



Aging and self-reported morbidity in India: Socio-economic determinants and long-term trends from National Sample Survey data (2004-2018)

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Abstract— India's aged population is projected to grow significantly in the future and it may pose many social, economic, and health challenges. The present study examines the self-reported illness patterns among the aged persons in India by using information from the National Sample Survey Organization's 60th, 71st, and 75th rounds. Findings reveal that self-reported morbidity among the aged population is nearly three times higher than those in other age groups. Chronic ailments and hospitalization rates among the aged persons are also higher than the rest of population. The health profile of the aged is also changing and diseases like hypertension, heart diseases, and diabetes are more prevalent. Logistic regression analysis shows that individual characteristics like age of old, marital status, and education significantly influence the health status of the aged people. Furthermore, household factors like rural residence, family size, economic status, caste and religion also play a crucial role in determining their health status. The findings emphasize the need for targeted health policies and improved data collection methods to address the health challenges faced by older adults in India.

Keywords— morbidity, aging population, older adults, self-reported illness, determinants.

I. INTRODUCTION

There had been deliberations, research, and policy focus on India's demographic dividend and associated growth benefits in the last decade^{1,2}. This increase in share of working age-population is projected to be maximum at 56 percent of total population in 2045. Coupled with rise in proportion of working-age population in India, the share of population over the age of 60 is projected to increase from 8 percent to nearly 20 percent in 2050²⁻⁴. India had 72 million aged people above 60 years in 2001 and the projections pointed at 179 million aged in 2031 and further 319 million by 2050 which is a rather

astounding figure^{3,5}. Even the latest report on aged persons by Government of India, recognizes that the aged population face economic issues, physiological and health issues, housing related problems and are victims of many crimes⁶.

The report and recent empirical findings recognize that, firstly, a large section of aged adults are women folks in India. Secondly, majority of aged population reside in rural areas of India, where service delivery of any facility can be a challenge. Thirdly, the number of oldest of old is increasing in every decade. Fourthly, a chunk of aged population lives below poverty line. Combination of all

these factors, can make the older adults in India more vulnerable ^{7,8}. In India, the changing family system from joint to nuclear, rapid urbanization, and modernization are exposing the aged to emotional, physical and financial insecurities and may pose bigger challenges for them in future ⁹. All these issues are intertwined, wide-ranging, complex and ever changing. A diverse and heterogeneous country like India must swiftly adapt to these challenges. The major challenge amongst these is health issues. Rising life-expectancy, challenge of non-communicable diseases, multi-morbidity, and growing costs of diseases pose a major health challenge for aged population in India ⁸. Factors like economic status, level of education, unhealthy living conditions and low accessibility of health facilities can directly impact the health status of population in general and aged population in particular ^{10,11}. Therefore, for the welfare of aged population and stakeholders, it is imperative to study the morbidity pattern and disease profile of the aged in India from time to time. Even though several studies have been conducted in India to understand the morbidity and its trends for all age groups. However, there are few studies focusing on morbidity and the social factors impacting the morbidity of aged adults in India. The literature also establishes that there is a rising threat of non-communicable and chronic ailments with progressing age ⁸. Therefore, the present study focuses on the morbidity and social determinants of ill-health of aged population in India. Furthermore, the most recent nationally representative data on health was conducted in 2017-18 by the National Sample Survey Organization (NSSO). This data remains one of the few sources which can be utilized to explore the morbidity among the older adults across multiple points/years in India. The recent survey or scientific studies do not provide the comparable information on national scale and the present study may offer to establish a pre-COVID baseline. The present study can also offer a longer-term perspective on structural vulnerabilities among the aging population in relation to health conditions and socio-economic determinants of health.

II. MATERIAL AND METHODS

The present study is based upon data collected by National Sample Survey Organization (NSSO), Ministry of Statistics and Programme Implementation, India across various rounds. Over the last three decades, the NSSO has collected health-related data in the 52nd round

(July 1995-June 1996), 60th round (January 2004-June 2004), 71st round (January 2014-June 2014), and 75th round (July 2017 - June 2018) ¹²⁻¹⁵. These rounds are nationally representative and use standardized sampling procedures, repeated at regular intervals, and employ broadly comparable concepts. However, there are differences in months/seasons of data collection and sample size. Therefore, these minor variations are considered while analyzing and interpreting the data, and only the information of 60th round (2004), 71st round (2014), and 75th round (2017-18) has been utilized.

