

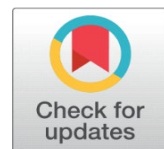
# MORBIDITY PATTERN OF HOSPITALIZATION AND ASSOCIATED OUT OF POCKET EXPENDITURE: EVIDENCE FROM NSSO (2017-2018)



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## ABSTRACT

In 2018, according to the National Sample Survey Report, the number of cases of hospitalization per 1000 persons in 365 days was 29 in India (26 per 1000 in rural and 34 per 1000 in urban areas). The increase in access to healthcare has also brought with it a massive spike in costs. India is rapidly undergoing an epidemiological transition with a sudden change in the disease profile of its population. This study aimed to analyze hospitalization due to different factors like age and morbidity and its effect on health care utilization from nationally representative data from 2018 among the total population of India. 75th round of National Sample Survey Organisation (NSSO) conducted in July 2017- June 2018 has been used to examine what are the determinant factors that affect the hospitalization and mean monthly disease-specific expenditure in the different age group populations in India. We have used cross-tabulation to understand the association between morbidity patterns and healthcare utilization with other socio-demographic variables. A set of logistic regression analyses was carried out to understand the role of age patterns on hospitalization. A log-linear regression model was used to understand the significant predictors of out-of-pocket expenditure (OOPE). The study finds that there is a highest percentage of hospitalization in case of non-communicable morbidity than the other morbidity for all age groups. Out of all the respondents 52.2% male and 50.9% female took admission in public hospitals to get rid from asthma. In private hospitals 45% male and 46.04% female took admission for this same reason. A positive coefficient indicates that as the value of the independent variable increases, the mean of the dependent variable also tends to increase. A negative coefficient suggests that as the independent variable increases, the dependent variable tends to decrease.

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**Keywords:** Morbidity, Health Care Utilization, Out of Pocket Expenditure

## 1. INTRODUCTION

The improvement in life expectancy in India has not been matched by the improvements in levels of health of the population. Hospital care is an important aspect of any health system, especially regarding the treatment of the more vulnerable morbidity among the total population. Monitoring change in hospitalization rates is important to highlight the necessity for health policies to allocate resources and services to respond to the diverse healthcare needs of different segments of the population. Studies in India have analyzed hospitalization, but they are restricted in their approach and lack comprehensive assessment of rate over time. The purpose of this study was to analyze the



determinant factors that affect the multiple hospitalization and mean monthly disease-specific expenditure in the different age groups from nationally representative data in 2018 of India and for various disease groups. Hospital care is an important aspect of any health system, especially regarding the factors that affect the multiple hospitalizations in India.

Monitoring change in hospitalization rates is important to highlight the necessity for health policies to allocate resources and services to respond to the diverse healthcare needs of different segments of the population. The data on hospitalization can be considered relatively free from biases of underreporting of ailments that do not require hospitalization. In addition, the study explores the pattern of the disease profile of the population.

In this era, healthcare facilities have improved greatly, which has increased the life expectancy of humanity, but all these costs and so the role of economic evaluations of healthcare interventions has become increasingly important, especially in developing countries like India.

In 2018, according to the National Sample Survey Report, the number of cases of hospitalization per 1000 persons in 365 days is 29 in India (26 per 1000 in rural and 34 per 1000 in urban areas). Most of these hospitalizations are for infections, but a significant number also for treatment for cancer and blood-related morbidity. The increase in access to healthcare has also brought with it a massive spike in costs. Between 2004 and 2014, for example, the average medical expenditure per hospitalization for urban patients increased by about 176%, and for rural patients, it jumped by a little over 160%.

The review of literature was conducted through database report and manual searches of published research reports, books and research papers. The key words used were age and disease as the determinant hospitalizations and its association with mean monthly expenditure among the total population of India.

A study was conducted to examine the trends of disease and age pattern of hospitalization and associated costs in India during 1995–2014 for selected morbidity and in four broad categories: communicable morbidity, non-communicable morbidity (NCDs), injuries and others. The authors found that there has been more than twofold increase in hospitalization rates in India during the last two decades, and significantly higher rates were observed among infants and older adults and for these reasons healthcare costs in India is rising. [Kastor and Mohanty \(2018\)](#)

There is also another cross-sectional survey among hospitalized BPL families in the beneficiaries and non-beneficiaries' groups to compare the proportion incurring OOPE and its extent during hospitalization, pre/post-hospitalization periods in different domains. The authors found that proportion of non-beneficiaries who incurred OOPE was higher than the beneficiaries but it was not statistically significant. They also said that non-beneficiary status was significantly associated with OOPE above median independently and also after adjusting for various covariates. [Gupt et al. \(2016\)](#)

Another study was conducted for investigating the socioeconomic differentials in the impact of out-of-pocket-health-expenditure (OOPHE) on impoverishment in China and India using Multivariate analysis. The authors found that lower wealth status and inpatient, as well as outpatient care, increase the odds of falling below the poverty line significantly (with the extent much higher in the case of inpatient care) due to OOPHE in both China and India. [Kumar et al. \(2015\)](#)

Government of India and National health policy draft. 2014 gives some evidence that suggests that the health care cost in India has become more

impoverishing than ever before, and almost all hospitalizations, even in public facilities, lead to catastrophic health expenditures.

Another research was conducted to examine the gender difference in HCE in the short-term and major morbidity in India, and understand the role of factors underlying the difference. Using IHDS data they calculate morbidity prevalence rate and mean HCE by gender, and examine the adjusted effect of gender on major morbidity-related HCE by using a two-part regression model and performed Oaxaca-Blinder decomposition of the gender gap in HCE in major morbidity to understand the contribution of demographic and socioeconomic factors. The authors found that Indians spend less on female health care than on male health care. Most of the gender gap in HCE is not due to differential distribution of factors affecting HCE. [Rajaratnam et al. \(2010\)](#)

A study was done aimed to estimate worldwide mortality in men and women aged 15-59 years. The researchers compiled a database of 3889 measurements of adult mortality for 187 countries from 1970 to 2010 using vital registration data and census and survey data for deaths in the household corrected for completeness, and sibling history data from surveys corrected for survival bias. They used Gaussian process regression to generate yearly estimates of the probability of death between the ages of 15 years and 60 years for men and women for every country with uncertainty intervals that indicate sampling and non-sampling error. After the analysis they found that the prevention of premature adult death is just as important for global health policy as the improvement of child survival. Routine monitoring of adult mortality should be given much greater emphasis. [Kastor and Mohanty \(2018\)](#)

