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Chronic Health Conditions, Physical Impairments and Psycho-Social Factors Leading to Depression among Older Adults in India: Evidence from Longitudinal Aging Study in India

Amitrajit Roy[1], Anurag Singh[2]&Dr Reeta Tomar[3]
[1,2]Department of Economics, Christ (deemed to be University), Nandgram Rd, Marium Nagar, Ghaziabad, Uttar Pradesh, India –201003
[3]Assistant Professor, Department of Economics Christ (deemed to be University), Nandgram Rd, Marium Nagar, Ghaziabad, Uttar Pradesh, India –201003

Abstract
Depression is a common mental illness and can be associated with several other comorbidity and aging. Again, aging is highly associated with physical impairment such as mobility issues, ADL/IADL status, and use of supportive devices. Still, there is no such extensive research about the link between depression and chronic health diseases or conditions. So, in this paper, we find the relationship between depression and physical impairments such as mobility problems, ADL/IADL status, and the use of any assist or supporting device(s) as well as to understand the effect of some psychosocial factors on the development of late-life depression.
The data is collected from the Longitudinal Ageing Study in India (LASI) Wave 1 (2017-18). A sample of 64,581 people is used for the analysis. We have used the Chi-square test and binary logistic regression. Hypertension, stroke, and Chronic health conditions are found to be highly associated with probable major depression. Physical impairments such as mobility issues, ADL/IADL difficulties, and use of supportive devices are found to be highly associated with probable major depression. Under supportive devices, the use of spectacles/contact lenses, walker/ walking sticks, wheelchairs, and adjustable shower stools /commodes is highly associated with probable major depression. Odds of depression is 2.07 times higher among those who are treated with less courtesy or respect than other people, 1.56 times higher among those who are ill-treated as people think they are not smart and 1.90 times higher among those who are threatened or harassed.
KEYWORDS: *Depression, Mental Health, CIDI-SF Scale, chronic health issues, psychosocial factors.*

Introduction

Mental health is an essential aspect of older adults' overall health and well-being (WHO, 2013). It is characterized as a state of well-being in which each person recognizes his or her potential, can cope with everyday stresses, work productively and fruitfully, and contribute to society. It is an integral part of the health and well-being of older adults (WHO, 2018). The effects of aging are felt not only in terms of physical health and functional abilities but also in mental health functioning abilities. According to studies, over 20% of older people aged 60 and up suffer from a mental or neurological disorder (excluding headaches). Mental and neurological disorders account for 7% of all disabilities among people aged 60 and up. The most common mental and neurological disorders are dementia and depression, which affect about 5% and 7% of the world's older population, respectively (WHO, 2017). Depression is a common mental illness that affects more than 264 million people worldwide (WHO,2020). Depression's effects can last a long time or come and go, and they can have a significant impact on a person's ability to function and live a happy life. A complex interaction of social, psychological, and biological factors causes depression. Women are more likely than men to suffer from depression (WHO,2020). One of the leading causes of disability, dementia, and death is depression. Depressive disorders have emerged as one of the top four leading causes of Years Lived with Disability (YLDs) globally over the 28 years 1990-2017 (James et al., 2018).
According to the National Mental Health Survey, 5.3 percent of India's population aged 18 and up suffers from depression (Gururaj et al., 2016). Depression becomes more common as people get older, and it's related to a rise in chronic morbidity conditions (Gururaj et al., 2016; Arokiasamy et al., 2015). It is considered the leading cause of suicide (Takahashi, 2001). Depression is linked to old

age and socio-economic factors (to some extent), necessitating accurate and timely diagnosis to provide proper care and support to the elderly population (Sharma et al., 2018). However, other studies show geriatric depression was not associated with increasing age, occupation, or education (Cole and Dendukuri, 2003; Osborn et al.,2003). Older people view retirement, especially forced retirement, as a psycho-traumatic event. About 90% of the people surveyed believe that poverty is a risk factor for depression. Loneliness is the second most common issue among the elderly, owing to retirement, a lack of social connections, and strained emotional ties with family members (Patricia et al.,2010).

One of the most significant demographic determinants of mental health is gender. Depression, particularly among men, is largely undiagnosed and untreated. Women were more likely than men to suffer from depression (Roxo and Perelman, 2020). Another study found that the depression prevalence rate (10.6 percent) is higher in males compared to females (9.8 percent) (Cong et al., 2015). Low and medium educated men and unemployed people tend to be less likely to have been previously diagnosed. Homemakers are less likely to have been diagnosed with depression than other women (Roxo and Perelman, 2020). Although another study states geriatric depression was not linked to female participants, advanced age, or cognitive disability (Sharma et al., 2018). According to WHODAS scores, disability is the leading cause of depression in the elderly. This score can also be used to investigate the mental health of elderly people with disabilities (Sharma et al., 2018). Somatic symptoms and depressed mood were strongly linked to functional impairment, physician- and self-rated wellbeing, and pain. Depressed mood at baseline was the only independent indicator of cognitive impairment, activities of daily living results, and physicianrated health over time (Parmelee et al., 1998). Although another study reveals that Geriatric depression was not associated cognitive impairment or further disability (Rajkumar et al., 2009).