These survey round collected the information on self-reported morbidity including chronic ailment, other ailments, and hospitalizations. One of the issue with self-reported morbidity is that responses may be influenced by education, awareness, access to health services, and memory of the respondents. These issues are recognized when interpreting results. Detailed information on demographic and social factors was also collected in each of these surveys. For the present analysis, this information is utilized to explore different dimensions of morbidity like prevalence, co-morbidities, and severity among the persons aged 60 years or above i.e. aged adults. Secondly, the study examines the types of acute, chronic diseases, and reasons of hospitalization of aged adults in India. Lastly, social determinants of the self-reported illness of aged adults are explored. In the 71st and 75th round of NSSO, information on chronic illnesses, other illnesses reported in the last 15 days from the date of survey, and other illnesses reported in last one day from the date of survey was collected separately. For exploring the social determinants of illnesses, a person reporting any illnesses in these three criteria is utilized.

World Health Organization and literature on health establish that the factors impacting health status include social, economic, and physical environment, health infrastructure, person's characteristics and behaviors ^{16,17}. Among these factors, the social and economic factors often termed as Social Determinants of Health (SDH) are considered more important than healthcare and lifestyle choices ¹⁸. The research indicates that the SDH are fundamental for improving the health of individuals and for reducing health inequities ¹⁹⁻²⁴. For aged population, these social determinants can significant impact the their ability to age well and live independently ²⁵.

Empirical findings suggest that ill-health of aged is significantly associated with factors like age, gender and economic status of the aged²⁶⁻²⁸. Moreover, the health status of female old adults is associated with factors like residence, religion, work and marital status²⁹. Education and economic status also affect the morbidity among the aged population^{30,31}. Therefore, the potential factors have been divided into two groups: individual characteristics and household characteristics. The summary statistics and definition of variables are presented in table 1.

The individual characteristics include gender, age, marital status and education level. The female dummy variable is defined in the table 1. The two dummy variables of age between 70 to 80 years and age equal to or above 80 years has been included in the model to test the hypothesis that oldest of old have high possibility of falling ill. The empirical studies suggest contrasting findings regarding the impact of marriage on ill-health. However, common perception is that married adults might have emotional and financial support of each other^{32,33}. Therefore, a married dummy variable is included in the models to test the hypothesis that married older adults have a low probability of falling ill compared to those old adults who are unmarried or divorced or separated in India. Education nominal variable is included in the model to test the hypothesis that education level of the older persons impacts their health status³⁴⁻³⁶.

Household characteristics in this study include family size, household location, access to flush toilets, use of clean drinking water, use of clean fuel, and the economic status of household. Household size is included in the analysis as a large family helps to maintain good health status by providing emotional and resource support. Large family may also act as buffer to certain shocks like loss of income or stress etc.¹⁰. However, large family size can also lead to malnutrition or bad health due to limited availability of resources for every family member³⁷. Therefore, family size and square of the family size are included in the models to test any quadratic relationship between ill-health and household size.

The location of the households (rural vs urban households) can play significant role in determining health-status of older adults. Some studies highlight that urban aged population have higher chances of encountering life-style diseases like hypertension or

diabetes and therefore may have high morbidity. Moreover, the inaccessibility or low accessibility of healthcare in rural area and lack of social awareness, the rural old adults may report less ailments vis-à-vis urban aged adults³⁸⁻⁴¹. The rural variable is included in the analysis to test the hypothesis that rural older adults have lower probability of reporting illness as compared to their urban counterparts.

Additionally, nominal variable of latrine facilities is also included in the analysis. Empirical findings suggest that household having access to flush toilets or latrine facility might have low probability of falling ill as open defecation might increase the chances of falling ill. Household with better drinking facilities, like access to tap water, may also have better health, therefore, the drinking tap water variable is included in the analysis. The variable of cooking fuel is also included in the analysis. Household using clean cooking fuel like LPG or biogas might have better health status. These variables are included in the analysis to test the hypothesis that having access to flush toilets, tap water, and clean cooking fuel reduces the probability of falling sick.

Individuals from lower in social hierarchy, such as belonging to schedule caste, schedule tribe or backward castes in India, may be more prone to illness. The dummy variable for caste is utilized to test the biases against the vulnerable section of Indian society. Similarly, variable of minority religion is included in the analysis. The study tests the hypothesis whether older adults belonging to minority religion (Muslim, Sikh, Jain, Buddhist etc.) in India are more prone to ill-health.

