Functional Status of the Elderly and their Rehabilitation Needs: A Mixed-Method Study in a Slum of Kolkata, West Bengal

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ABSTRACT

Objective: A comprehensive understanding of the requirements of elderly is necessary to preserve their "functional capacity", an important indicator of their health status. This study aimed to assess the functional status of the elderly and their rehabilitation needs.

Materials and Methods: A mixed-method study was conducted from November 2021 to June 2022 at a health centre in Chetla, West Bengal, India. Quantitative data, collected from 172 elderly persons using a pretested questionnaire, were analyzed by logistic regression analysis. Qualitative data, collected via focus group discussions, were analyzed thematically.

Results: Overall, 11.62% and 66.86% participants were functionally dependent in one or more activities of daily living (ADL) and instrumental activities of daily living (IADL), respectively. Significant association of age ≥70 years (AOR = 4.06, 95% CI= 1.13-14.63), male gender (AOR= 5.21, 95% CI= 1.57-17.28) and assistive device use (AOR= 6.92, 95% CI= 1.85-25.83) was found with ADL limitations. Increasing age (AOR= 1.29, 95% CI= 1.13-1.50), female gender (AOR= 13.97, 95%CI= 3.61-54.00), residence in joint family (AOR= 3.95, 95%CI=1.47-10.61), without spouse (AOR= 3.59, 95% CI= 1.12-11.44) and daily intake of multiple medications (AOR= 4.99, 95%CI= 1.45-17.13) were factors significantly associated with IADL limitations. Major identified needs of the elderly were related to development of peer support groups, transportation systems and delivery of services from the health system.

Conclusion: Rehabilitative services like providing assistive devices to the needy, developing elderly support groups, undertaking household visits for bedridden and those with restricted mobility, and building supportive environments within families and communities should be ensured.

Keywords: Activities of daily living; elderly; functional status; instrumental activities of daily living; rehabilitation
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INTRODUCTION

The unprecedented increase in human longevity in the 20th century has led to a global rise in the elderly population. India is soon destined to become home to the second-largest number of elderly persons in the world. The Census data has demonstrated a steady increase in the proportion of older people from 7.7% of the total population in 2001 to 10.1% in 2021, which is estimated to reach 300.96 million by 2051.[1]

Over the past decade, 'Healthy aging' has emerged as an important concept concerning health issues of the elderly. It has been defined as "not only the mere absence

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of a disease but the process which enables older people to continue to do the things that are important to them".[2] Data provided by the United Nations has shown that more than 46% of the global elderly population (≥60 years of age) live with disabilities.[3] Disabilities are the negative aspects of the interaction between the individual and the environment, i.e., deficits, limitations in the activity and restrictions in his/her social participation.[4] Thus, maintenance of functional capacity becomes an important indicator of health status in the elderly.[5]

Activities of daily living (ADL) are considered as those activities that are essential for an independent life while instrumental activities of daily living (IADL) are more complex tasks that involve decision making and greater interaction with the environment.[6] Studies conducted previously across different countries have assessed the functional capacity of the elderly and have demonstrated varying prevalence of limitations in activities of daily living (ADL) ranging from 17.3% to 34.6% while limitations in instrumental activities of daily living (IADL) ranged from 35.75% to 59.3%.[7-10] Although laudable efforts have been made by the researchers for assessing the functional status, the issue of social and healthcare needs of the elderly required for healthy ageing has been largely overlooked. Therefore, a comprehensive understanding of the requirements of our elderly population is needed to preserve their functional capacity and promote healthy aging so that they can continue to make their positive contributions towards the society. With this backdrop, this mixed method study was undertaken to assess the functional status of the elderly residing in an urban slum in West Bengal and to explore their unmet needs from the health system for rehabilitation

MATERIALS AND METHODS

This cross-sectional study with convergent parallel mixed method design (QUAN+QUAL) was conducted from November 2021 to June 2022 among the elderly persons (age≥60 years) attending the non-communicable disease (NCD) clinic at Urban Health Unit and Training Centre, Chetla, Kolkata, West Bengal. Participants who did not give written informed consent were excluded from the study.

Sampling

For the quantitative strand of the study, considering the prevalence of ADL disability and IADL disability among the study population to be 53.6%[11] and 48%[9] respectively and relative error of 20% with a confidence level of 95%, the sample size was calculated separately using the standard Cochran's formula.[12] It came to be 84 and 105 respectively. Taking into account the larger value, that is 105, the final sample size was estimated by adding a design effect of 1.5 and 10% non-response rate allowance which came to be 172.