Another research was done based upon data from the HCUP 2003 Nationwide Inpatient Sample (NIS). The researchers found that compared to non-elderly patients, a larger proportion of hospitalizations among the elderly were admitted through the emergency department and the proportion of elderly patients who died during their hospital stay was five times higher than in-hospital deaths among the non-elderly. [Russo and Elixhauser \(2006\)](#)

Evidence suggests that household health spending in India accounts for 71% of total health spending and is catastrophic to a large number of households. Hospitalization accounts for a large share of medical spending, and the pattern of hospitalization varies across different ages. Besides, the growth rate of household health spending is faster than the growth rate of household economic wellbeing.

## 2. NEED FOR THE STUDY

India is rapidly undergoing an epidemiological transition with a sudden change in the disease profile of its population. The purpose of this study was to analyse hospitalization due to different factors like age and nature ailment from nationally representative data from 2018 among the total population of India. This study is useful in knowing the scenario of Hospitalization in India for various morbidity. In this study we have tried to find out what kind of disease affect the hospitalization in the different age group in India. In the country like India, it is also important to see how the hospitalization due to different morbidity affect the mean monthly expenditure on individual. In the country like India people are more likely to go to the private care due to poor infrastructure and for this the monthly expenditure due to different morbidity go high day by day. The relevance of our study is to understand how the expenditure due to hospitalization increase because it is very hard to manage for the poor people to afford the monthly expenses. So better health infrastructure in the government hospital will reduce these expenses accordingly.

**Objectives:** Objectives of the current study are as follows

- 1) To assess the age and sex pattern of hospitalization due to broad classification of disease with a special focus on selected non-communicable diseases.
- 2) To assess the out-of-pocket expenditure and its determinants during hospitalization for selected non-communicable diseases.

### **3. DATA AND METHODOLOGY**

75th round of National Sample Survey Organisation (NSSO) conducted in July 2017- June 2018 has been used to examine what are the determinant factors that affect the hospitalization and mean monthly disease-specific expenditure in the different age group populations in India.

The NSSO was set up in 1950 as a permanent survey organized by the Ministry of Statistics and Program Implementation to collect data on various facets of the Indian economy through nationwide sample surveys in order to assist in socioeconomic planning and policy making. Besides gathering information on its core areas, that is, household consumption and expenditure, the NSSO collects detailed information on the hospitalization of the population from the selected households.

These surveys record the utilization of healthcare for inpatient, with hospitalization episodes in 365 days reference period recorded in detail. Individual-level data were collected for a nationally representative sample of 555,115 in NSS 2017- 2018. Samples with missing values for the independent variables were dropped to do a complete case analysis. In the occupied households that could be interviewed, this study utilizes data from 60,924 numbers of total respondents who have reported hospitalization during 365 days. Schedule 25.0 of the 75th round has detailed information on types of ailments, duration of ailment, healthcare utilisation, hospitalization, source of treatment (public/private) and expenditure incurred by each member of the sampled households on treatment of morbidity/hospitalization.

#### **Description of variables**

##### **Outcome variables**

The dependent variables used in this study are, percentage of persons hospitalized in the age group of 0 to 80 & above years and the mean monthly costs per hospitalization by public and private hospitals for each specified morbidity and the different age group. The following study focuses the different factors that are associated with the hospitalization and the mean monthly expenditure due to hospitalization.

##### **Exposure variable**

The independent variables used in the study are age group (0-1, 1-4, 5-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80 & above) of the total men and women, place of residence, education of the respondents, place of hospitalization, duration of stay, number times of hospitalization, nature of the ailment, MPCE (Monthly Per Capita Expenditure. Literature suggests that these variables seem to be affecting hospitalization.

### **Analytical approach**

For the study, we have classified the morbidity into four broad categories, namely Communicable disease, non-Communicable disease, Injuries and Other morbidity and five specific non-communicable morbidity i.e, Hypertension, Asthma, Diabetes, Heart disease and Cancer. Injuries include all the accidental injury, road traffic accidents, burns and corrosions, poisoning, intentional self-harm and assault. Other non-communicable diseases include anemia, bleeding disorders, malaria, Goiter, and other morbidities of thyroid, headache, weakness in limb muscles, decreased hearing, cataracts, etc. Communicable morbidity includes fever due to diphtheria, rash, tuberculosis jaundice, diarrhea, undernutrition, worm infection, and skin infection etc. A broad classification of morbidity has been given in the annexure. In this analysis respiratory disease has been computed for child age group in the communicable disease and for adult age group respiratory has been computed as non-communicable morbidity (NCD).

We have taken the hospitalization rate per 10000 people. The hospitalization rate is defined as the number of persons being hospitalized due to a specific disease in the age group among the total exposed population at risk in that age group. Hospitalization rate is expressed per 10000 people.

#### ***Hospitalization Rate***

$$= \frac{\text{No. of persons being hospitalized due to specific disease in the age group}}{\text{Total exposed at risk in that age group}} * 10000$$

A set of logistic regression analyses was carried out to understand the role of age pattern on hospitalization. The dependent variables used are hospitalization for specific morbidity with a special focus on selected non-communicable disease and the independent variables used are age group, sex, place of residence (rural-urban), educational attainment and monthly per capita expenditure.

A log linear regression model was used to understand the significant predictors of out-of-pocket expenditure. It is used to assess the effects of dichotomous explanatory variables on a dependent variable. The dependent variable used is log of OOPE and the independent variables are frequently denoted as yes and no. This regression has been used to understand the significant predictors of OOPE. Unstandardized beta (B) coefficient value represents in the analysis to estimate the effects of predictor variables on dependent variable. This would mean that amount of change in dependent variable due to change of 1 unit of predictor (or independent) variable.