As discussed earlier, economic status of the household can also impact the health status of aged population. Economically better-off households have better access to resources and this can prevent the households from malnutrition and diseases. However, persons belonging to better-off households are often aware and conscious about their health. For the poor due to resource constraint, the health is not on their priority list and burden of ill-health discourages them to recognize reporting and seeking health care^{42,43}. In the analysis, per capita monthly consumption of households is used instead of income, as consumption also reflects economic status of households. The per capita monthly consumption is divided into quartiles and quarter 2, 3, and 4 are included as dummy variables in the models with quarter 1 as reference category. Since the dependent variable is qualitative, logistic regression is

used to study the impact of various socio-economic factors on self-reported ill-health of older adults. The estimate of logistic regression is also presented in odds ratio for three years i.e. 2004, 2014, 2017/18.

III. RESULTS AND DISCUSSIONS

The proportion of people suffering from any illness in last two decades has been presented in the Table 2. As discussed earlier, there are several differences in time of data collection, sample size, concepts, and definitions utilized in the aforementioned rounds, therefore, these morbidity figures are not strictly comparable. However, prevalence of self-reported morbidity among the aged population is 37.18 percent, 38.23 percent, and 34.37 percent in the year 2004, 2014 and 2017-18 respectively. It is noteworthy that morbidity is consistently higher as compared to that of the entire sampled population in 2004, 2014 and 2017-18.

Some of the diseases require hospitalization and the severity of disease can be understood in terms of the course of action after sickness such as whether the patient can recover through outpatient treatment or whether the patient needs to be hospitalized in order to recover^{17,44}. Around 31 percent (2004), 30 percent (2014) and 28 percent (2017-18) of the total aged adults are outpatients. Ailments recovered through outpatient treatment is almost three times more common in aged adults as compared to the other population groups in all the three years of the study. Additionally, 6.15 percent (2004), 7.98 percent (2014) and 6.65 percent (2017-18) of aged persons required hospitalization for their ailments where in all age groups' population only 2.4 percent (2004), 4.4 percent (2014) and 3.8 percent (2017-18) of the total population required hospitalization.

The duration of ailment can be understood as the time period between the start of the illness and the recovery or death of the concerned person. Based on duration or length of sickness, diseases can be classified as acute, occurring for about a month, or chronic, continuing for more than a month. The prevalence of acute as well as chronic diseases among older adults is higher than the all age groups' population. It is noteworthy that 23.73 percent of aged population reported chronic diseases in 2014 and in 2017-18, 22.43 percent of aged population reported chronic diseases. In contrast, only 4 to 5 percent (in 2014 and in 2017-18) of the total sampled

population reported to be suffering from chronic ailments.

Co-morbidities refer to situation where patient is suffering from multiple diseases i.e. one disease or two or more than two ailments. The percentage of aged patients suffering from both the acute and chronic diseases is 0.98 percent in the year 2004 and 2.25 percent in the year 2017-18. It is evident from the above discussion and Table 2 that:

- a) Over the years, morbidity in aged persons is almost three times higher compared to other age groups in India. This aligns with the common perception that the older adults are more prone to illness compared to their young counterparts.
- b) Aged patients have higher prevalence of chronic diseases and high rate of hospitalization compared to other age groups in India.
- c) The proportion of aged adults suffering from both the acute and chronic diseases is also higher among aged patients in 2014 and 2017-18 in India.

Among these acute and chronic diseases, it would be worthwhile to discuss the kind of ailments that the aged persons in India are suffer from. The top ten acute and chronic diseases for all three rounds are presented in table 3 to illustrate the changes over time. Among the acute diseases, fevers of various types, bronchitis or acute upper respiratory infections are among the major acute diseases affecting the aged persons in India. The air pollution particularly and pollution in general in India is on the rise, this may be proving detrimental for health of aged persons in particular and for entire population in general^{45,46}. Probably due to these reasons diseases like bronchitis are among the top ranked acute diseases in aged population in India.

Secondly, diseases like joint pains, diarrhea, gastric problems, falls, accidents are also among the top ten acute diseases, consistently affected the health of aged persons throughout the study years. The diseases like joint pains and falls/accidents are also common health issues faced by aged population across the world⁴⁷⁻⁴⁹. Thirdly, only 3 to 5 percent of acute ailments are heart diseases or hypertension issues. This could be because these conditions no longer remain acute and instead become chronic diseases among the aged in India.