Data collection was performed on 1 day per week. So, for estimated sample size of 172, it took approximately 12 weeks for data collection. Study participants were selected by systematic random sampling technique for the quantitative strand. Approximately 30 elderly persons attended the NCD clinic per day. Study piloting revealed that only 15 patients could be interviewed per day. Therefore, taking sampling interval of 30/15= 2, every 2nd patient attending the NCD clinic was interviewed.

Separate days were taken to conduct Focus group discussions (FGDs) for collecting data for the qualitative strand of our study. Data was collected till the point of data saturation which was reached after conduction of 2 FGDs. Each FGD constituted 6 members who were recruited purposively from the patients visiting the NCD clinic.

Study Tools and Parameters Used

Medical records were checked and face-to-face interview technique was performed using pre-tested, pre-designed structured questionnaire to collect data for the quantitative strand of our study. Pretesting was done on 15 elderly patients diagnosed with NCDs in a different setting who were not included in the study. Reliability of the scales used within the questionnaire was checked with Cronbach's alpha along with inter-item correlation. Face & construct validity of the scales used was checked by public health experts. The questionnaire consisted of the following domains:

(a) Independent variables

i. *Socio-demographic variables*: age, religion, caste, gender, marital status, living arrangement, education, employment status, financial status, socioeconomic status, availability of medical insurance

ii. *Physical health status*: body mass index (BMI), pain on visual analog scale (VAS), number of chronic diseases (from medical records), number of daily medicine intake (from medical records)

iii. *Environmental characteristics*: presence of assistive technology (handrails, grab bars, hearing aid, glasses, walker wheelchair etc.), home modifications (widened doors, lowered cabinets) and material adjustments (removing throw rugs, rearranging furniture etc.)

iv. *Multidimensional scale of perceived social support (MSPSS)*: It was assessed via a 12-item tool for measuring perceptions of support from 3 sources: family, friends,

and significant others. [Cronbach's alpha= 0.87].[13] A mean score of 1-2.9 meant low support, 3-5 indicated moderate support and 5.1-7 indicated high support.

v. *Geriatric depression scale 15 (GDS 15)* consisted of a 15-item preliminary screening tool for depression in elderly [Cronbach's alpha= 0.71].[14] Scores of 0-4 were considered normal, 5-8 indicated mild depression; 9-11 as moderate depression; and 12-15 indicated severe depression.

(b) Dependent variable

i. *Katz Index of Independence in Activities of Daily Living (ADL)*: It assessed the client's ability to independently perform six activities of daily living i.e bathing, dressing, toileting, transferring, continence, and feeding.[15] Participants were given 1 point if they required no assistance in performing their daily activities and 0 point if they required help, personal assistance or total care for the same. (Cronbach's alpha=0.79). Study participants were categorized into two groups according to their summary scores:

1. Independent (score of 6, needed no assistance in any of the activities)

2. Dependent (score 0-5, assistance needed in some or the other activity)

ii. *Lawton- Brody Instrumental Activities of Daily Living Scale (IADL)*: It measured the client's ability to perform independent living skills, measured across 8 domains.[16] Women were scored on all 8 areas of function; whereas, for men, the areas of food preparation, housekeeping, laundering were excluded [Cronbach's alpha= 0.82]. Participants were given 1 point if they required no assistance in performing the activities and 0 point if they required help, personal assistance or total care for the same. Study participants were categorized into two groups according to their summary scores:

For *females*: 1. Independent (score of 8, needed no assistance in any of the activities)

2. Dependent (score of 0-7, assistance needed in some or the other activity)

For *males*: 1. Independent (score of 5, needs no assistance in any of the activities)

2. Dependent (score 0-4, assistance needed in some or the other activity)

For the qualitative part of the study, two FGDs were conducted among the study participants to find out their expectations from the health system with respect to their healthcare needs, using a predesigned FGD guide, audio recorder and field notes.

Data analysis

Quantitative data was analysed using Microsoft Excel 2016 and Statistical Package for Social Sciences software (version 16). Descriptive statistics were shown by frequency table, mean, median and interquartile range. After excluding multicollinearity (variance inflation factor>10), factors were analyzed by test of significance (p-value< 0.05) at 95% confidence interval via univariate regression model. All the biologically plausible significant factors in the respective univariate analysis where then included in the final multivariable model.