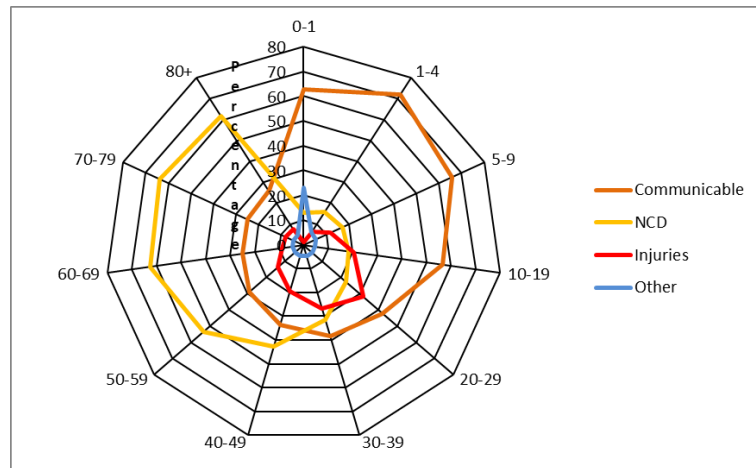
## **4. RESULTS AND FINDINGS**

It is important to study the hospitalization among the total population in terms of age, education, marital status, social groups, wealth quintile, place of residence and different morbidity. The age pattern of hospitalization due to different disease has been shown in the (Table 1). The age distribution of hospitalization has been estimated from the 75th round of National Sample Survey Organisation data from July 2017 – June 2018.

**Table 1** Percentage distribution of respondents who were hospitalized during past one year of the survey date by broad classification of morbidity according to age groups

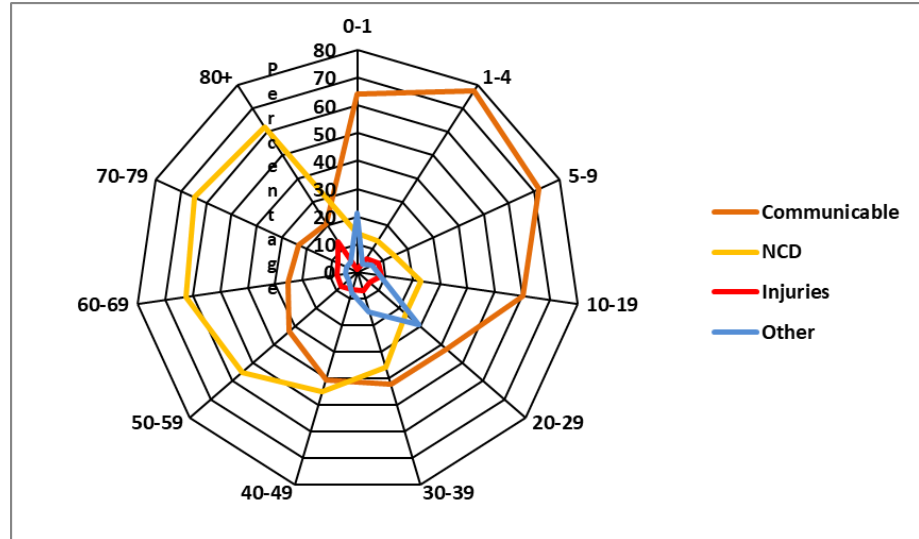
Age Group	Total					Male					Female				
	All Causes	Communicable	NCD	Injuries	Other	All Causes	Communicable	NCD	Injuries	Other	All Causes	Communicable	NCD	Injuries	Other
0-1	5.3	62.0	13.8	1.1	23.2	6.6	62.8	12.9	1.1	23.2	3.9	64.1	13.8	1.1	21.1
1-4	8.6	73.6	15.2	6.2	5.1	10.2	72.2	15.7	6.2	5.9	6.9	77.5	13.5	5.7	3.4
5-9	6.8	68.0	16.2	10.4	5.4	7.9	65.9	17.1	11.8	5.2	5.5	71.9	14.4	8.2	5.5
10-19	8.2	57.7	20.5	15.8	6.0	9.1	56.5	18.3	20.5	4.6	7.1	60.0	23.2	8.7	8.1
20-29	8.6	42.1	22.9	17.4	17.6	6.8	42.2	22.7	31.9	3.2	11.0	42.3	22.9	5.6	29.3
30-39	10.0	40.3	34.3	15.4	10.0	7.4	38.3	31.5	26.6	3.6	13.7	42.3	35.8	7.0	14.9
40-49	16.3	36.9	44.5	12.5	6.1	15.1	33.5	42.9	19.5	4.1	17.5	40.7	44.9	6.8	7.7
50-59	18.3	30.5	54.7	10.8	4.0	19.2	29.2	53.4	13.9	3.5	17.5	32.6	55.1	7.8	4.4
60-69	25.7	24.4	63.4	8.1	4.1	27.2	25.0	62.7	8.9	3.4	24.0	25.3	62.5	7.7	4.5
70-79	33.1	23.6	65.3	7.3	3.8	36.0	25.0	63.9	7.9	3.3	29.7	23.4	64.7	7.7	4.3
80+	35.5	22.3	63.1	9.6	4.9	40.6	26.0	61.7	7.7	4.6	30.6	20.8	62.0	12.8	4.4
All Ages	12.0	40.1	40.4	11.9	7.6	11.6	40.1	38.6	16.6	4.7	12.4	41.5	40.5	7.2	10.8
N	66,228	26,541	26,777	7,875	5,035	33,102	13,287	12,775	5,499	1,541	30,672	12,739	12,434	2,196	3,303

From the Table 1 it is observed that there is a highest percentage of hospitalization in case of non-communicable morbidity than the other morbidity for all age groups. For the past one-year percentage of communicable and non-communicable morbidity is almost same for all ages. It is seen that highest percentage of children under age five and persons aged 60+ are admitted to the hospital for communicable morbidity and non-communicable morbidity respectively. In case of injuries percentage of infants' hospitalization is lowest and age group 20 – 29 shows the highest percentage.