The information on chronic diseases also reveals that, firstly, hypertension is top ranked chronic disease in the year 2014 and 2017-18. In 2004, it is second top-ranked chronic health issue among aged persons in India. Secondly, diabetes remained highly prevalent through all the years (2004 to 2017-18) being the second or third most highly prevalent chronic issue amongst the aged persons. Thirdly, joint and bone diseases are the top ranked disease in the 2004 and third most highly ranked disease in the year 2014 and 2017-18.

Fourthly, bronchitis and bronchial asthma have consistently remained the 4th or 5th most prevalent chronic health issue among aged persons. As discussed earlier, rising air pollution may be one of the causes of this and these issues impact the aged persons all over the globe⁴⁷. Chronic ailments such as hypertension, diabetes, and heart issues together constitute the 29.04 percent of total ailments in 2004, it increased to 52.83 percent of total ailments in 2014 and further increased to 63.21 percent in 2017-18. These changes in the disease patterns, with hypertension, diabetes, and heart issues becoming dominant, can be attributed to the changes in Indian lifestyle, genetic make-up of Indians, obesity and dietary habits⁵⁰⁻⁵².

It is evident from the Table 3 that respiratory issues and bone and joint issues are not only acute but have also become chronic for many aged as only few amongst them are cured while others have to resort to unrelenting treatments over the course of their life. These findings are in sync with empirical studies on morbidity in India in general and for aged persons in particular, indicating that the disease profile is changing, with hypertension, heart issues, diabetes, asthma and arthritis being most common chronic morbidities among the aged adults⁵³⁻⁵⁸.

It is evident from Table 3 that heart diseases are the leading cause of hospitalization among the aged persons in India in 2014 and 2017-18. Heart diseases were second-ranked leading cause of hospitalization in 2004. Vision loss or cataract, accidents injuries, asthma, and fevers are among the top leading reasons of hospitalizations of aged persons in 2006, 2014 and also in 2017-18. Apart from these diseases, abdomen pain, urinary issues, joint and bone diseases are also the leading cause of hospitalization among aged persons in India. Furthermore, incidence of cancer and mortality due to cancer is increasing rapidly all over the globe especially for older population⁵⁹. The table 3 indicates

that around 4 to 5 percent of cases of hospitalization are due to cancer among the aged persons in India in 2014 and 2017-18. It appears that incidence of diseases like cancer is increasing in the last decade, but these cases are clustered around specific areas/districts of India^{15,60,61}. Aged persons majorly suffer from ailments like heart diseases, diabetes, hypertension, joint and bones diseases.

The results of logistic regression for the years 2004, 2014 and 2017-18 are presented in Table 4. The individual characteristics like age (70 to 80 years and above 80 years), marital status, and education significantly impact the health status of aged persons in 2004, 2014 and 2017-18. Among the household characteristics, rural residency, family size, religion, and per capita monthly consumption significantly impact the health status of aged persons in 2004, 2014 and 2017-18. Results show that gender was not a significant determinant of health status for aged in India.

Empirical studies consistently suggest that with increase in age of old persons, morbidity also increases⁶²⁻⁶⁶. It is evident from the Table 4 that the odds for falling ill for aged 70 to 80 years are 1.408 times that of aged below 70 years and odds for falling ill for aged 80 years or above are 1.820 times that of aged below 70 years in 2017-18. Across all the years, the probability of falling ill is higher for those aged 70 to 80 years and above 80 as compared to those aged below 70. Proportion of aged above 70 years in India has increased from 2.8 percent in 2001 to 3.3 percent in 2011 and projected to be 5.6 percent of total population in 2031⁶. This signifies that the Indian health policy should prioritize aged persons especially oldest of old in near future. The Government of India launched schemes like National Programme for health care of aged and Senior citizen health insurance scheme or Pradhan Mantri Jan Arogya Yojana (PM-JAY) in the past. Such schemes should be strengthened for the welfare of aged persons in India.

Married aged persons have lower probability of falling ill compared to single or widowed aged person. The odds of being ill for married aged adults is 0.811 times that of unmarried or widowed, or divorced aged adults. This finding is in accordance with other study on Varanasi District of India⁶⁴. For single, separated, divorced or widower aged person, the loneliness significantly impacts the physical and emotional well-being and therefore, the social scientists have called it loneliness epidemic especially in developed nations⁶⁷. This

signifies that in old age the company of partner is crucial support against age-related challenges.

