	20.6 (8-53.1)***
Sex				
Male	142 (57.7)	29 (20.4)	1	
Female	104 (42.3)	51 (49)	3.7 (2.1-6.5)***	1.7 (0.2-3.2)
Religion				
Hindu	211 (85.8)	59 (28)	1	
Muslim	35 (14.2)	21 (60)	3.8 (1.8-8.1)***	2 (0.5-7.5)
Caste				
Others	98 (39.8)	18 (18.4)	1	
OBC	106 (43.1)	45 (42.5)	3.2 (1.7-6.2)***	1 (0.3-3)
SC	42 (17.1)	17 (40.5)	3 (1.3-6.7)**	2.7 (0.7-10.3)
Marital status				
Currently married	134 (54.5)	27 (20.1)	1	
Widow/separated	112 (45.5)	53 (47.3)	3.5 (2-6.2)***	1.4 (0.5-3.8)
Type of family				
Nuclear	66 (26.8)	13 (19.7)	1	
Joint	180 (73.2)	67 (37.2)	2.4 (1.2-4.7)*	1.9 (0.6-5.8)
Educational status				
Primary and above	133 (54.1)	22 (16.5)	1	
Below primary	113 (45.9)	58 (51.3)	5.3 (2.9-9.5)***	2.1 (0.7-6.5)
Number of children				
0-3	153 (62.2)	58 (51.3)	1	
>3	93 (37.8)	22 (16.5)	4.7 (2.6-8.4)*	0.7 (0.2-1.9)
Per capita income				
>25 th percentile	183 (75.4)	53 (29)	1	
≤25 th percentile	63 (25.6)	27 (42.9)	1.8 (1-3.3)*	1.6 (0.6-4.1)
Depression				
≤2 symptoms	138 (56.1)	15 (10.9)	1	
>2 symptoms (depressed)	108 (43.9)	65 (60.2)	12.3 (6.4-23.9)***	13 (4.5-37)***
Chronic illnesses				
≤2 illnesses	91 (37)	10 (11)	1	
>2 illnesses	155 (63)	70 (45.2)	6.6 (3.2-13.8)***	1.4 (0.4-4)
Hosmer-lemeshow test				Nonsignificant
Naeglerke's R ²				0.518

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$. OR: Odd ratio, AOR: Adjusted odd's ratio, CI: Confidence interval, ADL: Activities of daily living

Predictors of poor functional status

In the present study and in other studies reviewed, it has been observed that older age and female gender are important predictors of dependency. Aging leads to physical and social weakening, as a result, they were prone to chronic illnesses which in turn lead to dependency and hence, the interventions should be provided at an early age, to have a healthy aging.^[7,12,13,16-20] Females are still neglected in terms of food and care with little focus on their health, it is due to the gender-segregated activities in our society where females were restricted to kitchen works and not involved in economic reasoning and decisions. Widow/separated were prone to more dependency in this study and this was also seen in a study in Haryana.^[12]

A longitudinal study in India showed household wealth and caste showed no clear association with limitations in ADL, similar to the present study.^[7]

Poor functional status is significantly associated with depression and chronic illnesses. In a study done in Malaysia showed depression (odd's ratio [OR] - 1.8) and the presence of >2 chronic illnesses (OR - 8.4), whereas in the present study, there were higher odds of 12 and 6.6, respectively, as significant predictors of poor functional status.^[23] Studies done in Brazil and Poland showed that depressed and multi-morbid persons having higher odds (OR - 2-3) of poor functional status.^[20,21] In a longitudinal study done in America showed higher depressive symptoms predicted greater risk of functional

Table 5: Factors associated with functional dependency (instrumental activities of daily living) among the elderly in a rural area of West Bengal (n=246)