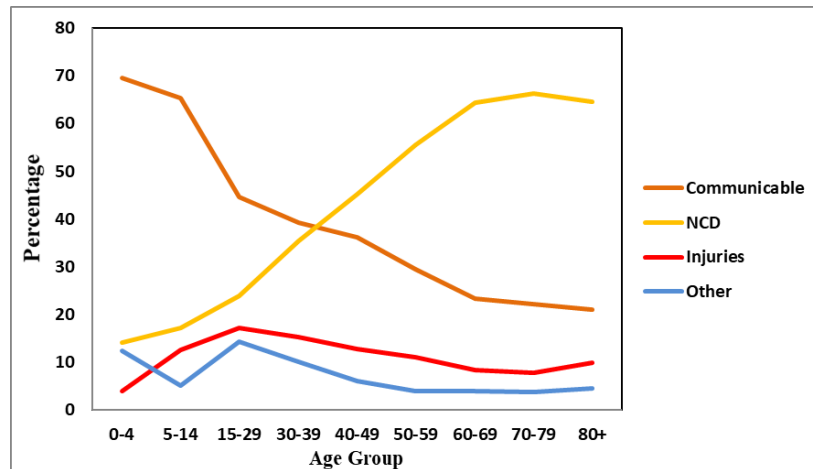
**Figure 1** Percentage distribution of male respondents who were hospitalized due to different morbidity according to age groups





**Figure 2** Percentage distribution of female respondents who were hospitalized due to different morbidity according to age groups

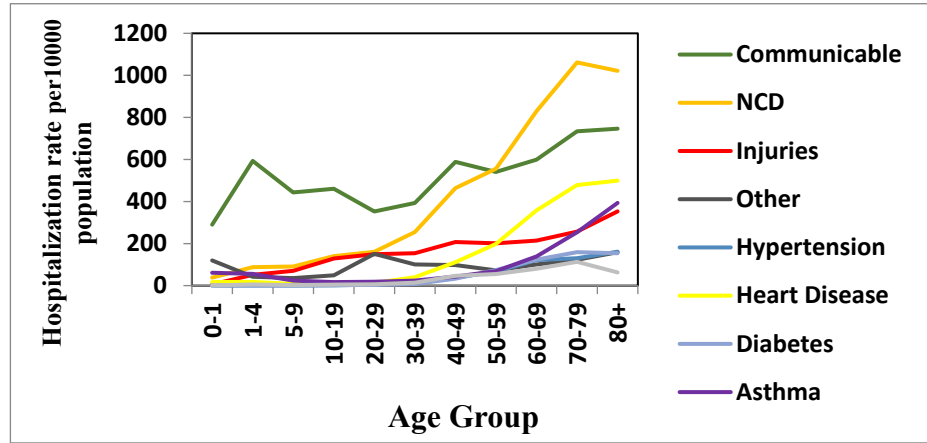
Regarding the gender scenario it is quite different as it is seen in the [Figure 1](#) as it shows that in communicable morbidity female percentage is greater than male percentage except 70+ age group due to immunization power. In 50 – 59 age group percentage of hospitalization due to NCD is highest in female than male. Table 1.1 shows that the probability of injury is highest in male than the female irrespective of all age groups.



**Figure 3** Percentage distribution of total respondents who were hospitalized due to different morbidity according to specific age groups

[Figure 3](#) reveals that there is the highest percentage of hospitalization in case of non-communicable morbidity than the other morbidity for all age groups. In this table we have taken a different age group. The age group has been classified for children and adult population, where for the child age group has been classified into two (0-4 and 5-14) and for adult population we have classified the age group into seven (15-29, 30-39, 40-49, 50-59, 60-69, 70-79 and 80+). For the past one-year percentage of hospitalized patients due to communicable morbidity is in the second position. The highest percentage of children under age five and persons aged 60+

are admitted to the hospital for communicable morbidity and non-communicable morbidity respectively. In case of injuries percentage of infants' hospitalization is lowest and age group 15 – 29 shows the highest percentage.



**Figure 4** Age pattern of hospitalization rate in India by different morbidity

Figure 4 shows that age pattern of hospitalization rate due to communicable morbidity and non-communicable morbidity is highest in 80+ age group and 70 – 79 age group respectively. Due to illness of aged persons hospitalization rate for illness is highest in 80+ age group. Although the patients having hypertension and heart morbidity are mainly shown in 80+ age group. Hospitalization rate due to cancer and diabetes is highest in 70 – 79 age group. Hospitalization due to asthma cases is highest in 80+ age group due to heart related problems and other types of illness.

In Table 2 comparison with gender shows the situation is totally different. In case of communicable morbidity male patients ages 70 and above have highest risk for hospitalization. This scenario is same for injuries and other morbidity. For hypertension, asthma, heart morbidity, diabetes and cancer, hospitalization rate is highest in male patients in 80+ age group. In 0 – 10 age group the hospitalization rate for hypertension, diabetes and cancer is lowest. But in case of asthma the hospitalization rate slightly differs and hospitalization rate is highest in male for this same age group.

**Table 2** Age pattern of hospitalization rate (per 10000 population) by broad classification of disease, and selected non-communicable morbidity

Age group	Total									
	All Causes	Communi cable	NCD	Injuries	Other	Hyperten sion	Heart Disease	Diabetes	Asthma	Cancer
0-1	534	290	38	6	120	0	17	1	61	1
1-4	855	593	88	52	42	0	18	1	56	5
5-9	675	443	91	70	36	0	8	0	24	2
10-19	815	460	141	129	49	1	10	3	17	5
20-29	860	353	161	150	151	5	13	3	18	7
30-39	1002	393	254	154	101	14	40	8	24	14
40-49	1630	589	464	207	98	38	112	33	43	47
50-59	1833	541	556	201	73	67	198	74	69	55



Morbidity Pattern of Hospitalization And Associated Out of Pocket Expenditure: Evidence From Nsso (2017-2018)