Previous research has shown that psychiatric disorders are risk factors/co-morbid conditions or consequences of a wide range of acute and chronic conditions, including non-communicable diseases, injury and violence, and maternal and child health issues (Gururaj et al., 2016). Depression and cancer, for example, are known to coexist, and anxiety disorders have been linked to the development of cardiovascular disease. Alzheimer's disease and other dementias, as well as crashes, are two of the top ten causes of DALYs among people 75 years and older. Despite an extensive research and development campaign to recognize medications, the potential to intervene through prevention or treatment for dementia remains small, but efforts continue. There is strong evidence that a variety of modifiable risks (tobacco, physical inactivity, metabolic risks, and hearing loss) lead to the development of dementia.

Still, there is little evidence that treatments addressing these risk factors are successful (WHO, 2013). According to research, there are also strong links between depression and physical health, such as TB and cardiovascular disease.Depression in old age is a major public health concern that causes substantial morbidity and disability around the world (Cole and Dendukuri, 2003; Rajkumar et al.,2009). WHO finds depression to be the leading cause of global disability which accounts 7.5 percent of all years lived with disability in 2015. According to a meta analysis survey, the Chinese older population has a 3.86 percent depression prevalence rate, compared to a 12 percent prevalence rate in Western Europe (Chen et al., 1999). Participants who reported one or more chronic diseases had a depression incidence of 10.63 percent, compared to 6.58 percent in those who did not report any chronic diseases. Surprisingly, very less Indian literature has been found which can give snapshots of the mental disorders (especially depression) in India at the regional level. Most of the past researches are done in community level or taking sample from institutions. Secondly, most of the previous study used cross-sectional design which may have adverse impact on the casual relation. In this study longitudinal design is applied as it provides higher accuracy over time. In addition, this study is likely to provide more robust evidence on the current scenario of association between depression and multiple chronic diseases and associated physical impairments in the country.

So, in this paper, we find the relationship between depression and physical impairments such as mobility problems, ADL/IADL status, and the use of any assist or supporting device(s) as well as to understand the effect of some psychosocial factors on the development of late-life depression.

Data Source and Methodology

The data for the analysis has been taken from the Individual survey schedule of the LASI (Longitudinal Ageing Study in India), Wave 1 (2017-18) conducted by the International Institute for Population Sciences in Mumbai, India, Harvard School of Public Health, and University of Southern California (USC). The LASI Wave 1 target population included all Indian adults and elderly men and women aged 45 and above, as well as their spouses living in the same household, regardless of their age. It covered a panel survey of 72,250 people in Wave 1, and this analysis used a sample of 64,581 people. Since the LASI uses a multistage stratified area probability cluster sampling design, the estimates are derived using sampling weights provided by LASI (India level individual weight). LASI Wave 1 used a three-stage sampling design in rural areas and a four-stage sampling design in urban areas within each state. The first level in each state/UT involved choosing Primary Sampling Units (PSUs), which are sub-districts (Tehsils/Talukas), and the second stage involved choosing villages in rural areas and wards in urban areas within the chosen PSUs. In the third level, households were chosen from different villages in rural areas. In urban areas, there was an additional step in the sampling process. In the third level, one Census Enumeration Block (CEB) was selected at random in each urban area. Households from this CEB were chosen in the fourth level. The study involved 64,581 participants, with 4,018 of them estimating the diagnosis of major depression based on symptoms.

Definitions used for the study

Probable Major depression

Major depression is more than a bad mood, a "bad day," or a brief period of sadness. Major depressive symptoms are described as lasting at least two weeks, but they typically last much longer — months or even years. The most common symptom of major depression is a serious and persistent low mood, deep sorrow, or a feeling of despair. Irritability may be a sign of a bad mood. Alternatively, a person suffering from major depression can be unable to enjoy things that they normally enjoy. Low mood is often accompanied by a number of symptoms, which can differ greatly from person to person.

A traumatic life event can set off an episode of depression. However, depression does not always tend to be linked to a single incident. A major depressive disorder can happen either once or several times in a person's life. People who have experienced several episodes of severe depression can also experience periods of chronic but milder depression.

Thought can become out of sync with reality during a major depressive episode. False beliefs (delusions) or false expectations are among the "psychotic symptoms" shown by the person (hallucinations).

