

# Adding life to years: Role of gender and social and family engagement in geriatric depression in rural areas of Northern India

Kikkeri Hanumantha Setty Naveen<sup>1</sup>, Akhil Dhanesh Goel<sup>1</sup>,  
Shraddha Dwivedi<sup>2</sup>, Mohd Amirul Hassan<sup>3</sup>

<sup>1</sup>Department of Community Medicine and Family Medicine, All India Institute of Medical Sciences, Jodhpur, Rajasthan, <sup>2</sup>Department of Community Medicine, MLN Medical College, Allahabad, <sup>3</sup>Department of Community Medicine, Government Medical College, Ambedkarnagar, Uttar Pradesh, India

## ABSTRACT

**Background:** Depression among elderly population is a major public health issue affecting nearly 5% to 7% of the world's elderly. In the coming years, a major share will be contributed by developing countries like India. In the rural areas of Allahabad district of Uttar Pradesh, there is scarce data on the depression. **Methodology:** A community-based cross-sectional study was conducted in rural Allahabad. A total of 411 elderly persons were selected from 2 blocks—Jasra and Bahadurpur—through multistage random sampling method. Short form of geriatric depression scale (GDS) was used to assess depression. **Results:** The prevalence of depression among elderly was 19.7%. On binary logistic regression, depression had significant association with female sex [aOR = 2.4, 95% CI 1.1–5.1], having less-than-good relationship with family members [aOR = 2.7, 95% CI 1.2–6.0], not being cared for during illness by family members [aOR = 3.9, 95% CI 1.2–12.9], not being involved in leisure time activities [aOR = 2.5, 95% CI 1.3–4.9], and not regularly meeting relatives and friends [aOR = 4.7, 95% CI 1.9–11.6]. **Conclusions:** The prevalence of depression in elderly was high in rural areas of Allahabad. Female sex and social and family engagement are the important predictors of depression among them.

**Keywords:** Depression, elderly, family relations, morbidity, social support

## Introduction

With about 322 million people in the world are living with depression today, it has become the third leading cause of disability globally.<sup>[1]</sup> Nearly half of these are from South-East Asia and Western Pacific regions. The global prevalence of depression is estimated to be 4.4% and it is more common among females (5.1%) than males (3.6%). Prevalence is also higher among older age group people.<sup>[2]</sup>

**Address for correspondence:** Dr. Kikkeri Hanumantha Setty Naveen, Department of Community Medicine and Family Medicine, All India Institute of Medical Sciences, Jodhpur, Rajasthan, India.  
E-mail: naveenkhd@gmail.com

Received: 16-11-2019

Revised: 27-12-2019

Accepted: 09-01-2020

Published: 28-02-2020

### Access this article online

#### Quick Response Code:



Website:  
www.jfmpc.com

DOI:  
10.4103/jfmpc.jfmpc\_1019\_19

The world's population is ageing rapidly. Using the United Nations Population Fund (UNFPA) benchmark of referring to older people as those above 60 years,<sup>[3]</sup> the proportion of the world's elderly is estimated to reach almost 22% by 2050—almost double from the 2015 levels. In absolute terms, this is an expected increase from 900 million to 2 billion people.<sup>[4]</sup> Similarly, in Asia, the proportion of the elderly is expected to increase from 11.6% to 24.6% during 2015–2050.<sup>[5]</sup> In India, the share of elderly population is projected to increase from 8% in 2015 to 19% in 2050.<sup>[6]</sup>

The elderly age group are known to suffer from special physical and mental health challenges which thus needs

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

**How to cite this article:** Naveen KH, Goel AD, Dwivedi S, Hassan MA. Adding life to years: Role of gender and social and family engagement in geriatric depression in rural areas of Northern India. J Family Med Prim Care 2020;9:721-8.

public health attention. Over one-fifth of elderly are known to suffer from a mental or neurological disorder attributing to disability-adjusted life years (DALYs) of 6.6% and 17.4% of Years lived with disability (YLDs). Of special note is depression which is one of the most common mental disorders in this age group accounting for high burden (4%–7% prevalence) and YLDs (~5.7%).<sup>[4]</sup> However, depression continues to remain one of the most under-diagnosed and poorly managed conditions, especially in primary care settings, thereby adding to impaired daily functions, poor perception of health and costs.<sup>[4]</sup>

In the rural areas of Allahabad district of Uttar Pradesh, there is scarce data on the depression and its associated factors among the elderly. Hence, this study was planned to ascertain the prevalence of depression and assess its predictors among elderly population.