<b>60-69</b>	2566	599	830	214	101	122	358	124	139	80
<b>70-79</b>	3310	734	1062	257	123	130	478	159	254	113
<b>80+</b>	3551	747	1021	353	159	161	499	154	393	63
<b>All Ages</b>	1195	465	293	144	91	25	81	25	47	23
<b>N</b>	63,774	24,830	15,636	7,695	4,844	1,351	4,302	1,360	2,513	1,243
<b>Age group</b>	<b>Male</b>									
	<b>All Causes</b>	<b>Communi cable</b>	<b>NCD</b>	<b>Injuries</b>	<b>Other</b>	<b>Hyperten sion</b>	<b>Heart Disease</b>	<b>Diabetes</b>	<b>Asthma</b>	<b>Cancer</b>
<b>0-1</b>	663	349	48	7	154	0	19	1	85	1
<b>1-4</b>	1017	687	111	63	60	0	19	1	66	10
<b>5-9</b>	785	498	114	92	41	0	9	0	28	2
<b>10-19</b>	907	500	143	186	42	1	9	2	19	5
<b>20-29</b>	676	277	128	216	22	3	11	2	13	4
<b>30-39</b>	735	271	175	196	27	6	29	6	18	8
<b>40-49</b>	1509	483	403	294	62	29	128	29	46	35
<b>50-59</b>	1916	537	527	266	67	64	256	76	71	52
<b>60-69</b>	2723	632	828	242	93	104	452	137	151	82
<b>70-79</b>	3602	820	1148	283	119	102	559	167	284	121
<b>80+</b>	4064	929	1154	313	185	139	646	128	487	82
<b>All Ages</b>	1156	441	266	192	54	20	91	24	49	20
<b>N</b>	33,102	12,616	7,608	5,499	1,541	565	2,597	696	1,402	578
<b>Age group/ Sex</b>	<b>Female</b>									
	<b>All Causes</b>	<b>Communi cable</b>	<b>NCD</b>	<b>Injuries</b>	<b>Other</b>	<b>Hyperten sion</b>	<b>Heart Disease</b>	<b>Diabetes</b>	<b>Asthma</b>	<b>Cancer</b>
<b>0-1</b>	393	226	27	4	83	0	15	1	35	1
<b>1-4</b>	688	496	65	39	23	1	17	1	46	1
<b>5-9</b>	552	383	65	45	30	0	6	1	19	3
<b>10-19</b>	707	414	137	61	57	1	12	4	15	5
<b>20-29</b>	1103	453	205	62	323	7	14	4	26	10
<b>30-39</b>	1373	562	365	96	204	25	56	10	33	23
<b>40-49</b>	1753	697	527	119	134	47	95	37	40	59
<b>50-59</b>	1751	545	584	137	78	70	142	72	66	58
<b>60-69</b>	2403	565	831	185	109	140	260	110	126	78
<b>70-79</b>	2972	635	961	228	127	163	385	150	218	105
<b>80+</b>	3056	570	893	392	134	184	357	179	303	45
<b>All Ages</b>	1240	494	325	89	134	32	69	27	45	27
<b>N</b>	30,672	12,214	8,028	2,196	3,303	786	1,705	664	1,111	665

some valuable information has been found from [Table 3](#) on percent distribution of respondents who were admitted to the hospital in one year prior to survey by

type of health facilities according to sex. After analyzing we may comment on the private and public hospitals where the respondents admitted for their health problems. It is clearly seen that the maximum persons go to private hospitals than the public hospitals for their treatment just because of huge and extra-ordinary facilities and also for a good environment. Within all the morbidity male persons admitted in private hospitals due to heart morbidity like open heart surgery, valve blockage etc. and female patients admitted in private hospitals due to cancer like

**Table 3 Percent distribution of respondents who were admitted to the hospital in one year prior to survey by type of health facilities according to Sex**

All Age Groups	Total			Male			Female		
	Public	Private	Other	Public	Private	Other	Public	Private	Other
All Causes	46.01	51.38	2.61	44.9	52.5	2.6	47.24	50.16	2.6
Communicable	49.8	48.2	2.0	48.8	49.3	1.9	50.84	47.14	2.01
NCD	41.9	54.4	3.8	41.0	55.0	4.1	42.68	53.8	3.52
Injuries	43.7	54.6	1.8	43.1	55.2	1.8	45.13	53.1	1.78
Other	48.6	48.9	2.4	41.1	55.9	2.9	52.13	45.66	2.21
Hypertension	48.3	49.4	2.3	48.3	49.4	2.3	48.35	49.36	2.29
Heart Disease	39.3	57.8	2.9	38.9	58.0	3.1	39.92	57.5	2.58
Diabetes	42.4	54.9	2.7	43.5	54.3	2.2	41.27	55.57	3.16
Asthma	51.6	45.5	2.9	52.2	45.0	2.8	50.9	46.04	3.06
Cancer	39.6	54.6	5.8	43.4	51.0	5.5	36.24	57.74	6.02
N	29,343	32,771	1,667	14,851	17,385	869	14,492	15,386	798

breast cancer, skin cancer, throat cancer etc.

We are aware of the suicide case in India due to hypertension. [Table 3](#) reveals the information that near about 49.5 percentage of population irrespective of sex admitted in private hospitals to get rid from hypertension. Due to pollution and many other reasons asthma is a common disease now a days. Out of all the respondents 52.2% male and 50.9% female took admission in public hospitals to get rid from asthma. In private hospitals 45% male and 46.04% female took admission for this same reason. So, we may say that peoples also depend on public hospitals because in some of the reputed public hospitals caring facilities of asthma is better than the public hospitals.

Odds of having morbidity have been calculated in the [Table 4](#), we found that people aged 80 and above have higher odds of having hypertension. In case of diabetes there is a 95% probability that the highest odds ratio would be likely to lie in the range 5.27 – 9.23 assuming there is no bias or confounding. 70 – 79 age group has high prevalence of having heart morbidity and cancer than the other age groups. In case of asthma higher odds is found in 80+ aged people and then in infants.