Variables	Total, n (%)	IADL (dependent), n (%)	OR (95% CI)	AOR (95 CI)
Age				
60-70	139 (56.5)	57 (41)	1	
>70	107 (43.5)	89 (83.2)	7.1 (3.8-13)***	5.2 (2.3-11.4)***
Sex				
Male	142 (57.7)	67 (47.2)	1	
Female	104 (42.3)	79 (76)	3.5 (2-6.1)***	1 (0.4-2.7)
Religion				
Hindu	211 (85.8)	117 (55.5)	1	
Muslim	35 (14.2)	29 (82.9)	3.8 (1.5-9.7)**	1.1 (0.2-2.4)
Caste				
Others	98 (39.8)	43 (43.9)	1	
OBC	106 (43.1)	82 (77.4)	4.3 (2.3-8)***	2.9 (1.2-7)**
SC	42 (17.1)	21 (50)	1.2 (0.6-2.6)	1.2 (0.4-3.2)
Marital status				
Currently married	134 (54.5)	57 (42.5)	1	
Widow/separated	112 (45.5)	89 (79.5)	5.2 (2.9-9.2)***	2.3 (1.1-5.2)*
Type of family				
Nuclear	66 (26.8)	25 (37.9)	1	
Joint	180 (73.2)	121 (67.2)	3.3 (1.8-6)***	2.6 (1.1-5.9)*
Educational status				
Primary and above	133 (54.1)	52 (39.2)	1	
Below primary	113 (45.9)	94 (83.2)	7.7 (4.2-14)***	3.4 (1.5-7.7)**
Number of children				
0-3	153 (62.2)	74 (48.4)	1	
>3	93 (37.8)	72 (77.4)	3.6 (2-6.5)***	2 (0.7-5.2)
Per capita income				
>25 th percentile	183 (75.4)	111 (60.7)	1	
≤25 th percentile	63 (25.6)	35 (55.6)	1.2 (0.6-2.2)	
Depression				
≤2 symptoms	138 (56.1)	57 (41.3)	1	
>2 symptoms	108 (43.9)	89 (82.4)	6.6 (3.6-12.1)***	2.8 (1.2-6.4)**
Chronic illnesses				
≤2 illnesses	91 (37)	35 (38.5)	1	
>2 illnesses	155 (63)	111 (71.6)	4 (2.3-6.9)***	1.2 (0.6-2.7)
Hosmer-lemeshow test				Nonsignificant
Naeglerke's R ²				0.535

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$. IADL: Instrumental activities of daily living, CI: Confidence interval, OR: Odd ratio, AOR: Adjusted odd's ratio

decline over 5 years.^[24] Depressed persons are more likely to engage in unhealthy eating habits, smoking, excessive alcohol intake, and physical inactivity which hamper health status over time and discourage persons from obtaining adequate medical attention and social support which in turn may result in a decline in physical health which leads to the poor functional status which results in depression. In the present study, the presence of chronic illnesses had higher odds of dependency, which was similar to a study done in Haryana and Shimla.^[12,18] A study in the rural area of West Bengal showed 16.16% prevalence of poor functional status same as the present study area, elicited "the different chronic disorders, age and sex were significantly associated with functional

disability, were able to explain risk factors in 58.2% of cases nearly identical to the present study.^[25] Chronic illness impairs the functional status and reduce physical activity, in turn, leads to more illnesses and leads to a vicious cycle. In this study, older age and depression remained to be imperative predictors after adjusting with other variables of ADL. In addition to these, literacy and marital status were significant factors affecting IADL.

Strength

Most similar studies were done in the clinical set-up, but the current study is a community-based study and the study sample was selected scientifically from the study population from 64 villages with a robust sampling technique.

Limitation

However, there may be other factors which consequences in poor functional status, prospective studies will give a clear picture; as the measures were self-reported, subjective bias may have occurred.

CONCLUSION AND RECOMMENDATIONS

The study concluded that 32.4% and 59.3% were dependent for basic ADL and IADL respectively with older age and depression, the important predictors of dependency for ADL. The functional disability in the elderly has become an important public health problem, given the impact they have on quality of life of individual, the family, and health services. More emphasis should be given on the integration of geriatric care at the primary care level. There should be a provision for community-based comprehensive geriatric health assessment, as it enables older people to avert the illness at early stage, to delay the onset of disabling diseases and conditions and to provide domiciliary care and rehabilitation and specialist services at facility level. Social security measures like old age pension should be arranged more liberally for the aged people, especially for the disabled. This will ensure their participation in the upliftment of the society and they thus will be less dependent on their progeny.

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Conflicts of interest

There are no conflicts of interest.

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