## Methodology

This is a community-based cross-sectional study conducted among elderly in rural areas of Allahabad district of Uttar Pradesh. The study area was selected by multistage random sampling method where, in the first stage, two community development blocks of Allahabad district, viz., Jasra in the Trans Yamuna area and Bahadurpur in the Trans Ganga area, were selected randomly. In the second stage, from the list of villages, 8 villages in each of these blocks were randomly selected. In the third stage, a list of elderly persons in each of these 8 villages was obtained and 25 study subjects from each of these villages were randomly selected using a random number table.

Considering the prevalence of depression as 52.2%,<sup>[7]</sup> we estimated sample size requirement as 404 at 10% relative error, 95% confidence interval, and 10% contingency. This was calculated using the formula  $n = Z^2 P(1-P)/L^2$ , where  $n$  = sample size,  $P$  = prevalence of depression in elderly (52.2%), and  $L$  = allowable error (taken as 10% of  $P$ ). Finally, 411 subjects were included in the study.

Persons aged 60 years and above were invited for participation in the study. WHO Technical Report Series-779 refers to those aged 60 years and over as elderly people and the same criterion was used in this study.<sup>[8]</sup> Any document issued by the revenue or education department (10<sup>th</sup> marks sheet, voter's ID card, and ration card) which contained the age of the person was used while ascertaining the age of the subjects. Informed consent was taken after explaining the purpose and objective of the study to the subjects.

A pretested, predesigned, and semistructured questionnaire was used to interview the study participants which included sociodemographic profile like age, sex, marital status, education, religion etc., Occupational status was categorized as involved in economically gainful work (landowner, service, artisan, and daily wager) and not involved in gainful work (unemployed, housewife, and retired). Socioeconomic status was assessed

using the Modified BG Prasad classification corrected to the latest AICPI (All India Consumer Price Index). History of any addiction like tobacco smoking (beedi, cigarettes, chillum, etc.) or chewing (Khaini, gutka, etc.), and substance abuse like cannabis was recorded. Depression was assessed using geriatric depression scale-short form consisting of 15 items and a score of more than 5 was considered as depression.<sup>[9]</sup> It was translated to Hindi language and back-translated by an independent translator and pilot tested before use.

All the participants were interviewed and assessed in detail for any symptoms and signs of any disease. The diagnosis was based on history, physical examination, and review of the previous records. Blood pressure was measured in a sitting position in the right upper arm using mercury sphygmomanometer by an auscultatory method. Average of two separate measurements taken 5 min apart was recorded. Subjects with systolic BP of less than 140 and diastolic BP of less than 90 mm of Hg were considered as nonhypertensives and those with more than that were considered to be hypertensives.<sup>[10]</sup> Visual disorders like cataract and refractive errors were examined using purkinje images and Snellen's chart, respectively. Hearing impairment was assessed using the whisper test.<sup>[9]</sup> Subjects with any morbidity were referred to the nearest health center for further evaluation and management.

All the data collected was analyzed using the Statistical Package for Social Sciences (SPSS ver. 23). All categorical variables were described using proportions and analyzed using Chi-square test or Fischer Exact test as applicable. Multiple binary logistic regression analysis was done by enter method including the variables which showed a significance at 10% level on univariate analysis. Hosmer and Lemeshow goodness of fit test and Naegelkerke R square were also calculated. A  $P$  value  $< 0.05$  was considered as statistically significant.

## Results

Among the 411 elderly subjects, the majority belonged to the 60 to 69 years age group (59.6%,  $n = 245$ ) and consisted of 52.1% ( $n = 214$ ) men. 61.8% ( $n = 254$ ) elderly were living with spouse and 70.1% ( $n = 288$ ) were illiterate. Only 18.5% ( $n = 76$ ) were involved in economically gainful work. The majority (74.2%,  $n = 305$ ) belonged to lower and upper-lower socioeconomic class. There were 64.2% ( $n = 264$ ) who reported some form of addiction—major being tobacco chewing seen in 51.8% ( $n = 213$ ) [Table 1]. There were important sex differentials in sociodemographic variables with all the female elderly subjects having 5 years or lesser education. As compared to males, female elderly subjects were more likely to be living without spouse, engaged in nongainful work, and had lower socioeconomic status.