This research uses the CIDI-SF (Short Form Composite International Diagnostic Interview) to estimate the diagnostic symptom-based prevalence of major depression (Kessler and Ustun, 2004). This scale has been validated in field settings and is commonly used in population-based health surveys to assess a possible psychiatric diagnosis of major depression. The CIDI-SF scale has a range of 0 to 10, with a score of four or more indicating the likelihood of major depression. Sampling weight (India level individual weight) is applied in this study. The flow of questions in the formation of CIDI-SF scale is mentioned in figure 1.

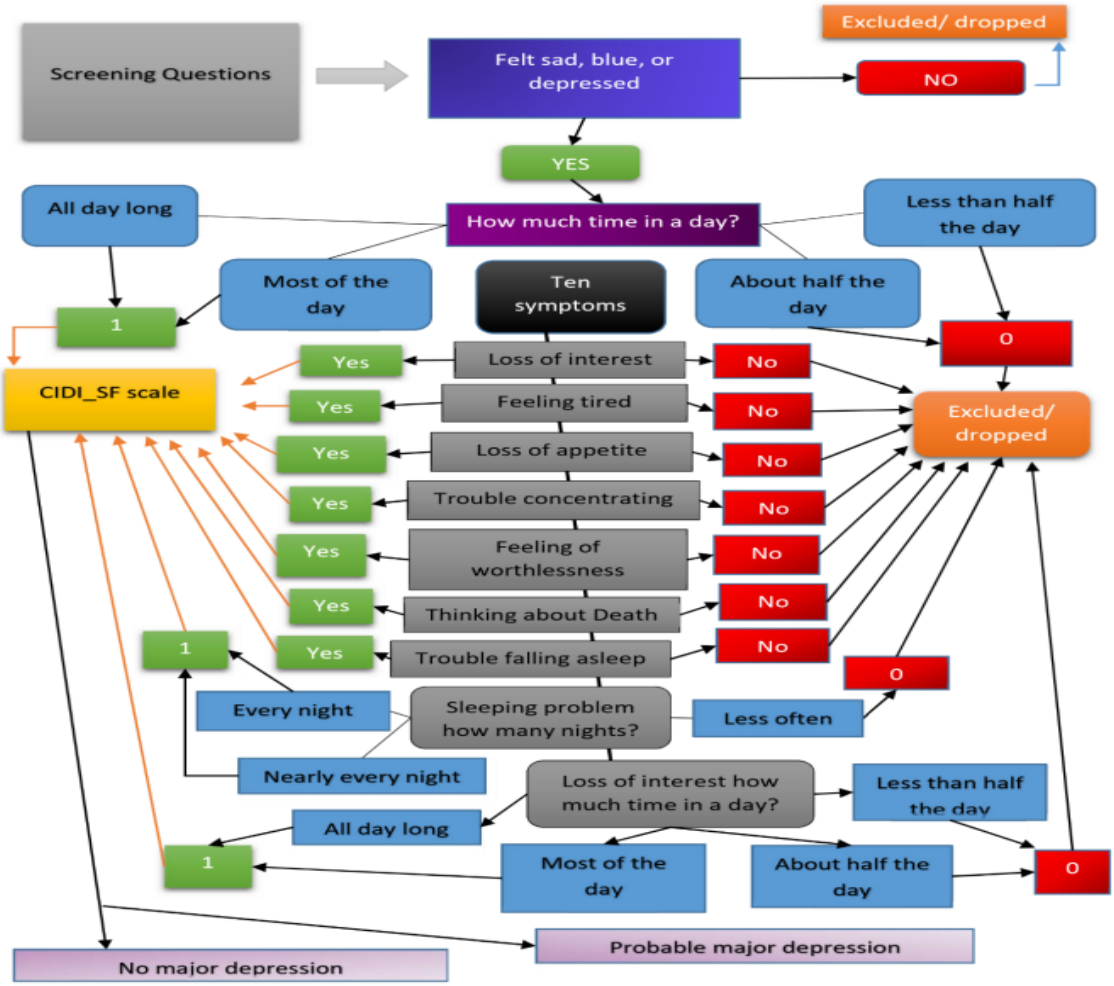

Figure 1: Flow of questions in CIDI-SF Scale

Prevalence rate

The word "disease prevalence" applies to all current cases (both old and new) in a population at a given point in time or over a period of time. "The total number of all individuals who have an attribute or disease at a given time (or over a specific period) divided by the population at risk of having the attribute or disease at this point in time or halfway through the period," according to a wider concept of prevalence. The prevalence rate of all the covariates are calculated by the following equation-

Prevalence rate (PR) = {(All new and existing cases during a given time period) / (Surveyed individual at the same time period)} × 1000

Variables under demographic and socio-economic characteristics

Age groups are categorized into three: youngest old (45-60), middle old (61-80), and oldest old (81+). Indian States and UT's are grouped into five regions: North (Jammu & Kashmir, Himachal Pradesh, Punjab, Chandigarh, Uttarakhand, Haryana, Delhi, Rajasthan, Uttar Pradesh), South (Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Puducherry, Andaman & Nicobar Islands), East (Bihar, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, Assam, West Bengal, Jharkhand), West (Gujarat, Daman & Diu, Dadra & Nagar Haveli, Maharashtra, Goa, Lakshadweep), and Central (Odisha, Chhattisgarh, Madhya Pradesh, Telangana).