For qualitative data, thematic analysis approach was undertaken. The recorded statements from the FGD were first transcribed in verbatim format and translated back to English language. Simultaneously, field notes were reviewed. Appropriate codes were then generated from the transcripts. Similar codes were put together to generate subthemes followed by the generation of appropriate themes.

Ethical approval

Permission was taken from Institutional Ethics Committee of All India institute of Hygiene and Public Health, Kolkata. All the ethical principles as per Declaration of Helsinki were strictly adhered to. Informed written consent was taken from each participant before data collection. Confidentiality was maintained throughout the process.

RESULTS

Among the 172 study participants, 118 were females and 54 were males with a median age of 62.50 years (IQR =61.00- 67.75). Majority of the male participants were married (81.5%) whereas only 36.4% females were married. Around 30.8% of the participants had two children. 47.1% of elderly were living with 'spouse and other members'. Almost 55.2% of the participants had no formal education and considered themselves to be financially dependent on their family members. Around one-fourth (25.6%) of the study participants were formally retired. More than half (60.5%) of the study participants belonged to class V of B.G Prasad's socioeconomic scale. The median per capita income was Rs 1,000/-. More than half of the participants (52.3%) were covered under state government financed medical insurance schemes like 'Swasthya Sathi'.

With regard to their health status, as many as 56.9% of individuals suffered from multiple chronic diseases and 55.8% were taking multiple medicines daily. Around 44.8% individuals reported to be suffering from moderate pain on Visual Analogue Scale (VAS).

On the part of environmental modifications, only 0.6% and 5.8% of participants had special equipment attached to their home structure and did material adjustments

respectively, for unhindered movement. Assistive devices were used by 24.4% of the elderly. None of the participants had the interior of their homes modified as per their necessity of old age.

Almost 65.7% of the elderly received moderate social support (friends, family and significant other combined) with median score of 4(IQR= 3.44-5.04).

Majority (82.6%) of study participants were suffering from some or other form of depression with a median score of 6(IQR= 5-9) as measured by GDS 15.

Functional Status of the elderly:

The respondents reported at least one problem with IADL (66.86 %) more frequently than with ADL (11.62 %). Among the female participants 7.6% and among males 20.4% were dependent in one or more ADL while 80.5% of females and 37% of males were found to be one or more IADL (Fig 1 & 2).

The most frequent problem in ADL was related to transferring (6.4%) followed by continence (4.7%) and toileting (4.7%). The most frequent problem associated with IADL was food preparation (61.9%) among the females and shopping in males (52.3%).

Factors associated with functional limitations among the study participants

Significant factors associated with functional limitations in ADL were age of ≥70 years {Adjusted odds ratio (AOR) = 4.06, 95% CI= 1.13-14.63}, male gender (AOR= 5.21, 95% CI= 1.57-17.28) and use of assistive devices (AOR= 6.92, 95% CI= 1.85-25.83) (Table 1).

With respect to IADL limitations, increasing age (AOR= 1.29, 95% CI= 1.13-1.50), female gender (AOR= 13.97, 95% CI= 3.61-54.00), participants residing in joint family (AOR= 3.95, 95% CI= 1.47-10.61) without spouse (AOR= 3.59, 95% CI= 1.12-11.44) and taking multiple medicines daily (AOR= 4.99, 95% CI= 1.45-17.13) were the factors that came to be statistically significant (Table 2).

The models examining the influences of factors on ADL and IADL explained 16.6%-32.3% and 39.7%-55.1% of the variance respectively.

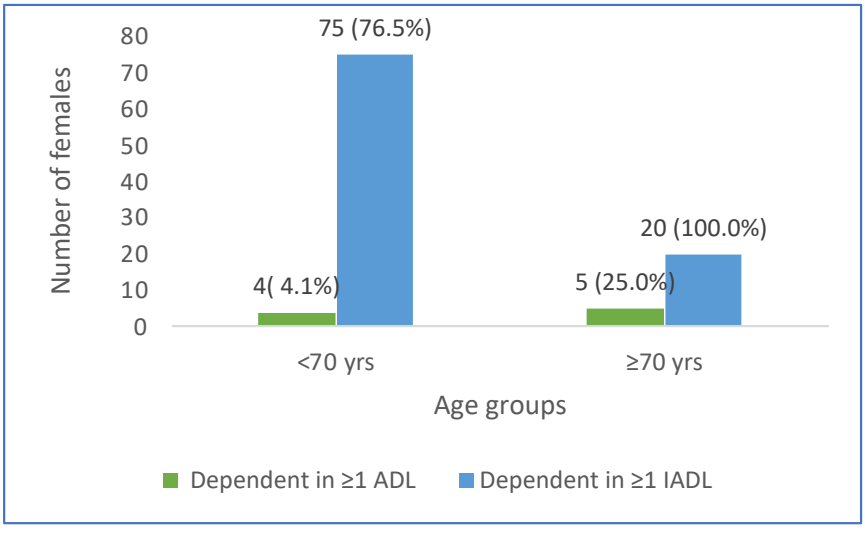

Fig 1. Multiple bar diagram showing functional status of female participants across age groups (n=118).