Depression was found in 19.7% ( $n = 81$ ) of subjects according to geriatric depression scale (GDS score  $> 5$ ) and it was found to be significantly associated with female sex ( $P < 0.001$ ), those living without spouse ( $P < 0.001$ ), lesser education ( $P = 0.025$ ), those

**Table 1: Characteristics of study population**

	Count	Percentage
<b>Age</b>		
60-69 years	245	59.6
70-79 years	126	30.7
80 years and above	40	9.7
<b>Sex</b>		
Female	197	47.9%
Male	214	52.1%
<b>Marital Status</b>		
Living with spouse	254	61.8%
Living without spouse	157	38.2%
<b>Religion</b>		
Hindu	379	92.2%
Muslim	32	7.8%
<b>Caste</b>		
General	158	38.4%
S.C./S.T	88	21.4%
OBC	165	40.1%
<b>Type of family</b>		
Nuclear	106	25.8%
Joint	138	33.6%
Three generation	137	33.3%
Single member	30	7.3%
<b>Education</b>		
Illiterate	288	70.1%
≤5 years of education	66	16.1%
6 to 10 years of education	37	9.0%
>10 years of education	20	4.9%
<b>Occupation</b>		
Gainful work (landowner, service, artisan, any other)	76	18.5%
No gainful work (unemployed, landless laborer, housewife, or retired)	335	81.5%
<b>Socioeconomic Status</b>		
Upper, upper middle, and lower middle	106	25.8%
Lower and upper lower	305	74.2%
<b>Addictions</b>		
Any addiction present	264	64.2%
Tobacco smoker	106	25.8%
Tobacco chewer	213	51.8%
Cannabis consumer	18	4.4%
Alcohol consumer	7	1.7%

not involved in economically gainful occupation ( $P = 0.026$ ), and those belonging to lower and upper-lower socioeconomic status ( $P = 0.05$ ) [Table 2]. 83.9% of the elderly participants reportedly suffered from at least one morbidity. The most common morbidity seen was visual disorder in 70.1% ( $n = 288$ ) followed by hypertension in 44.8% ( $n = 184$ ) and orthopedic disorders in 34.6% ( $n = 142$ ). Those suffering from visual, neurological, and gastrointestinal disorders had a significantly higher association with depression [Table 3].

Table 4 shows the association of family relationships and social interactions with depression. It was seen that depression was significantly more in those elderly subjects living alone (33.3%,  $n = 10$ ), having less-than-good relationship with family members (35.0%,  $n = 63$ ), whose advise in family issues was not

honored or ignored (28.0%,  $n = 74$ ), and who were not cared for during illness (29.6%,  $n = 76$ ).

Those elderly subjects involved in leisure time activities, social activities, and met relatives and friends regularly had significantly lower depression [Table 4].

On binary logistic regression analysis, female sex, having less-than-good relationship with family members, not cared for during illness by family members, not involved in any leisure time activities, and not regularly meeting relatives and friends were found to be significant predictors of depression among the elderly people [Table 5]. Hosmer and Lemeshow goodness of fit was not significant ( $P = 0.867$ ) which indicated good fit of the logistic regression model. Nagelkerke R square showed that 44.3% of the depression among the elderly could be predicted by the variables in the model [Table 5].

## Discussion

Geriatric depression is a frequently overlooked clinical diagnosis and often considered a normal response to aging or other life events. It causes excess disability and has an adverse interaction with physical health.<sup>[11]</sup>

The prevalence of depression was found to be 19.7% in the present study. This is almost similar to the findings of the study done by Paliania *et al.* in rural Haryana (14.4%).<sup>[12]</sup> Goel *et al.* in an urban slum Muzaffarnagar city of Uttar Pradesh found 9.4% elderly to be depressed.<sup>[13]</sup> Similarly, Gupta *et al.* 2015 in Lucknow city of Uttar Pradesh found 15.6% elderly to be depressed.<sup>[14]</sup> In different studies in India, the prevalence of geriatric depression varied from 8.9%–52.2%.<sup>[7,15,16]</sup> The National Mental Health Survey 2016 has used MINI tool and reported the lifetime prevalence of depression as 6.93%.<sup>[17]</sup> A recent systematic review has found a pooled prevalence of depression to be 34.4% among elderly persons aged 60 years and above which is almost double than what we have found in our study. However, in the same study, they have reported the pooled prevalence of depression among them as 10.9% [8.3%–13.6%] in the state of Uttar Pradesh which is nearly half of that we have found in our study.<sup>[18]</sup> While these differences may be due to the variations in the methodology and the tool/scale used for assessment of depression, it can also indicate subtle underlying risk indicators like environmental predisposition.