Marital status is categorized as currently married, widowed, and others (divorced, separated, deserted, live-in relationship, and never married).Highest level of education is grouped into five categories:

Primary or less, Middle secondary school or Higher Secondary, Graduate or post-graduate degree, Diploma and certificate holders, Professional course/degree. Other variables include Gender, Place of Residence, and Working Status.

Variables under chronic health diseases and conditions

Under this section chronic health diseases such as hypertension, diabetes, Chronic obstructive pulmonary disease (COPD), Stroke and coronary heart disease is taken for this study. Beside these chronic diseases, chronic health conditions are also taken which are as follows

1. Sleeping disorder (variable addressing 'How often do you have trouble falling asleep' recoded),
2. Vision problem (diagnosed with any eye or vision problem or condition, including ordinary nearsightedness or farsightedness),
3. Hearing problem (diagnosed with any hearing or ear-related problem or condition),
4. Major injury (Traffic accident; Struck by person or object; Fire, flames, burn, electric Shock; Drowning; Poisoning; Animal attack or bite and Fall).

Variables under physical impairments such as mobility issues, ADL/IADL status and use of any aid/ supportive device(s)

Impairment refers to a failure or abnormality in psychological, physiological, or anatomical structure or function. The main focus of this section is whether participants have any physical impairments. This includes mobility issues, activities of daily living (ADL), and instrumental activities of daily living (IADL). Mobility issues encompass difficulties in activities like walking, sitting for extended periods, climbing stairs, and lifting heavy objects, lasting more than three months. ADL involves routine self-care activities crucial for independence, while IADL covers tasks necessary for community living, such as cooking, shopping, and managing finances. If any of these issues persist, they're coded as 1 for yes and 2 for no under impairment status.

Variables under psychosocial measures

Any component of a person's psychological and social environment that has the potential to affect their thoughts, feelings, behaviours, and general well-being is referred to as a psychosocial variable. Personality characteristics, cognitive functions, social support, financial level, cultural background, relationships with relatives, and life experiences are just a few examples of psychosocial variables. Complex interactions between these factors may have an impact on a person's physical and mental health. Psychology, sociology, and public health are just a few of the disciplines that frequently study psychosocial factors to better understand how they affect behaviour and wellbeing in people. In our study we have taken six variables as psychosocial factors which are in fact some general questions on social discrimination such as whether they are treated with less courtesy or respect than others, whether they receive poorer service than other people at restaurants or stores, whether they are considered not smart, whether they are considered to harm others, whether they are threatened or harassed and whether they receive poorer service or treatment than other people from doctors or hospitals. These variables record responses in a scale of 6 point in which 1 indicate most negative impact (everyday discrimination) and 6 means less negative impact (no discrimination at all). We have recoded all the variable into binary variable taking 1 and 2 as discrimination (coded as 1) and others points are non- discrimination (reference category coded as zero).

Statistical Methods:

For the estimation of prevalence rates in all socioeconomic and demographic variables, a statistical analysis was conducted as part of the methodological approach. The Chi-Square test was employed to investigate the potential association between depression and chronic health conditions or diseases in the second methodological step. In the third methodological step, the Chi-Square test was utilized to assess the correlation between depression and physical impairments, including mobility issues, ADL/IADL status, and the utilization of assistive devices. Furthermore, the prevalence of major probable depression was determined among individuals with physical or mental impairments and those utilizing assistive devices for daily activities (ADL).

Inferential statistics:
Chi-square test are used to check whether there is any significant association exists between the various disease and the various socio economic, demographic, biological variables.
In order to test the hypothesis, the chi square test for the association was carried out.
The Hypothesis are,
H0: Two variable are not associated (independent)
H1: Two variable are associated
The test statistics for the Chi square Distribution is given by:

$$\chi 2 = \frac{\sum(Oi - Ei)\text{^}2}{Ei}$$

Where, Oi is the observed frequency
Ei is the Expected frequency.
The observed frequency was taken from the survey data and the contingency table was constructed in Stata Software. We use the p value to conclude the results from the test. We reject the null hypothesis if p value is < 0.05 (at 5 % level of significance) and conclude there is significant association between two variable.
The binary logistic regression model is used to understand the effect of some psychosocial factors on the development of late life depression.