Studies worldwide suggest that persons with better education and better economic status have low probability of falling ill⁶⁸⁻⁷¹. However, some empirical evidences suggest that education has little impact on health-status, especially self-reported health status. Self-reported health status or morbidity in case of developing countries can be slightly misleading as poor often do not consider their ailments to be serious because they face a bigger challenge of survival⁷². However, in comparison to poor, better-off households due to better awareness and education level may be reporting even minor health issues as ailments. Therefore, self-reported morbidity surveys are often criticized and some social scientists believe that self-reported morbidity surveys must be supplemented with observed morbidity^{73,74}. In present study, the odd ratios of educated persons are 1.258 in 2004, 1.323 in 2014, and 1.352 in 2017-18. This implies that better-educated aged persons have high probability of falling ill. The odds ratios and statistically significant coefficients of per capita monthly consumption of quartile two, three and four across all the three years signify that economically better-off households have high probability of facing illness. These type of findings were also reported by studies in India and Bangladesh that economically better-off households have higher probability of morbidity and even have reported higher incidence of multi-morbidity^{75,76}.

Rural residency significantly impacts the health status of aged persons in 2014 and 2017-18. The statistically significant odds ratios less than one in 2014 and 2017-18 implies that aged belonging to rural areas have low probability of reporting any ailment vis-à-vis their urban counterparts. It indicates that there are rural-urban differentials in morbidity of aged in India. Family size and the probability of reporting any ailment, exhibit U-shaped relationship. As household size increases, the probability of reporting any ailment decreases in case of aged persons, but beyond a certain point, the family size has an increasing impact on the probability of reporting any ailment. The smaller families may not be able to give the necessary physical and emotional support/care to the old person and in large families due to resource constraint, they may not be able to support the aged adults. Therefore, in both the cases the probability of reporting an ailment was higher for aged.

Aged persons belonging to disadvantaged social groups (schedule castes, schedule tribes and backward castes) have low probability of reporting any ailment in 2004 and 2017-18. This aligns with the argument that economically better-off have high probability of reporting any ailment among the aged person. In Indian context, caste often proxies socio-economic status and such groups have high probability of living in adverse socio-economic conditions and poverty⁷⁷.

The households belonging to minority religion in India (Muslim, Sikh, Christian, Jain, Buddhist etc.) have high probability of reporting any ailment of aged adults in the year 2004, 2014 and 2017-18. The statistically significant odds ratio in 2004 (1.315), 2014 (1.416), and 2017-18 (1.258) exhibit that odds of falling ill are higher for minorities as against the persons practising majority religion in India. The aged in households with tapped water drinking facilities reported to have low probability of falling ill as compared other aged adults in 2004 and 2017-18. The aged residing in household having flush toilet facility has statistically significant impact on the health status of aged adults in 2014.

These findings are in sync with the common perception that better drinking facilities and/or latrine facilities improve the health status of general population. The variables like cooking fuel, latrine facilities, and drinking water are crucial social determinants of health. However, in case of present analysis these are statistically significant in one or two years only. It may be due to the fact that majority of aged adults are suffering from chronic ailments and these facilities are commonly believed to reduce the incidence of acute or communicable diseases.

The F- test statistic and its p-value for all the three models suggest that models are a good fit⁷⁸. The area under ROC for three years' regression models also support model adequacy⁷⁹⁻⁸¹.

IV. LIMITATIONS

The study is based on self-reported morbidity and one of the challenges with self-reported morbidity studies is that poor and uneducated households may tend to under-report the ailments and better-educated or economically better-off households are more likely to recognize or report ailments. This could also explain the higher probability of ailments in economically better-off and educated older adults in the present study. Furthermore, the estimates across rounds of NSSO

should be interpreted as indicative as these round maintain broader conceptual consistency but also have minor variations in concepts and definitions across rounds. The study is based upon cross-sectional data as longitudinal data may shed more insights on the casual effects of various determinants, therefore, the associations reported between self-reported ailments and socio-economic characteristics be interpreted as correlations. Furthermore, the various caste sub-groups and religious groups are combined into one broad category/group as very small numbers exists in sampled older adults with ailments in some religious groups or social groups. This aggregation may obscure heterogeneity within different social groups or religious minority communities.