After adjusting for multiple factors, it was found that elderly women (30.5%) had higher odds of depression compared to elderly men (9.8%) [aOR 2.4; 95% CI: 1.1–5.1] which was similar to other studies conducted globally and in India.<sup>[12,16,19-23]</sup> Three systematic reviews done in 2003, 2006, and 2019 have also found similar results indicating the female sex to be a significant risk factor across different time periods and geographic regions.<sup>[18,24,25]</sup> Women are known to have a longer life expectancy because of biological reasons and also maybe because they are less likely than men to engage in health-endangering or life-shortening behaviors such as smoking, drinking excessive alcohol, fighting, and other

**Table 2: Sociodemographic profile and depression**

	Depression Present (n=81)		Depression Absent (n=330)		P
Age					
60-69 years	43	(17.6%)	202	(82.4%)	0.177
70-79 years	26	(20.6%)	100	(79.4%)	
80 years and above	12	(30.0%)	28	(70.0%)	
Sex					
Female	60	(30.5%)	137	(69.5%)	<0.001
Male	21	(9.8%)	193	(90.2%)	
Marital Status					
Living with spouse	36	(14.2%)	218	(85.8%)	<0.001
Living without spouse	45	(28.7%)	112	(71.3%)	
Literacy Status					
≤5 years of education	76	(21.5%)	278	(78.5%)	0.025
>5 years of education	5	(8.8%)	52	(91.2%)	
Occupation *					
Gainful work	8	(10.5%)	68	(89.5%)	0.026
No gainful work	73	(21.8%)	262	(78.2%)	
Religion					
Hindu	76	(20.1%)	303	(79.9%)	0.545
Muslim	5	(15.6%)	27	(84.4%)	
Caste					
General	29	(18.4%)	129	(81.6%)	0.540
S.C/S.T	21	(23.9%)	67	(76.1%)	
OBC	31	(18.8%)	134	(81.2%)	
Socioeconomic Status					
Upper, upper middle, and lower middle	14	(13.2%)	92	(86.8%)	0.05
Lower and upper lower	67	(22.0%)	238	(78.0%)	
Addiction					
No	26	(17.7%)	121	(82.3%)	0.442
Yes	55	(20.8%)	209	(79.2%)	

Values in parentheses represent row-wise percentages. All P values are calculated using Chi-square test. \*Gainful work includes landowner, service, artisan. No Gainful work includes unemployed, landless laborer, housewife, or retired

aggressive behaviors.<sup>[26]</sup> Hence, there are greater chances that they live longer without their spouse, with multiple morbidities and disability and also lack of adequate social support system, which can be significant contributor to depression.<sup>[27]</sup>

In this study, we found that absence of regular meeting with relatives and friends was the most important risk factor contributing toward depression [aOR 4.7; 95% CI: 1.9–11.6]. Elderly persons who were regularly meeting relatives and friends had a lower risk of depression in comparison to those who were occasionally meeting them.

Similarly, depression was associated with not being involved in leisure time activities [aOR 2.5; 95% CI: 1.3–4.9]. Elderly without any leisure time activities had about 2.5 times higher odds of depression. Similar findings were reported in the study done by Pilania *et al.* and by Sandhya.<sup>[12,28]</sup> This may be due to the fact that these leisure time activities act as distractors for depressive thoughts and improve the person's self-esteem. While there is a biological mechanism where physical activity leading to endorphin release and limbic system activation, thereby having a protective role in depression is well documented.<sup>[29]</sup> The similar mechanism between recreational leisure time activities and depression is yet to be explored further.

In a study in China, poor social engagement like lower frequency of participation in social activities and leisure activities, loss of social contact, and absence of a friendly companion were the significant predictors of depression among older adults.<sup>[30]</sup> In another study done by Carayanni *et al.* in Greece, meeting with friends in free time was found to be a protective factor for depression.<sup>[27]</sup>

Regular involvement with friends and relatives during leisure time or at workplace provides mental support and opportunity to share, which has a preventive role against the development of depression.