**Table 4 Results of logistic regression for hospitalization due to broad classification of morbidity, India, 2017-18**

Background Characteristics	Communicable morbidity		NCDs		Injuries		Others	
	Odds Ratio	CI (LL-UL)	Odds Ratio	CI (LL-UL)	Odds Ratio	CI (LL-UL)	Odds Ratio	CI (LL-UL)
<b>Age group (years)</b>								
<1	1.92***	1.71-2.14	0.21***	0.17-0.25	0.05***	0.03-0.07	3.37***	2.89-3.93
1-4	3.58***	3.23-3.96	0.31***	0.27-0.36	0.28***	0.23-0.33	0.55***	0.45-0.67
5-9	2.89***	2.63-3.16	0.48***	0.43-0.54	0.57***	0.50-0.65	0.55***	0.46-0.66
10-19	2.07***	1.93-2.20	0.64***	0.59-0.68	0.89***	0.81-0.97	0.63***	0.55-0.71
20-29	1.09***	1.02-1.16	0.68***	0.63-0.73	1.13***	1.03-1.23	1.98***	1.80-2.18
<b>30-39®</b>								
40-49	0.89***	0.83-0.94	1.16***	1.08-1.24	0.77***	0.70-0.83	0.59***	0.53-0.66
50-59	0.66***	0.61-0.70	1.26***	1.17-1.34	0.62***	0.57-0.68	0.40***	0.35-0.44
60-69	0.48***	0.44-0.51	1.37***	1.27-1.47	0.45***	0.40-0.49	0.41***	0.35-0.46
70-79	0.45***	0.41-0.49	1.35***	1.24-1.47	0.41***	0.35-0.46	0.41***	0.34-0.48
80+	0.42***	0.36-0.47	1.14***	1.00-1.29	0.55***	0.46-0.67	0.49***	0.37-0.63
<b>Sex</b>								
<b>Male®</b>								
Female	1.14***	1.11-1.18	1.14***	1.09-1.18	0.35***	0.33-0.37	2.46***	2.30-2.63
<b>Place of residence</b>								
<b>Rural®</b>								
Urban	1.00	0.97-1.04	0.94***	0.91-0.98	0.80***	0.76-0.84	1.00	0.94-1.07
<b>Education level</b>								
<b>No education®</b>								
Primary	1.06**	1.01-1.11	0.85***	0.80-0.89	0.88***	0.81-0.94	1.12**	1.01-1.23
Secondary	0.96	0.91-1.01	0.91***	0.86-0.95	0.97	0.90-1.04	1.07	0.97-1.18
Higher secondary	0.97	0.91-1.02	0.90***	0.85-0.96	1.03	0.94-1.11	0.98	0.88-1.10
<b>MPCE</b>								
<b>Poorest®</b>								
Poorer	0.95	0.90-1.01	0.96	0.90-1.02	1.03	0.95-1.12	1.00	0.90-1.11
Middle	1.01	0.95-1.06	0.96	0.90-1.02	0.92	0.84-1.00	0.95	0.86-1.05
Richer	0.99	0.94-1.05	0.98	0.92-1.04	0.92**	0.84-0.99	0.93	0.84-1.03
Richest	1.01	0.96-1.06	0.91***	0.86-0.96	0.86***	0.80-0.93	0.94	0.85-1.04
Constant	0.60***	0.56-0.65	0.37***	0.34-0.40	0.37***	0.33-0.40	0.06**	0.05-0.07

® is a reference category

Significance Level:  $\leq .01 = ***$ ,  $\leq .05 = **$ ,  $\leq .1 = *$ 

It is clearly seen in Table 5 that females are at much higher chance of having hypertension. Although the prevalence of heart morbidity (highest odds ratio 1.33) and other morbidity are higher in urban areas. People having primarily education level are having higher odds of having hypertension and asthma whereas people completed higher secondary education level are having higher odds of having

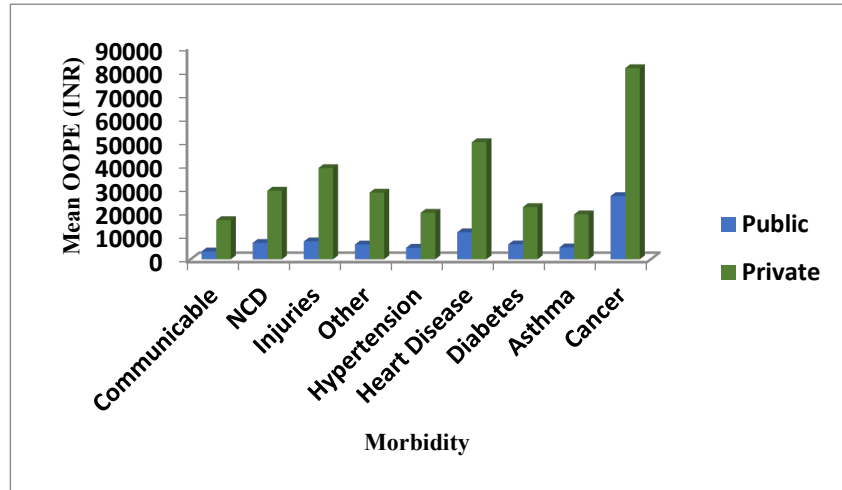
diabetes, heart morbidity and cancer. Middle class people are at the higher risk of being hypertension and asthma with CI (0.94, 1.4) and (0.98, 1.31) respectively. Richest people are at high risk in case of diabetes, heart morbidity and cancer.

**Table 5 Results of logistic regression for hospitalization due to four selected non communicable morbidity, India, 2017-18**