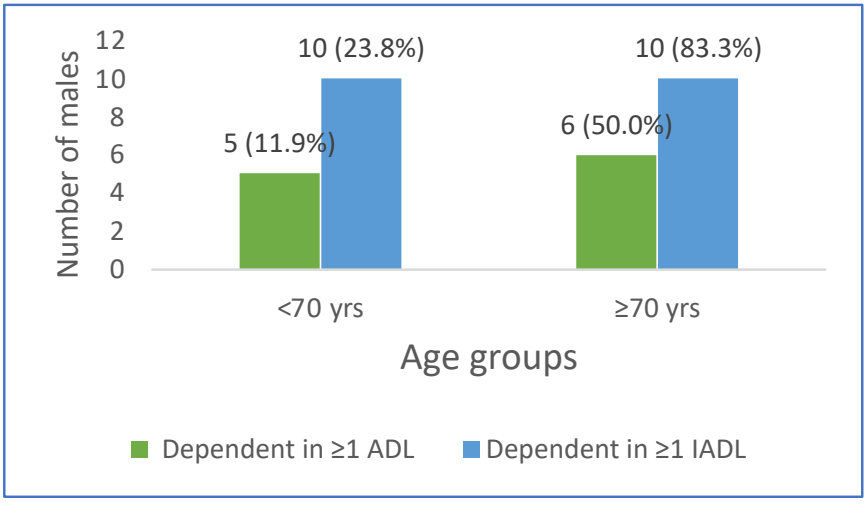

Fig 2. Multiple bar diagram showing functional status of male participants across age groups (n=54).

TABLE 1. Factors associated with functional limitation in ADL among study participants: Univariate and Multivariable logistic regression analysis (n=172).

Parameters	Total number (n)	Dependent in ≥1 ADL (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age				
<70 yrs	140	9(6.4)	1(Ref)	1(Ref)
≥70 yrs	32	11(34.4)	7.62(2.82-20.60)	4.06(1.13-14.63)
Gender				
Female	118	9(7.6)	1(Ref)	1(Ref)
Male	54	11(20.4)	3.09(1.19-8.00)	5.21(1.57-17.28)
Number of chronic diseases				
<2	74	4(5.4)	1(Ref)	1(Ref)
≥2	98	16(16.3)	3.41(1.09-10.68)	0.57(0.09-3.61)
Number of medicines taking daily				
<2	76	4(5.3)	1(Ref)	1(Ref)
≥2	96	16(16.7)	3.60(1.15-11.26)	3.04(0.52-17.83)
Use of assistive devices (hearing aid, wheelchair, walker etc)				
Absent	130	8(6.2)	1(Ref)	1(Ref)
Present	42	12(28.6)	6.10(2.29-16.24)	6.92(1.85-25.83)
Material adjustments at residence (removing through rugs, rearranging furniture, adjusted lighting etc.)				
Absent	162	16(9.9)	1(Ref)	1(Ref)
Present	10	4(40.0)	6.08(1.55-23.85)	0.81(0.12-5.35)

Hosmer-Lemeshow test statistic=0.669, Cox and Snell's R^2=0.166, and Nagelkerke's R^2=0.323.

Qualitative exploration of the unmet needs of the elderly from the health system for rehabilitation

The FGDs revealed three major themes: (I) need to cater to service issues (II) need to cater to transportation issues (III) need for development of peer support group. Under the first theme the major sub themes identified were 'Homebased services', 'Supplies and logistics', 'Social protection schemes' and 'Other health services'.

Under the 'Homebased services' subtheme, the need for domiciliary visits at least once every month by trained healthcare workers for routine health check-ups was identified. In this context P4 (60 years, female) reiterated:

"If it was possible that once or twice in a month the health workers come and visit us in our house and do a checkup of our sugar, pressure it would have been very very helpful."