Higher levels of social engagement in the form of increased frequency of participation in social and leisure time activities is found to be protective against geriatric depression, thereby higher levels of well-being and longer survival.<sup>[31-33]</sup>

While a majority of the study participants reported some form of morbidity like visual, cardiovascular, neurological, or gastrointestinal disorders, these were not significantly associated with depression. However, not being cared by family members during illness significantly predisposed to depression [aOR 3.9; 95%CI: 1.2–12.9]. In addition, elderly



**Table 3: Morbidity profile and depression**

	Depression Present (n=81)		Depression Absent (n=330)		P
Visual Disorder					
Yes	66	(22.9%)	222	(77.1%)	0.012
No	15	(12.2%)	108	(87.8%)	
Hearing Impaired					
Yes	19	(22.4%)	66	(77.6%)	0.491
No	62	(19.0%)	264	(81.0%)	
Cardiovascular Disorder					
Yes	14	(29.8%)	33	(70.2%)	0.065
No	67	(18.4%)	297	(81.6%)	
Respiratory Disorder					
Yes	16	(25.8%)	46	(74.2%)	0.19
No	65	(18.6%)	284	(81.4%)	
Neurological Disorder					
Yes	14	(42.4%)	19	(57.6%)	0.001
No	67	(17.7%)	311	(82.3%)	
Gastrointestinal Disorder					
Yes	19	(24.4%)	59	(75.6%)	0.0251
No	62	(18.6%)	271	(81.4%)	
Genitourinary Disorder					
Yes	3	(16.7%)	15	(83.3%)	0.74
No	78	(19.8%)	315	(80.2%)	
Orthopedic Disorder					
Yes	30	(21.1%)	112	(78.9%)	0.599
No	51	(19.0%)	218	(81.0%)	
Hypertension					
Yes	41	(22.3%)	143	(77.7%)	0.237
No	40	(17.6%)	187	(82.4%)	
Diabetes Mellitus					
Yes	4	(25.0%)	12	(75.0%)	0.587
No	77	(19.5%)	318	(80.5%)	
Skin Disorders					
Yes	5	(22.7%)	17	(77.3%)	0.714
No	76	(19.5%)	313	(80.5%)	
Tuberculosis					
Yes	1	(20.0%)	4	(80.0%)	0.987
No	80	(19.7%)	326	(80.3%)	

Values in parentheses represent row-wise percentages. All P values are calculated using Chi-square test

subjects having less-than-good relationship with family members had higher odds of depression [aOR 2.7; 95% CI: 1.2–6.0].

In two studies done among older adults in Nepal, lack of family engagement like not having enough time spent with family members, not being considered in family decision-making, and physical and/or verbal abuse by family members were significantly associated with depression.<sup>[34,35]</sup>

The family relationships, sense of being valued in the family, and availability of family help at times of need play an important role in mental well-being and prevention of depression among the elderly.<sup>[30,34]</sup> However, failure to receive relevant care as well psychological and emotional support, especially during ill health when it is absolutely needed, results in a greater risk of depression among the elderly people. These findings clearly indicate the

importance of good family relationship and family support system in the mental health of the elderly.

The traditional family system in India is a joint family system. This family system provides healthy management of an entire family with the division of labor, care of children, and when people grow old they are respected, obeyed, and taken care of by the younger generation. In this family hierarchy, the elderly hold a place of authority. But with rapid industrialization and urbanization, over the past few decades, there is disruption in the joint family system, younger generation have migrated away in search of better job opportunities. Many have settled in cities with nuclear families leaving behind the older adults in the rural areas and many have abandoned the elderly owing to pressures of urban family life.

The National Program for the Health Care of Elderly<sup>”</sup> [NPHCE], 2010 envisions to address various health problems of the elderly. However, the implementation framework is far from ideal due to lack of trained manpower and infrastructure dedicated toward mental health problems of the elderly.<sup>[36,37]</sup> The National Mental Health Program in coordination with the NPHCE can embark on strengthening the health infrastructure to promote timely diagnosis and evidence-based management of mental health problems of the elderly.<sup>[38,39]</sup> This still does not address the need of family and social engagement among the elderly with an aim to curb mental health problems. Government of India has enacted the Maintenance and Welfare of Parents And Senior Citizens Act, 2007 which has penal provisions against abandonment of the elderly.<sup>[40]</sup> Elderly social groups, laughter clubs, and yoga groups are some novel ways of bringing people together which has the potential of addressing the mental health needs. However, much more social research into timely diagnosis and innovative interventions for social and family support are required to prevent depression from becoming a giant public health problem among the elderly. Thus, it is most important to add life to years of the elderly rather than just adding years to life.