V. CONCLUSION

Over the three nationally representative rounds of NSSO from 2004 to 2018, the aged adults in India consistently reported higher morbidity than the other age groups. The chronic conditions such as hypertension, diabetes, heart disease, asthma and arthritis were also on rise and these outcomes point to persistent health vulnerabilities of aged adults in India. These findings provide a crucial pre-COVID baseline and the trends can be assessed for future studies.

The analysis indicates that both individual and household characteristics like age, marital status, household size, economic position, caste and religion are associated with self-reported ill-health. Particularly, the better-off or more educated older adults reported more morbidity than the disadvantaged or less educated counterparts. This may be due to the differential awareness, diagnosis and health-seeking behaviour rather than the low morbidity among the poorer groups especially in case of self-reported morbidity surveys. This also underscore the gap in current morbidity surveillance systems. This also demonstrate the continuing need of strengthening the data systems to capture morbidity particularly among the economically and socially marginalized older adults. The self-reported surveys may provide valuable insights on long-term inequities but can be complemented with clinically observed morbidity and real-time e-health records. Furthermore, as policies under the National Action Plan for the Welfare of Senior Citizens and initiatives like digital health records expand, attention to chronic disease management, access to health care,

and reduction of structural barriers can be crucial for welfare of older adults. Upgraded, comparable, and real-time updated digital data can be critical to design responsive policies for older adults and can be better suited to monitor the true progress in the health status of India's elderly.

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Table 1: Descriptive statistics and Definition of variables included in the analysis

Variable	Definition	2004		2014		2017-18			
		Prop	S.E.	Prop	S.E.	Prop	S.E.		
Individual Characteristics	Female	Nominal Variable: =1 if person is female, =0 if person is male		0.499	0.004	0.508	0.007	0.509	0.006
	Married	Nominal Variable: =1 if the person is currently married, =0 for unmarried, widowed or divorced.		0.592	0.004	0.634	0.007	0.647	0.006
	Age70_80	Nominal Variable: =1 if person's age is 70 to 80 years, =0 otherwise		0.299	0.003	0.272	0.006	0.289	0.005
	Ageabove80	Nominal Variable: =1 if person's age equal to or above 80 years, =0 otherwise		0.049	0.001	0.083	0.003	0.050	0.002
	Educated	Nominal Variable: =1 if person is educated and attended school, =0, otherwise		0.325	0.003	0.415	0.006	0.445	0.006
Household Characteristics	HH Size*	Number of family members in the household		5.54	3.20	5.14	2.74	5.07	2.63
	HH Size sq*	Square of number of family members in the household		40.87	51.87	33.94	38.33	32.67	35.26
	Rural	Nominal Variable: =1 if persons lives in rural area, =0 persons lives in Urban area.		0.757	0.003	0.687	0.006	0.671	0.005
	Flush Latrine	Nominal Variable: =1 if HH uses Flush/pour flush latrine, =0 other type of latrine or open defecation		0.287	0.003	0.436	0.006	0.732	0.005
	Drinking Water	Nominal Variable: =1 if HH uses tap drinking water, =0 if HH uses other water sources		0.388	0.003	0.484	0.007	0.515	0.006
	Cooking Fuel	Nominal Variable: =1 if HH uses LPG, Biogas or natural gas or electricity for cooking, =0 other cooking fuel		0.231	0.003	0.386	0.006	0.590	0.005
	Caste	Nominal Variable: =1 if person belongs to lower caste category (SC/ST/OBC), =0 otherwise		0.638	0.003	0.670	0.006	0.659	0.006

Religion	Dummy=1 if person belongs to Minority religion, =0 if person is Hindu	0.157	0.002	0.166	0.005	0.167	0.004
PCMC Q1 (Base Category)	If person resides in HH having per capita monthly consumption in quartile 1,	0.249	0.003	0.281	0.006	0.239	0.005
PCMC Q2	If person resides in HH having per capita monthly consumption in quartile 2,	0.245	0.003	0.204	0.006	0.242	0.005
PCMC Q3	If person resides in HH having per capita monthly consumption in quartile 3,	0.261	0.003	0.253	0.006	0.260	0.005
PCMC Q4	If person resides in HH having per capita monthly consumption in quartile 4,	0.243	0.003	0.260	0.006	0.258	0.005
Ill-health	Dummy=1 if a person is reporting any Chronic ailment or acute ailment in 15 days or in the last 1 day from date of survey, 0 otherwise	0.310	0.003	0.302	0.006	0.277	0.005
Number of aged persons		34,831		27,245		42,762	

Note: * Household size and households size square are continuous variables their mean and standard deviations are reported.