Binary logistic regression model:
The model is of the form:
ln(f(x)/(1-f(x)) =i. a(x) + i.b(x)+i. c(x) +….+ general effect(constant)
Where f(x) = response in binary format
a(x) = independent variable
i(a(x)) =effect of dummies or effect several categories of independent variables .
Simpler form of logistic equation that is used:
(f(x)/(1-f(x)) = Exp (i. a(x) + i.b(x)+i. c(x) +….+ general effect(constant))
Implies, f(x) = Exp (i. a(x) + i.b(x)+i. c(x) +….+ general effect(constant))/ (1+ Exp (i. a(x) + i.b(x)+i. c(x) +….+ general effect(constant)))
And,
Exp (i.(a(x)) is odds ratio of different categories of first independent variable ,(where i suggest different category suppose i varies 1 to 3 then Exp (1.a(x)) is the odds ratio of first category of first independent variable, so on)
Sly, Exp (i.b(x)) is odds ratio of second variable. And so on.

Results:
Prevalence of major depression among Older adults by demographic and socioeconomic factors
In this part we are going to see the prevalence of major probable depression in various demographic and socioeconomic factors. The prevalence of probable major depression is tabulated in figure 2 by different demographic and socioeconomic factors such as gender, age group, region, place of residence, marital status and highest level of education.
In the finding the prevalence of probable major depression is higher among females (46.4) compared to males (32.1). The prevalence of probable major depression found to be greater in the youngest old (aged between 45-60) age group (41.18) compared to middle old (33.7) and oldest old (3.77) age group. In case of regional variation, the prevalence is higher in northern states (23.76) and lower in the central region (4.23). Higher prevalence of depression is observed in rural setup (60.07) compared to urban residence (18.59). Based on marital status the prevalence of probable major depression found to be higher among those who are widowed (105.18) and the lowest prevalence is observed in other categories (61.42). If we compare between those who are currently married and those who never married, the prevalence is higher for the currently married individuals (70.83). Higher prevalence is observed among those who are illiterate or having less than primary education (79.43). Highly significant association (p= 0.000) is observed for all the predictor variables used in this section (not shown in the table).

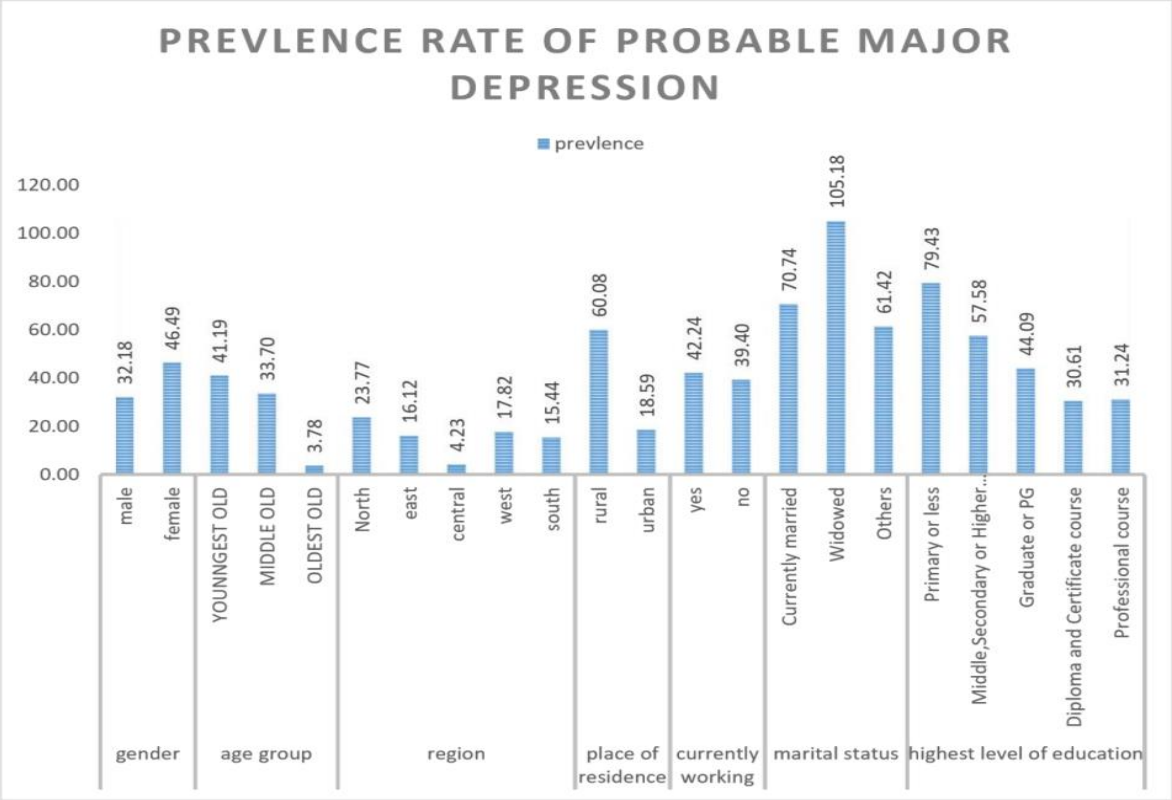

Figure 2: Prevalence of major probable depression by demographic and socio-economic factors, LASI Wave 1, 2017-18