Background Characteristics	Hypertension		Diabetes		Heart Disease		Cancer		Asthma	
	Odds Ratio	CI (LL-UL)	Odds Ratio	CI (LL-UL)	Odds Ratio	CI (LL-UL)	Odds Ratio	CI (LL-UL)	Odds Ratio	CI (LL-UL)
<b>Age group (years)</b>										
<1	1		0.27**	0.08-0.85	0.89	0.66-1.18	0.17***	0.05-0.54	4.00***	3.19-5.01
1-4	0.03***	0.00-0.22	0.19***	0.06-0.60	0.53***	0.39-0.72	0.63***	0.37-1.08	2.32***	1.84-2.91
5-9	0.05***	0.01-0.18	0.08***	0.02-0.34	0.29***	0.20-0.40	0.22***	0.11-0.43	1.33***	1.03-1.70
10-19	0.09***	0.04-0.17	0.48***	0.30-0.76	0.28***	0.22-0.36	0.46***	0.32-0.65	0.84	0.67-1.05
20-29	0.38***	0.26-0.54	0.46***	0.30-0.72	0.34***	0.27-0.42	0.47***	0.34-0.64	0.97	0.79-1.20
<b>30-39†</b>										
40-49	1.68***	1.33-2.11	2.72***	2.03-3.64	1.71***	1.49-1.97	2.14***	1.71-2.68	1.08	0.89-1.31
50-59	2.78***	2.24-3.45	5.75***	4.36-7.56	2.87***	2.52-3.27	2.34***	1.87-2.92	1.48***	1.24-1.77
60-69	3.70***	2.96-4.61	6.98***	5.27-9.23	3.79***	3.32-4.34	2.59***	2.04-3.28	2.14***	1.79-2.57
70-79	3.08***	2.38-3.97	6.75***	5.00-9.12	3.94***	3.40-4.57	2.75***	2.10-3.59	3.11***	2.56-3.77
80+	3.61***	2.62-4.97	6.22***	4.30-8.98	3.78***	3.11-4.58	1.21	0.75-1.97	4.71***	3.75-5.91
<b>Sex</b>										
<b>Male®</b>										
Female	1.53***	1.36-1.71	1.10	0.98-1.22	0.72***	0.67-0.77	1.32***	1.17-1.48	0.87***	0.80-0.95
<b>Place of residence</b>										
<b>Rural®</b>										
Urban	1.26***	1.11-1.41	1.30***	1.46-1.15	1.33***	1.24-1.43	0.92	0.81-1.04	1.19***	1.09-1.29
<b>Education level</b>										
<b>No education®</b>										
Primary	1.11	0.96-1.29	1.24***	1.07-1.44	1.13***	1.03-1.24	1.36***	1.15-1.60	0.88**	0.78-0.99
Secondary	1.09	0.98-1.28	1.24***	1.06-1.45	1.21***	1.10-1.33	1.35***	1.13-1.60	0.74***	0.65-0.83
Higher secondary	1.04	0.86-1.25	1.27***	1.05-1.53	1.20***	1.07-1.34	1.71***	1.40-2.09	0.65***	0.56-0.76
<b>MPCE</b>										
<b>Poorest®</b>										
Poorer	1.00	0.81-1.23	0.98	0.79-1.20	1.20***	1.06-1.36	1.40***	1.10-1.76	1.06	0.92-1.22
Middle	1.15	0.94-1.40	1.06	0.86-1.29	1.11	0.98-1.25	1.43***	1.14-1.80	1.14*	0.98-1.31
Richer	1.13	0.92-1.37	1.04	0.85-1.27	1.28***	1.14-1.44	1.29**	1.02-1.61	1.04	0.90-1.19
Richest	1.12	0.92-1.35	1.13	0.93-1.36	1.43***	1.27-1.60	1.44***	1.16-1.78	1.12*	0.98-1.28
Constant	0.01***	0.01-0.01	0.01***	0.00-0.00	0.03***	0.03-0.04	0.01***	0.00-0.01	0.03***	0.02-0.03

® is a reference category

Significance Level: ≤ .01 = \*\*\*, ≤.05 = \*\*, ≤ .1 = \*



**Figure 5** Mean Out of pocket expenditure (INR) per hospitalization stay in public and private health care

From Table 6 (Figure 5) it is clearly seen that in total cases mean cases of hospitalization is highest in heart morbidity and lowest in communicable morbidity. Reimbursement is highest in Cancer patients and lowest for the patients who are affected by communicable morbidity. Due to chemotherapy or change of blood in the whole body due to blood cancer, out of pocket expenditure is normally high. So, it's a normal issue. After that heart disease expenditure comes due to some special medicines and extra cares.

**Table 6** Total expenditure (Mean), Reimbursement and OOPE per Hospitalization stay in public and private health care facilities by classification of morbidity, India, 2017-18

Causes of Hospitalization	Total			Public facilities			Private facilities		
	Total Expenditure (Mean)	Reimbursement	OOPE	Total Expenditure (Mean)	Reimbursement	OOPE	Total Expenditure (Mean)	Reimbursement	OOPE
Communicable	12593	2719	9874	3940	598	3342	21239	4646	16594
NCD	25019	5735	19284	7600	669	6931	38505	9396	29109
Injuries	30126	5477	24649	9122	1537	7585	46713	7985	38728
Other	21344	4149	17195	7016	747	6269	35435	7158	28277
Hypertension	17056	4758	12298	5144	264	4880	28497	8758	19739
Heart Disease	49852	15838	34015	13597	2158	11439	74171	24472	49699
Diabetes	19163	4601	14561	6321	996	5325	28961	6796	22164
Asthma	14480	2815	11665	5517	482	5035	24570	5523	19047
Cancer	78417	20294	58123	36486	9659	26827	109927	28797	81130

As facilities are good in private hospitals than the public hospitals or nursing homes, so means, reimbursement and OOPE is higher in private hospitals. There are not too much relative changes are shown due to the causes of hospitalization. Everything is dependent on Causes of Hospitalization whatever the sector is private or public.

It is found in Table 7 that the household income or savings is highest in communicable morbidity and lowest in cancer. In case of borrowing cancer has

highest percentage and diabetes has lowest percentage. For others communicable morbidity has lowest percentage and cancer and highest percentage.

**Table 7 Major sources of funding for out-of-pocket spending on hospitalization**

Cause of Hospitalisation	Household Income/savings	Borrowing	Others
All Causes	84.4	9.6	6.0
Communicable	87.2	7.9	4.9
NCD	82.8	10.9	6.3
Injuries	80.7	12.8	6.5
Other	83.8	9.4	6.9
Hypertension	86.0	7.9	6.1
Heart Disease	82.7	9.8	7.5
Diabetes	86.6	6.7	6.7
Asthma	85.1	8.8	6.2
Cancer	73.3	14.2	12.6

## 5. RESULTS FROM REGRESSION

In the Table 8 the sign of a regression coefficient tells that whether there is a positive or negative correlation between each independent variable and the dependent variable. A positive coefficient indicates that as the value of the independent variable increases, the mean of the dependent variable also tends to increase. A negative coefficient suggests that as the independent variable increases, the dependent variable tends to decrease.