Source: ¹³⁻¹⁵.

Table 2: Prevalence of Morbidity among aged population in India: Proportion of ailing persons (PAP) in India (In percentage)

Ill-health		PAP of old adults			PAP of all age groups		
		2004	2014	2017-18	2004	2014	2017-18
Prevalence (Outpatients + Hospitalization)		37.18	38.23	34.37	11.52	14.19	11.28
Severity	Outpatient	31.03	30.25	27.72	9.12	9.79	7.48
	Hospitalization	6.15	7.98	6.65	2.40	4.40	3.80
Duration	Chronic		23.73	22.43		4.84	3.66
	Acute	31.03#	7.44	5.74	9.12#	5.17	3.90
	Acute*		0.08	2.05		0.07	1.00
Co-	No illness	68.97	69.75	72.27	90.87	90.21	92.52

morbidity s	Only Acute or Chronic	31.03#	29.27	25.47	9.12#	9.51	6.44
	Both Acute and Chronic		0.98	2.25		0.28	1.04
Number of persons		34,705	27,245	42,762	3,81,565	3,33,104	5,55,351

Note:

1. Chronic ailment mean any person self-reported that he/she is suffering from chronic ailments.
2. Acute mean any person suffering from any ailment apart from chronic diseases in the last 15 days from the date of survey.
3. Acute* mean any person suffering from any ailment apart from chronic diseases in the last one day before the date of survey.
4. Outpatient mean any person reporting any ailment in Chronic ailment, acute ailment in 15 days or acute ailment in the last 1 day from date of survey. For calculating outpatient, in case of any person suffering from chronic and acute both then it was counted as one ailment only.
5. Hospitalization mean the person was hospitalized during last 365 days from the date of survey.
6. # signify that in 60th round the information on all the diseases (Acute or Chronic) in last 15 days from date of survey was recorded collectively.

Source: ¹³⁻¹⁵.

Table 3: Nature of ailments of aged adults in India: Acute, Chronic ailments and Hospitalization

Rank	Acute Diseases			Chronic Diseases			Hospitalization		
	2004 [§]	2014	2017-18	2004 [§]	2014	2017-18	2004	2014	2017-18
1	Fever of unknown origin (16.61)	All other fevers (25.47)	All other fevers (34.36)	Disorders of joints and bones (16.53)	Hypertension (25.7)	Hypertension (31.17)	Other Diagnosed Ailments (11.04)	Heart Diseases (11.84)	Heart Diseases (14.32)
2	Other diagnosed ailments (13.51)	Acute upper respiratory infections (9.12)	Joint or bone disease (10.02)	Hypertension (13.63)	Diabetes (20.6)	Diabetes (25.08)	Heart Disease (10.72)	Cataract (7.72)	All others fevers (9.74)
3	Disorders of joints and bones (8.39)	Joint or bone disease (9.00)	Acute upper respiratory infections (7.75)	Diabetes mellitus (9.36)	Joint or bone disease (14.89)	Joint or bone disease (11.71)	Cataract (9.08)	Fevers (7.08)	Accidents Injuries (7.31)
4	Bronchial	Back or body	Fever with loss	Other	Bronchial	Heart disease	Bronchial	Accidents	Bronchial

	asthma (6.69)	aches (7.91)	of consciousness (6.07)	diagnosed ailments (8.46)	asthma (7.74)	(6.96)	Asthma (7.74)	Injuries (6.76)	Asthma (5.94)
5	Respiratory including ear/nose/throat ailments (6.48)	Gastric Issues (6.3)	Fever due to Diphtheria, Whooping Cough (4.4)	Bronchial asthma (7.69)	Heart disease (6.53)	Bronchial asthma (5.68)	Accidents Injuries (6.53)	Bronchial Asthma (6.23)	Cataract (5.66)
6	Diarrhea/dysentery (5.88)	Diarrheas/dysentery (5.76)	Back or body aches (3.61)	Cataract (6.39)	Gastric and peptic ulcers (3.08)	Back or body aches (2.27)	Kidney or Urinary Diseases (5.8)	Pain in Abdomen (5.48)	Pain in Abdomen (5.53)
7	Hypertension (4.98)	Cough with not diagnosed as TB (4.41)	Heart disease (3.22)	Heart disease (6.05)	Back or body aches (2.9)	Gastric and peptic ulcers (1.96)	Diabetes (4.35)	Hypertension (5.22)	Joint and Bone Diseases (5.4)
8	Gastritis/gastric or peptic ulcer (4.79)	Accidents, injury and falls (3.23)	Diarrheas/dysentery (3.00)	Locomotor (4.11)	Other diseases (2.9)	Other diseases (1.69)	Diarrhea/Dysentery (4.15)	Urinary Issues (4.92)	Stroke (5.24)
9	Other ailments (3.75)	Hypertension (3.06)	Gastric and peptic ulcers (2.95)	Visual including blindness (3.88)	Muscles Issues (1.84)	Muscles Issues (1.68)	Hypertension (4.12)	Cancers (4.74)	Cancers (4.57)
10	Fractures/Poisoning (2.83)	Fever with loss of consciousness (2.89)	Cough with not diagnosed as TB (2.76)	Hearing (3.3)	Skin disease (1.16)	Stroke/hemiplegia (1.61)	Fevers of Unknown Origin (4.02)	Joint and Bone Diseases (4.37)	Diabetes (4.49)