Chronic health diseases and conditions and its association with depression

In table 1, the association between probable major depression and different chronic diseases and health conditions are highlighted. Highly significant association (p= 0.000) is observed among individuals with hypertension, stroke, sleep disorder, panic attack, vision problem, hearing or ear related problem and major injury. Previous studies also mentioned a significant association between hypertension and depression (Argyriadou et al., 2001, Ma et al., 2015). Although another study (Rajkumar et al.,2009) oppose this finding. In this study no association is found between diabetes and probable major depression which is opposed by other studies (Rajkumar et al.,2009; Leonard & Charles, 2010). Chronic obstructive pulmonary disease (COPD) is found to be not associated with depression in this study but another study (Cong et al., 2015) showed a positive and major association between this two. There is a high significance (p=0.000) between depression and stroke which is supported by several studies (Cong et al., 2015; Hörnsten et al., 2016). No association is found between coronary heart disease and probable major depression which opposed the finding of another study (Cong et al., 2015). A high significant association (p=0.000) for depression and sleep disorder and panic attack is found in this study. vision problem, hearing or ear related problem and major injury is highly significant (p=0.000) according to this study.

Chronic Health Diseases and Conditions	P-Value	Decision
1. Hypertension	0.000	Rejected
2. Diabetes	0.114	Accepted
3. Chronic Obstructive Pulmonary Disease (COPD)	0.581	Accepted
4. Stroke	0.000	Rejected
5. Coronary Heart Disease	0.166	Accepted
6. Health Conditions	0.000	Rejected

Table 1: Association of different chronic health diseases and conditions with depression, insight from LASI Wave 1, 2017-18

Physical Impairments and Depression

Mobility issues and advanced age seem to raise the risk of experiencing depressive symptoms in the elderly (Lampinen & Heikkinen, 2003). The prevalence of major probable depression among those who have any physical or mental impairment is 139.14 and among those who use of any aid or supportive device(s) to assist in the activities of daily living (ADL) is 66.11(figure-3). In this study four mobility issues are addressed such as having difficulty with walking 100 yards, having difficulty with Stooping, kneeling or crouching, having difficulty with Pulling or pushing large objects and having difficulty with Lifting or carrying weights over 5 kilos, like a heavy bag of groceries. All this mobility issues are found to be highly significant (p=0.000) in this study (Table-2).