In the context of improving the quality of life and thereby adding life to years of elderly, primary care physician or family medicine practitioner plays a crucial role. As it is well known, family medicine practice envisages wholistic approach which involves medical management of the disease as well as addressing ideas, concerns, and expectations of patient, and also the involvement of family members or caregivers as relevant to the case. Evidence from this study emphasizes the need of primary care physician to focus on the commonly prevalent mental health problem among the elderly-depression. Based on the identified risk factors, the study points to the role of a family physician in improving and maintaining family relationships through counselling and motivation of caregivers involved in elderly care. Also, as a leader of the health team, family physician should steer community to provide opportunities for socialization and free time activities relevant to elderly.

**Table 4: Association of family and social engagement with depression**

	Depression Present (n=81)		Depression Absent (n=330)		P
Living Status					
Living alone	10	(33.3%)	20	(66.7%)	0.05
Living in family	71	(18.6%)	310	(81.4%)	
Financial dependency on Family Members					
Complete or partial dependence	65	(21.0%)	245	(79.0%)	0.261
Independent	16	(15.8%)	85	(84.2%)	
Relationship with Family Members					
Less than Good	63	(35.0%)	117	(65.0%)	<0.001
Good	18	(7.8%)	213	(92.2%)	
Advice in family issues					
Not honored or ignored	74	(28.0%)	190	(72.0%)	<0.001
Honored	7	(4.8%)	140	(95.2%)	
Care during illness					
Not cared for during illness	76	(29.6%)	181	(70.4%)	<0.001
Cared	5	(3.2%)	149	(96.8%)	
Leisure time activities					
No	55	(36.4%)	96	(63.6%)	<0.001
Yes	26	(10.0%)	234	(90.0%)	
Involvement in Social Activities					
Not involved	78	(21.6%)	283	(78.4%)	0.009
Involved	3	(6.0%)	47	(94.0%)	
Meeting Relative and Friends					<0.001
No regular meeting	73	(30.8%)	164	(69.2%)	<0.001
Regular meeting	8	(4.6%)	166	(95.4%)	

Values in parentheses represent row-wise percentages. All P values are calculated using Chi-square test

**Table 5: Binary logistic regression assessing predictors of depression**

	aOR [95% CI]	P
Female Sex	2.4 [1.1-5.1]	0.025
≤5 years of education	0.7 [0.2-2.8]	0.647
Living without spouse	1.3 [0.7-2.6]	0.382
No gainful work	0.7 [0.2-2.1]	0.549
Lower and upper lower socioeconomic status	1.1 [0.5-2.5]	0.806
Visual disorder	1.9 [0.9-4.1]	0.090
CVS disorder	1.1 [0.5-2.8]	0.790
Neurological disorder	2.4 [0.9-6.4]	0.077
Gastrointestinal disorder	1.9 [0.9-4.2]	0.089
Living alone	0.7 [0.3-2.2]	0.577
Complete or partial financial dependence on the family	0.7 [0.3-1.8]	0.448
Less-than-good relationship with family members	2.7 [1.2-6.0]	0.014
Advice in family issues not honored or ignored	1.8 [0.6-5.2]	0.300
Not cared for during illness	3.9 [1.2-12.9]	0.024
Not involved in leisure time activities	2.5 [1.3-4.9]	0.009
Not involved in social activities	1.3 [0.3-5.2]	0.759
Not regularly meeting relatives and friends	4.7 [1.9-11.6]	0.001

The study area belongs to a backward state in India where the health indicators are still poor compared to other well-performing states of India. The study was done in the rural areas of Allahabad district and the results may not be generalizable to the entire nation. However, it represents the living conditions of the rural part of the eastern Uttar Pradesh and hence is a valid estimate for that region.

## Conclusion

Nearly one-fifth of the elderly people in the rural areas of Allahabad were suffering from depression. Female sex, lack of or poor social and family engagement in the form of not being involved in leisure time activities, not meeting relatives and friends on a regular basis, not having good relationship with family members, and not being cared for by family members, especially during illness, are the important predictors of depression among elderly. Appropriate implementation of national program and screening and management at the primary level is need of the hour for reducing the burden of depression among rural elderly. Apart from medical management, innovative interventions focused on improving the social and family engagement of elderly people with special focus on elderly females may go a long way in addressing the depression.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## References

1. Institute for Health Metrics and Evaluation (IHME). Findings from the Global Burden of Disease Study 2017. [Internet]. Seattle, WA: IHME; 2018. Available from: <http://www.healthdata.org/sites/default/files/files/>