The major 'Supplies and logistics' need identified was ensuring the availability of medicines and assistive devices such as glasses, hearing aids etc. from the health centre, better if free of cost. P3 (61 years, female) said in this regard:

"Sometimes they ask us to buy medicines from outside but we cannot buy them due to our economic constraint. So, we miss the dose for that month."

Under the 'Social protection schemes', the need for old age pension, increase in pension amount, and health insurance schemes were identified. P2 (62 years, female) said in this respect:

"I get old age pension of ₹1,000 per month. But you tell me, in these days does ₹1,000 have any value?"

The study participants also highlighted the need for provision of 'Other health services' such as dental facility, ophthalmology, psychiatry, otorhinolaryngology and investigations such as thyroid profile from the PHC. P1 (64 years, male) & P2 said in this regard:

"I hear less in one ear. If facility for ear check-up was present over here I would go for the same."

TABLE 2. Factors associated with functional limitation in IADL among study participants: Univariate and Multivariable logistic regression analysis (n=172).

Parameters	Total number (n)	Dependent in ≥1 IADL (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age(↑)*			1.14(1.05-1.24)	1.29(1.13-1.50)
Gender				
Female	118	95(80.5)	7.20(3.43-14.36)	13.97(3.61-54.00)
Male	54	20(37.0)	1(Ref)	1(Ref)
Type of family				
Joint	99	78(78.8)	3.61(1.85-7.03)	3.95(1.47-10.61)
Nuclear	73	37(50.7)	1(Ref)	1(Ref)
Marital Status				
No spouse	83	70(84.3)	5.26(2.55-10.85)	3.59(1.12-11.44)
Married	89	45(50.6)	1(Ref)	1(Ref)
Education				
No formal education	95	70(73.7)	2.06(1.07-3.96)	0.79(0.28-2.17)
Educated (any form)	73	42(57.5)	1(Ref)	1(Ref)
Socioeconomic status †				
Class V	104	83(79.8)	4.44(2.26-8.73)	0.87(0.31-2.41)
Class IV & below	68	32(47.1)	1(Ref)	1(Ref)
Pain				
Severe pain	27	24(88.9)	4.74(1.36-16.51)	5.56(0.93-33.18)
Less than severe pain	145	91(62.8)	1(Ref)	1(Ref)
Number of chronic diseases				
≥2	98	73(74.5)	2.22(1.16-4.24)	0.60(0.16-2.23)
<2	74	42(56.8)	1(Ref)	1(Ref)
Number of medicines taking daily				
≥2	96	75(78.1)	3.21(1.66-6.22)	4.99(1.45-17.13)
<2	76	40(52.6)	1(Ref)	1(Ref)
Multidimensional scale of perceived social support				
Lower support	131	96(73.3)	3.17(1.53-6.56)	0.71(0.23-2.11)
High support	41	19(46.3)	1(Ref)	1(Ref)

Hosmer-Lemeshow test statistic=0.095, Cox and Snell's R^2=0.397, and Nagelkerke's R^2=0.551.

*Continuous variables, OR=odds ratio, CI=confidence interval

† According to Revised B.G Prasad Scale for January 2021 based on labour bureau statistics of November 2020

"I have pain in my gums and teeth but no dental facility is available here".

Under the second theme, the distant location of tertiary care hospitals, poor access to accessible, comfortable and reliable transport services were reported to cause hindrance to patients' journey to hospitals for specialized care. Notable verbatim by P7 (61 years, female) in this aspect is:

"Sometimes we are said to go to specialized hospitals since all the treatment is not available here. But our old age and restricted mobility prevent us from going there and getting better treatment"

The third theme highlighted the 'need for development of peer support groups'. The elderly valued peer support as an important source of happiness, information and companionship as stated by P8 (65 years, male):

"It feels good to talk among your friends and relieve your mental burden. You can hear their side of their stories as well as you can express your concerns."

DISCUSSION

The study findings revealed the overall prevalence of ADL and IADL limitations among the elderly to be 11.62% and 66.86% respectively, which is comparable to the findings from other studies. A study done in Nepal by Chalise et al.[18] showed around 30% & 52% elderly aged 65 yrs and older were having functional limitation on at least one ADL and IADL respectively. In a study done in India by Patel et al. 22% & 48% of the older adults reported some form of ADL and IADL disability respectively. [9]

Increasing age showed significant association with functional limitations, both ADL and IADL in elderly proving that it can be the most important risk factor for the deterioration of the functional state in the elderly.