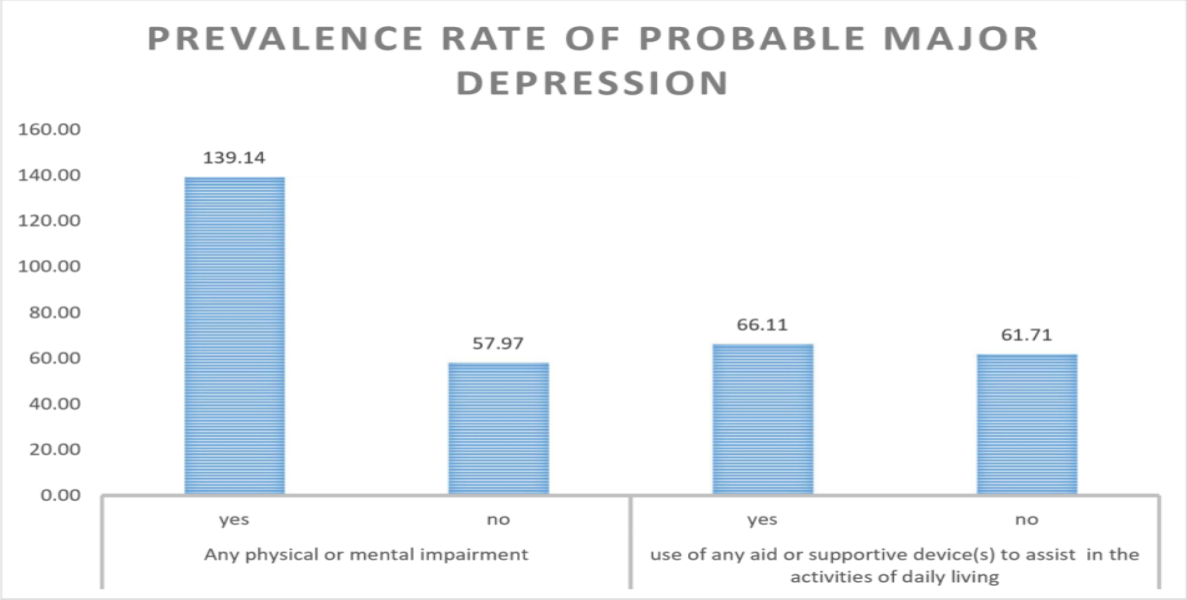

Figure 3: Prevalence of major probable depression by any physical or mental impairment and use of any aid or supported device(s) to assist in ADL, insight from LASI Wave 1, 2017-18.

ADL (activities of daily living) or IADL (instrumental activities of daily living) is a significant determinant of higher depression rates (Kim et al., 2017). In this study six ADL/IADL characteristics are included which are difficulty with dressing including putting on chappals, shoes, etc., difficulty with bathing, eating difficulties, difficulty with using the toilet including getting up and down, difficulty with Shopping for groceries and difficulty with doing work around the house or garden. All this ADL/IADL characteristics are found to be highly significant (p=0.000) in this study (table-2).

Depression is somehow associated with the use of any aid or supportive device(s) in this study. In this study highly significant association (p= 0.000) is observed among those using spectacles/contact lenses, Walker or walking Sticks and adjustable shower stools or Commodes in this study. Use of wheelchair is found to be associated (p= 0.001) with depression in this study. No association between hearing aid and major probable depression exists in this study (table-2).

Physical Impairment	P-Value	Decision
Mobility Issues	0.000	Rejected
ADL/ IADL Difficulties	0.000	Rejected
Aid or Supportive Device(s)	0.026	Rejected
1. Hearing Aid	0.681	Accepted
2. Spectacles/ Contact Lenses	0.000	Rejected
3. Walker/ Walking Sticks	0.000	Rejected
4. Wheel Chairs	0.001	Rejected
5. Adjustable Shower Stools/ Commodes	0.000	Rejected

Table 2: Association of different physical impairments such as mobility issues, ADL/IADL status and use of any aid/ supportive device(s) with depression, insight from LASI Wave 1, 2017-18

Psychosocial factors and depression

Mental health is highly associated with unfair treatment in terms of discrimination. Several focused studies prove that it has significant impact on the mental well-being of an individual (Amaro, Russo and Johnson 1987; Thompson, 1996; Meyer, 1995). Under psychosocial factors we only consider everyday discrimination factors. It is found that odds of depression is 2.07 times higher among those who are treated with less courtesy or respect than other people (p value = 0.000 < 0.05). It is also found that odds of depression is 1.56 times higher among those who are ill-treated as people think they are not smart (p value = 0.000 < 0.05). Again odds of depression is 1.90 times higher among those who are threatened or harassed (p value = 0.000 < 0.05). So there is a positive association between these three independent variables and major probable depression. However other variables such as receiving poor services in restaurants or stores, receiving poor treatment in from doctors or in hospitals or ignored because others are afraid of that individuals are not associated with major probable depression (Table-3).

CIDI_SF_Scale|	Odds Ratio	P>|z|	[95% Conf. Interval]	
You are treated with less courtesy or respect than other people| yes|	2.074336	0.000	1.742968	2.468701
You receive poorer	1.05493	0.728	0.780801	1.425301

service than other people at restaurants or stores| yes|			7	
People act as if they think you are not smart| yes|	1.568359	0.000	1.219429	2.017132
People act as if they are afraid of you | yes|	0.939238	0.689	0.6911728	1.276335
You are threatened or harassed | yes|	1.907146	0.000	1.423383	2.555326
You receive poorer service or treatment than other people from doctors or hospitals| yes|	0.7606388	0.153	0.5224346	1.107452
Constant	0.0652118	0.000	0.0631155	0.0673778

Table 3: Association of major probable depression among older adults in India with its psychosocial predictors and odds ratio, insight from LASI Wave 1, 2017-18.

Result Discussions

The study population consists of all individuals and their spouses aged 45 and above. People below the age of 45 is deliberately rejected for this analysis so that the adult responses doesn't dilute the result. The prevalence of major depression is calculated to fulfil the first objective.

This study mainly focuses on whether there is any relation between depression and any chronic health issues and how the elderly with one or several impairments deals with depression. Moreover, to understand the prevalence of major depression among different demographic and socioeconomic factors we have used age, gender, marital status, region and place of residence as demographic factors and other two (current working status and highest level of education) as socioeconomic variable.