- policy\_report/2019/GBD\_2017\_Booklet.pdf. [Last cited on 2019 Jul 26].
2. Depression and Other Common Mental Disorders: Global Health Estimates. [Internet]. World Health Organization. Geneva; 2017. Available from: [http://www.who.int/mental\\_health/management/depression/prevalence\\_global\\_health\\_estimates/en/](http://www.who.int/mental_health/management/depression/prevalence_global_health_estimates/en/). [Last cited on 2019Aug 03].
  3. Ageing [Internet]. Available from: <https://www.unfpa.org/ageing>. [Last cited on 2019 Aug 05].
  4. WHO. Mental health of older adults [Internet]. WHO. 2017. Available from: <https://www.who.int/news-room/fact-sheets/detail/mental-health-of-older-adults>. [Last cited on 2019 Jul 30].
  5. World Population Ageing 2015 [Internet]. United Nations; 2017. Available from: <https://www.un-ilibrary.org/content/publication/88fa44e7-en>. [Last cited on 2019 Aug 03].
  6. Agarwal A, Lubet A, Mitgang E, Mohanty S, Bloom DE. Population Aging in India: Facts, Issues, and Options. 2016.
  7. Nandi PS, Banerjee G, Mukherjee SP, Nandi S, Nandi DN. A study of psychiatric morbidity of the elderly population of a rural community in west bengal. *Indian J Psychiatry* 1997;39:122-9.
  8. WHO Expert Committee on Health of the elderly [Internet]. Geneva: World Health Organization; 1989. (WHO Technical Report Series). Report No.: 779. Available from: [https://apps.who.int/iris/bitstream/handle/10665/39521/WHO\\_TRS\\_779.pdf](https://apps.who.int/iris/bitstream/handle/10665/39521/WHO_TRS_779.pdf). [Last cited on 2019 Aug 05].
  9. Welty C, Palmer R. Aging and the geriatric patient. Chapter 26. In: *Clinical Preventive Medicine*. 2<sup>nd</sup> ed. American Medical Association; 2004. p. 301-12.
  10. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, *et al.* The Seventh Report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure: The JNC 7 report. *JAMA* 2003;289:2560-72.
  11. Khattri JB, Nepal MK. Study of depression among geriatric population in Nepal. *Nepal Med Coll J NMCJ* 2006;8:220-3.
  12. Paliana M, Bairwa M, Khurana H, Kumar N. Prevalence and predictors of depression in community-dwelling elderly in rural Haryana, India. *Indian J Community Med Off Publ Indian Assoc Prev Soc Med* 2017;42:13-8.
  13. Goel PK, Muzammil K, Kumar S, Singh JV, Raghav SK. Socio-demographic correlates of depression among elderly slum dwellers of North India. *Nepal J Epidemiol* 2014;4:316-22.
  14. Gupta A, Mohan U, Singh SK, Manar MK, Tiwari SC, Singh VK. Screening depression among elderly in a city of Southeast Asia. *J Clin Diagn Res JCDR* 2015;9:LC01-5.
  15. Sengupta P, Benjamin AI. Prevalence of depression and associated risk factors among the elderly in urban and rural field practice areas of a tertiary care institution in Ludhiana. *Indian J Public Health* 2015;59:3-8.
  16. Rathod MS, Dixit JV, Goel AD, Yadav V. Prevalence of depression in an urban geriatric population in Marathwada region of Western India. *Indian J Psychol Med* 2019;41:32.
  17. Gururaj G, Varghese M, Benegal V, Rao G. National Mental Health Survey of India, 2015-16: Prevalence, Pattern and Outcomes. Bengaluru: National Institute of Mental Health and Neuro Sciences, NIMHANS; 2016. Report No.: 129.
  18. Paliana M, Yadav V, Bairwa M, Behera P, Gupta SD, Khurana H, *et al.* Prevalence of depression among the elderly (60 years and above) population in India, 1997-2016: A systematic review and meta-analysis. *BMC Public Health* 2019;19:832.
  19. Pracheth R, Mayur S, Chowti J. Geriatric depression scale: A tool to assess depression in elderly. *Int J Med Sci Public Health* 2013;2:31-5.
  20. Taqui AM, Itrat A, Qidwai W, Qadri Z. Depression in the elderly: Does family system play a role? A cross-sectional study. *BMC Psychiatry* 2007;7:57.
  21. Jain RK, Aras RY. Depression in geriatric population in urban slums of Mumbai. *Indian J Public Health* 2007;51:112-3.
  22. Malhotra R, Chan A, Ostbye T. Prevalence and correlates of clinically significant depressive symptoms among elderly people in Sri Lanka: Findings from a national survey. *Int Psychogeriatr* 2010;22:227-36.
  23. Østbye T, Kristjansson B, Hill G, Newman SC, Brouwer RN, McDowell I. Prevalence and predictors of depression in elderly Canadians: The Canadian study of health and aging. *Chronic Dis Can* 2005;26:93-9.
  24. Cole MG, Dendukuri N. Risk factors for depression among elderly community subjects: A systematic review and meta-analysis. *Am J Psychiatry* 2003;160:1147-56.
  25. Djernes JK. Prevalence and predictors of depression in populations of elderly: A review. *Acta Psychiatr Scand* 2006;113:372-87.
  26. Levkoff SE, Chee YK, Noguchi S. *Aging in Good Health: Multidisciplinary Perspectives*. 1 ed. Springer Publishing Company; 2004. 392 p.
  27. Carayanni V, Stylianopoulou C, Koulterakis G, Babatsikou F, Koutis C. Sex differences in depression among older adults: Are older women more vulnerable than men in social risk factors? The case of open care centers for older people in Greece. *Eur J Ageing* 2012;9:177-86.
  28. Sandhya G. Geriatric depression and related factors - A cross sectional study from a rural community in South Kerala. *J Indian Acad Geriatr* 2010;6:61-3.
  29. Craft LL, Perna FM. The benefits of exercise for the clinically depressed. *Prim Care Companion J Clin Psychiatry* 2004;6:104-11.
  30. Cong L, Dou P, Chen D, Cai L. Depression and associated factors in the elderly cadres in Fuzhou, China: A community-based study. *Int J Gerontol* 2015;9:29-33.
  31. Kiely DK, Flacker JM. The protective effect of social engagement on 1-year mortality in a long-stay nursing home population. *J Clin Epidemiol* 2003;56:472-8.
  32. Lee LK, Shahar S, Chin A-V. Predicting comorbidities, nutritional status, and neuropsychological performance of depressed and nondepressed geriatric communities: A comparative study. *Int J Gerontol* 2012;6:278-84.
  33. Tu YY, Lai YL, Shin SC, Chang HJ, Li L. Factors associated with depressive mood in the elderly residing at the long-term care facilities. *Int J Gerontol* 2012;6:5-10.
  34. Simkhada R, Wasti SP, GC VS, Lee ACK. Prevalence of depressive symptoms and its associated factors in older adults: A cross-sectional study in Kathmandu, Nepal. *Aging Ment Health* 2018;22:802-7.
  35. Manandhar K, Risal A, Shrestha O, Manandhar N, Kunwar D, Koju R, *et al.* Prevalence of geriatric depression in the Kavre district, Nepal: Findings from a cross sectional community survey. *BMC Psychiatry* 2019;19:271.
  36. National Programme for Health Care of the Elderly (NPHCE): Operational guidelines [Internet]. Directorate General of