The current study showed that males were more dependent in ADL than females which is in contrast to other studies that showed female gender to be more predisposed to functional limitations in ADL.[7,19,20] This may be attributed to the fact that there were more older male participants (22.2%) compared to females (6.9%) in this study.

With respect to IADL limitations and gender differences, this study is in line with findings from other studies that showed that female elderly are significantly more dependent in one or more IADL.[7,19,20] This can be explained by the fact that in an Indian society, which is predominantly male dominated, women are traditionally bound to do household work whereas their male counterparts do work outside and are mainly responsible to handle finances.

Participants residing in joint family reported to have more dependency in IADL in our study. This finding substantiates the fact that those who live with others have the opportunity to depend on them for shopping, food preparation, housekeeping etc., than those who live alone.

Significant association between functional limitation of IADL and absence of spouse can be explained by the fact that loss of significant other in the extreme of age has a huge emotional impact on the surviving elderly to the extent that it can lead to depression. Many previous studies have also found a positive correlation between depression and worsened mobility in elderly.[21,22]

As disability and mobility problems increase with age, use of assistive devices such as canes, crutches, and walkers, increase a patient's base of support, improves balance, increased activity and independence, proving that significant association between functional dependency in ADL and assistive device use among the elderly may exist, as found in our study.

Significant association between dependency in IADL and intake of multiple medicines has been found in our study which can be ascribed to the fact that advancing age brings increased number of comorbidities and thereby increasing number of daily medicines intake.

The findings from the qualitative part of our study also substantiates our quantitative findings (Table 3). Subjective needs assessment is required for addressing the complexity of needs of dependent older people. Due to limitations in mobility and economic constraints, older people cannot access health facilities located far away from home or buy medicines from outside. There is a paramount need for provision of various rehabilitative and healthcare services like home visits, ensuring all-time supply of medicines and logistics, service delivery nearer to homes, easy availability and accessibility of social protection schemes and development of peer support groups.

CONCLUSION

This study revealed that emotional health is as important as physical health of the elderly. With advancing age there is not only an increasing limitation in the functional capacity of the elderly but also an increasing requirement of meaningful relationships and experiences. Declining agility and unsteadiness may result in falls and devastating injuries among the aged population. Similarly feeling of loneliness, isolation and lack of self-worth may result in depression among elderly. Health care administrators and policy makers should take into note the physical and emotional needs of the elderly while implementing strategies for their rehabilitation.

TABLE 3. Joint Display of health care needs of elderly with respect to their functional status.

Themes	Sub themes	Qualitative results (Codes)	Quantitative results
Service issues	Need for home based services	domiciliary visits by health workers for health check up	11.62% & 66.86% elderly are dependent in ADL & IADL respectively, hindering their regular visit to health centre. 15.7% participants reported severe body pain
	Need for supplies and logistics	ensure availability of medicines, insulin supply, supply of hearing aids, glasses, cane	56.9% and 55.8% participants respectively, were having ≥2 chronic diseases and taking ≥2 medications daily. 24.4% elderly required assistive devices in their daily activities.
	Need for Social Protection Schemes (SPS)	provision of government health insurance scheme, increment in amount of old age pension schemes, financial dependence on children	More than half of the study participants (55.2%) were financially dependent and belonged to lower socio-economic group (60.5%). 47.7% were not covered by any medical insurance.
	Other services	dental facility, psychiatry, Eye and ENT doctors, thyroid profile test	17.4% elderly had visual impairment, 6.4% had impaired hearing, 1.2% had dental problems, 1.2% had thyroid disorder.
Transportation issues		inconvenient and distant location of tertiary care hospitals providing specialized care and treatment	11.6% were found to be dependent on 'mode of transportation' item of Lawton Brody IADL Scale.
Peer support groups		isolation & neglect of family, loss of spouse, feeling of burden on children, no one to share emotional feelings	82.6% suffered from some form of depression in GDS 15 scale 8.7% participants reported to have low social support in MSPSS scale.

Tailor-made interventions are the need of the hour for holistically addressing the rehabilitative needs- both physical and emotional, of our elderly. Availability of various services such as mental health clinics, dental clinics, ophthalmology and otorhinolaryngology services etc, provision of assistive devices to the needy, developing elderly support groups, undertaking household visits for bedridden elderly, counseling about improved care-seeking, and increasing supportive environment in families and community should be ensured at the primary care level.

Limitations

This study was done in an outpatient clinic and hence elderly who are bedridden, too sick to attend OPD could not be interviewed. While most of the responses were recall-based, bias might be possible.

Conflict of interest : Nil

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