In our study it is observed that Prevalence of major depression is higher among female than that of male. Also evident that as the age advances, the prevalence decreases. However, beliefs regarding depression is more common in older adults (Tanaka, 2020). In case of regional difference in prevalence, highest prevalence is observed in the northern region followed by west, east, south and central region. People from rural backgrounds estimated with higher prevalence of major depression than that of urban areas (almost three times higher).

Marital status is an essential factor for depression in the elderly. Widows are estimated with higher depression prevalence. Interestingly lowest prevalence of depression among people in a live-in relationship is observed in our study (not shown in the figure).

Highest level of education and current working status, which are indicators of socioeconomic status, were also linked with depression. Highest prevalence of depression is observed among those who are illiterate or educated less than primary. As the level of education increases, probable major depression decreases. However, no significant difference is observed for those who are currently working and those who are not.

Under chronic health diseases, major depression is highly associated with hypertension and stroke. No significant association is found in this study for Diabetes, Chronic Obstructive Pulmonary Disease (COPD), and Coronary Heart Disease. Chronic health condition (i.e., sleeping disorder, vision problem, hearing problem & major injury) is highly associated with depression.

A significant association is found between physical impairment and major depression in this study. There is a higher association ($p = 0.026$) between depression and the use of aid or supportive device(s). under the use of aid or supporting device (s), the hearing aid is the only supportive device that has no association with depression ($p = 0.681$). So we can say that probable major depression is a significant cause of morbidity among the youngest old age group (45-60 years of age) and is less likely as one's education level rises.

The binary logistic regression gives an insight into how psychosocial factors do affect the late life depression among older adults in India. People's perception about an individual not being smart, lower respect in the society and physical or emotional threat or harassment are positively associated with late life geriatric depression. This research has given us a fresh look at the prevalence of depression in India. Although this is similar to previous findings, we tried to present the information on subgroups of the population that are most vulnerable to depression. Most previous studies collected data from community based surveys (Rajkumar et al.,2009; Sharma et al., 2018). Here the new source of data on elderly is used in this study, which in fact, is the first longitudinal aging survey in India. It provides information on significant issues of the elderly for overall India and Indian states and UTs as well.

Conclusions

We may infer from this study that old age is not linked to depression, i.e., as age advances, prevalence of depression decreases which is a big concern among researchers as this finding tells something new. Under demographic characteristics, the female is more exposed to major depression. Maybe women are exposed to more traumatic and stressful situations (for example, family or job) in their lives and have a higher vulnerability to these events, leading to depression. It is evident from the study that depression is found to be more common in rural areas than in urban areas. This issue can be attributed to social isolation or issues, ill-treatment, less or no family support (physically, mentally, or financially), etc. Northern states are exposed to a higher prevalence of major depression, according to the present study. The highest level of education is another major factor in late life depression. People with primary or less than primary education suffer from depression more, according to this study. Higher unemployment, lower income and/or job satisfaction, lowest reading/writing proficiency, and ill-treatment in the family are plausible explanations of such depression. Under chronic diseases, hypertension and stroke are found to be highly associated with major depression. Any impairment (both physical and mental) is, in general, a leading cause of depression worldwide. In this study, the presence of physical impairment and use of the supportive device(s) both the terms are highly associated with depression. Interestingly for the use of hearing aid, there is no association with depression.

The current study adds to an increasing body of evidence that suggests a connection between chronic diseases, physical impairment, and depressive symptoms in Indian elders but does not prove that age is a risk factor for depressive symptoms. Interventions to reduce the risk of depression in the elderly may make a significant difference in their ability to succeed in aging.

The biggest limitation is using the CIDI- SF scale (Composite International Diagnostic Interview - Short Form), which is used for diagnosis of probable major depression. Other scales such as CES-D (Centre for Epidemiologic Studies Depression), Geriatric Depression Screening Scale (Yesavage et al., 1982), Brief Carroll Depression Rating Scale (Carroll et al., 1981) could also be applied in this study. Moreover, selfreported depression is wholly excluded in this study.

Under chronic health diseases, five diseases are selected purposively. Extensive studies could be performed with other major diseases like cancer, asthma, high cholesterol, other neurological or psychiatric issues, etc.

Another limitation is the way we assign the Indian states and UTs into different regions. States like Odisha and Telangana are considered under the central region with no proper justification. At a general glance, Rajasthan is located in the western part of India, but it is considered under the northern region in this study. Again some states considered under the east region (Meghalaya, Assam, AP) should be under a different part.

Depression is ubiquitous, and anyone can be exposed to it. No one wants to report by themselves whether they have depression or not. Moreover, it is not always easy to detect depression symptoms clinically, and the under detection rate of depression is higher in any setting, especially in the elderly population. Physicians and medical staff and family members, and close ones need to cooperate with the affected individuals. Maybe a better understanding and a supporting hand can reduce the incidences of the depression and improves the quality of life.

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