**Table 8 A log-linear regression model was used to understand the significant predictors of OOPE**

Independent Variables	Unstandardized beta coefficients	95% CI	
		Lower Limit	Upper Limit
<b>Type of Morbidity</b>			
<b>Communicable (No®)</b>			
Yes	0.335***	0.295	0.374
<b>Other NCDs (No®)</b>			
Yes	-0.060***	-0.102	-0.018
<b>Injuries (No®)</b>			
Yes	-0.129***	-0.179	-0.078
<b>Heart Morbidity (No®)</b>			
Yes	-0.438***	-0.499	-0.377
<b>Cancer (No®)</b>			
Yes	-0.644***	-0.744	-0.544
<b>Age (in completed years)</b>	0.040***	0.034	0.045
<b>Sex (Male®)</b>			
Female	-0.065***	-0.092	-0.039
<b>Place of residence (Rural®)</b>			



<b>Urban</b>	-0.056***	-0.083	-0.029
<b>Education level (Illiterate®)</b>			
<b>Literate</b>	0.088***	0.059	0.118
<b>MPCE (1-10)</b>	0.025***	0.016	0.035
<b>Place of Hospitalization Public (No®)</b>			
<b>Yes</b>	1.666***	1.639	1.693
<b>Place of Hospitalization Private (No®)</b>			
<b>Yes</b>	0.000		
<b>Duration of Stay (continuous variable)</b>	0.064***	0.062	0.065
<b>Number of hospitalizations</b>	0.008	-0.011	0.027
<b>Constant</b>	8.204***	8.015	8.394

® is a reference category

Significance Level:  $\leq .01 = ***$ ,  $\leq .05 = **$ ,  $\leq .1 = *$

The coefficient value signifies how much the mean of the dependent variable changes given a one-unit shift in the independent variable while holding other variables in the model constant. This property of holding the other variables constant is crucial because it allows us to assess the effect of each variable in isolation from the other. As we see that out-of-pocket expenditure is increasing those who having different diseases. OOPE is much higher among the population those who live in the urban places as compare to the rural area. Those who are suffering from communicable disease the OOPE is high among them than those who are not suffering. As the age increase the out of pocket is also increasing as we can see from the table. The out-of-pocket expenses is also high among the male as compare to the female population. As we see that there is no significant effect of out-of-pocket expenditure on private hospitalization care. There is positive increase of expenditure as the increase of duration stay in hospital and the number of times people are being hospitalized during one year prior to our survey.

## 6. DISCUSSION AND CONCLUSIONS

In our study we found that the maximum number of children aged under 14 has been hospitalized due to communicable, perinatal problem and nutritional problems. This is happened in India due to deficiency of required nutrition among children. Older adults are more likely to be hospitalized due to non-communicable morbidity there is also hospitalization among the older adults due to respiratory disease. Older adults have the high risk of having non communicable and respiratory disease in India. It is also found from our study that the hospitalization due accidents are more likely to be high among male in India. Adults are being hospitalized due to injuries in the country like India. We found from our study that the high prevalence in injuries caused hospitalization among adults' population. Prevalence of cardio vascular disease is also high among the older adults in India. Hospitalization due to diabetes is very much less because people often go to the clinic at regular interval because our study restricted to only inpatient care during 365 days. Those have hospitalized due to cancer during 365 days they often go the clinic more than one time. We have found in our study that mean duration stay in hospital is maximum among the people above aged 60 years. We have found in our study that mean monthly expenditure due to non-communicable disease and cancer is more likely to

be high in the older adults and expenditure in the private care is much higher than the government health care. People expense due to disease in the private care and this is why expenditure is likely to be high in India. It is also clear that government hospital cannot provide the proper health facilities to satisfy the patients, due to this lack of infrastructure in the government hospital people prefer to go in the private care though the expense is much high than the government. Increased public spending on health has a direct effect in reducing out-of-pocket health expenditure and could be helpful for many households to overcome the medical poverty trap. The Ministry of Health and Family Welfare, Government of India, launched the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Disease and Stroke (NPCDCS) in 2010. These initiatives may be helpful in averting many households from the medical poverty trap.

## 7. STRENGTHS AND LIMITATIONS OF THIS STUDY

- 1) The use of large-scale data from nationwide surveys in India provides the most updated trends for hospitalization.
- 2) The evidence on the changing hospitalization rate by age groups and the reasons behind the increased hospitalization of the older population is timely for policy formulation given the population ageing and shifting disease burden.
- 3) It was not possible for us to study the contribution of the supply side factors in the increased hospitalization.
- 4) Self-reported data and the nature of cross-sectional data may lead to recall and reporting biases, which may have affected the accuracy of the results.

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## **ANNEXURE**

### **Classification of Morbidity**

- Communicable conditions.
- Non communicable conditions.
- Accidents/injuries/burns/fractures/poisoning.
- Others.

### **Communicable conditions**

#### **Fever/Pyrexia of unknown reasons**

- Malaria
- Diarrhoea/Dysentery, Gastritis/peptic ulcer, worm infestation, Amebosis, Hepatitis/Jaundice
- Tetanus
- Filariasis
- Tuberculosis
- Morbidity of Skin
- Gynaecological Disorders
- Sexually transmitted infection/ morbidity
- Respirator (including ear/nose/throat) ailment for age < years
- Genito/Urinary Tract infection

## **Non communicable conditions**

### **Chronic Conditions**

- Heart morbidity/ Problems with heart, including unexplained pain in chest
- Hypertension (high blood pressure)
- Cancer and Tumors
- Stroke/sudden paralysis of one side of body
- Diabetes

### **Respiratory Disease**

- Bronchial asthma
- Respiratory ailment for age > 15 years

### **Bone Morbidity**

- Disorders of Joints and bones (Chronic pain in joints/ arthritis /rheumatism /osteoporosis)

### **Gastrointestinal Morbidity**

### **Neurological disorders and psychological disorders**

- Mental retardation, Mental disorder, Headache, Seizures or known epilepsy, Weakness in limb muscles and difficulty in movements, Others including memory loss, confusion

### **Eye ailments (cataract, glaucoma, vision, others)**

### **Ear ailment (32, 33)**

### **Injuries Accidents/injuries/burns/fractures/poisoning**

### **Others**

- Other undiagnosed ailments
- Nutrition Malfunction: under nutrition, anaemia, Others including obesity, Goiter and other disease of thyroid
- Bleeding Disorder
- Maternal and prenatal conditions
- New born