- Health Services, Ministry of Health and Family Welfare, Government of India; 2011. Available from: [https://mohfw.gov.in/sites/default/files/8324324521Operational\\_Guidelines\\_NPHCE\\_final.pdf](https://mohfw.gov.in/sites/default/files/8324324521Operational_Guidelines_NPHCE_final.pdf). [Last cited on 2019 Aug 05].
37. Verma R, Khanna P. National program of healthcare for the elderly in India: A hope for healthy ageing. *Int J Prev Med* 2013;4:5.
  38. Sinha SK, Kaur J. National mental health programme: Manpower development scheme of eleventh five-year plan. *Indian J Psychiatry* 2011;53:261-5.
  39. National Mental Health Programme. Directorate General Of Health Services [Internet]. Available from: [https://dghs.gov.in/content/1350\\_3\\_NationalMentalHealthProgramme.aspx](https://dghs.gov.in/content/1350_3_NationalMentalHealthProgramme.aspx). [Last cited on 2019 Aug 05].
  40. Maintenance and Welfare of Parents and Senior Citizens Act, 2007 [Internet]. Ministry of Law and Justice (Legislative department); 2007. Available from: <http://socialjustice.nic.in/writereaddata/UploadFile/Annexure-X635996104030434742.pdf>. [Last cited on 2019 Aug 05].