Note: Figure in parenthesis is percentage of cases of a particular ailment out of total number of ailments. § for Chronic diseases the duration of ailment is equal to higher than 30 days. In case of acute ailments, the duration of ailment is less than 30 days. For the year 2014 and 2017-18, respondent declared that the particular person is suffering from chronic disease or not.

Source: ¹³⁻¹⁵.

Table 4: Social determinants of ill-health of aged adults in India: Logit regression models

Variable	2004				2014				2017-18				Significant in number of models
	Coeff	S.E.	P-value	OR	Coeff	S.E.	P-value	OR	Coeff	S.E.	P-value	OR	
Female	0.050	0.040	0.205	1.052	0.082	0.071	0.247	1.086	0.017	0.060	0.776	1.017	0
Married	-0.104	0.039	0.008	0.901	-0.144	0.073	0.049	0.866	-0.210	0.063	0.001	0.811	3
Age70 to 80	0.415	0.038	0.000	1.514	0.141	0.071	0.047	1.151	0.342	0.061	0.000	1.408	3
Ageabove80	0.529	0.077	0.000	1.698	0.344	0.109	0.002	1.410	0.599	0.106	0.000	1.820	3
Educated	0.229	0.043	0.000	1.258	0.280	0.074	0.000	1.323	0.302	0.065	0.000	1.352	3
HH Size	-0.045	0.014	0.001	0.956	-0.106	0.028	0.000	0.900	-0.126	0.026	0.000	0.882	3
HH Size sq	0.001	0.001	0.120	1.001	0.003	0.002	0.049	1.003	0.005	0.002	0.002	1.005	2
Rural	-0.040	0.049	0.418	0.961	-0.137	0.078	0.079	0.872	-0.117	0.066	0.076	0.890	2
Flush Latrine	0.023	0.051	0.653	1.023	-0.149	0.078	0.056	0.862	0.034	0.077	0.660	1.034	1
Drinking Water	-0.064	0.038	0.096	0.938	-0.103	0.068	0.132	0.903	-0.111	0.059	0.059	0.895	2
Cooking Fuel	0.078	0.054	0.149	1.081	0.090	0.089	0.313	1.094	-0.087	0.070	0.214	0.917	0
Caste	-0.178	0.038	0.000	0.837	0.069	0.070	0.325	1.072	-0.153	0.060	0.012	0.859	2
Religion	0.274	0.044	0.000	1.315	0.348	0.076	0.000	1.416	0.230	0.066	0.000	1.258	3
PCMC Q2	0.185	0.053	0.000	1.203	0.250	0.099	0.011	1.284	0.286	0.091	0.002	1.332	3
PCMC Q3	0.262	0.052	0.000	1.300	0.370	0.095	0.000	1.448	0.517	0.090	0.000	1.676	3
PCMC Q4	0.513	0.061	0.000	1.671	0.651	0.102	0.000	1.917	0.666	0.099	0.000	1.947	3
Cons	-0.959	0.096	0.000	0.383	-0.821	0.176	0.000	0.440	-0.829	0.158	0.000	0.436	3
Number of Obs.	34,831				27,245				42,762				
Goodness of Fit F-Statistics	1.44		0.33		1.26		0.25		1.40		0.18		
Area under ROC	0.618				0.619				0.635				

Source: ¹³⁻¹⁵.