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Understanding changes in access to inpatient care in India between 1995-96 and 2017-18 - Evidence from the National Sample Survey

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Abstract

This study aims to analyze the changes in access to inpatient care and evaluate the shifts in key factors and inequalities influencing hospitalisation. The study is based on data from the 52nd and 75th National Sample Survey (NSS) rounds. The results show that the cases of hospitalisation have increased between the two rounds, from 16 persons hospitalised per 1000 persons in 1995-96 to 28 persons per 1000 in 2017-18. The wealth-related inequality in hospitalisation cases has reduced significantly over the two decades. The contribution of age group, gender, education, and MPCE quintile to hospitalisation inequality decreased over time, while the contribution of household type remained relatively stable. In states characterised by inadequate healthcare infrastructure, a pronounced inequality emerges between the rich and the poor in terms of access to hospitalisation services. Concerted efforts are needed to bridge the gap and ensure that healthcare services are accessible and affordable for all, especially the economically vulnerable sections of society.

Keywords: Hospitalisation, Inequalities, Health care

JEL Classification Code: I10, I12, I14, I18

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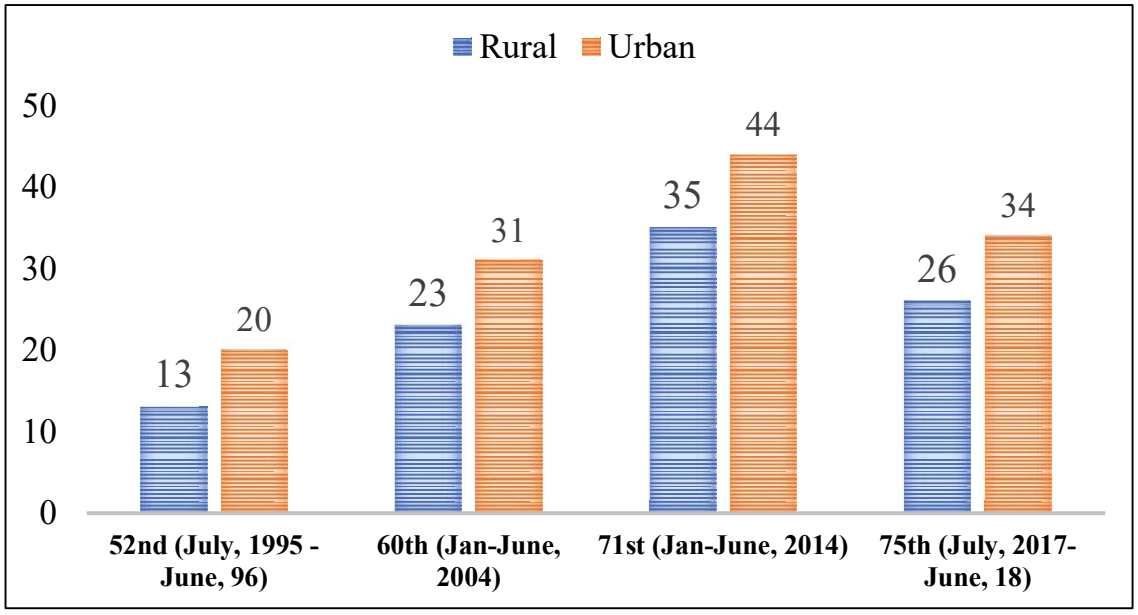
1. Introduction

A well-functioning healthcare system that effectively utilises its resources can play a key role in improving population health and reducing health inequities, making it an important area of focus for policymakers and public health professionals. Inequalities in access to health care services in countries with health security coverage can also be best understood by analysing trends in healthcare service utilisation, such as emergency room visits, outpatient appointments, hospital admissions or inpatient care. Estimates indicate that the risk of hospitalisation in a year or annual hospitalisation has increased from 16 per 1000 population in 1995-96 to 28 per 1000 population in 2017-18 (Mukhopadhyay et al., 2022; Pandey et al., 2017). However, the hospitalisation rates in India, characterised by scarcity in hospital infrastructure, urban bias in location of hospitals, and a younger age structure, are several times lower than in developed countries. The ongoing hospitalisation rate per 1000 population in a year is around 79 in Canada, 97 in the United States and 150 in the United Kingdom (CDC, 2018; CIHI, 2018, pp. 2017–2018; NHS Digital, 2022, pp. 2021–2022).

Figure 1 - Proportion of persons treated as inpatients per 1000 persons during the last 365 days, NSS 52nd, 60th, 71st and 75th rounds



Source: Estimates from the 52nd, 60th, 71st and 75th rounds are from NSS Report no. 586: Health in India.

The NSS estimates show an overall trend of increasing inpatient treatment services in both rural and urban areas over time, with certain fluctuations observed in the most recent round (**Figure 1**). The underlying causes behind the observed disruptions in the recent survey rounds remain obscure, and it remains a subject of extensive discussion within the existing body of literature (Dilip et al., 2021; Muraleedharan et al., 2022). Changes in hospitalisation rates in the last two decades mentioned above are not in concurrence with the rising chronic diseases and substantial increase in hospital beds across the country (Central Bureau of Health Intelligence, 2022). This raises the need to study the changes in determinants of hospitalisation

in India. India's healthcare system is a complex mix of public and private providers, with significant disparities in access to care between urban and rural areas. Despite the country having a large public healthcare system, many Indians choose to seek care at private facilities due to perceived higher quality of care and a lack of trust in the public system (Sengupta & Nundy, 2005). Additionally, the cost of healthcare can be a significant burden for many, leading to a large portion of the population forgoing necessary treatments. In rural areas, access to healthcare services is often limited due to a shortage of healthcare providers and a lack of infrastructure.

Existing evidence has also suggested the presence of income-related inequalities in hospitalisation (Balarajan et al., 2011; Mukherjee & Levesque, 2010; Prinja et al., 2012). There are significant socioeconomic inequalities in hospitalisation rates, with individuals from lower socio-economic groups being less likely to be hospitalised and receive adequate medical care. The disparity can be mainly attributed to several factors, such as financial issues, higher healthcare costs and lack of access to health insurance. Additionally, individuals from lower socio-economic groups may face systemic barriers to accessing healthcare, such as distance from healthcare facilities, lack of transportation, and a shortage of healthcare providers in their communities. These inequalities can lead to a vicious cycle, where poor health and lack of access to healthcare services further exacerbate poverty and hinder economic mobility.

The government of India has launched various initiatives to improve access to healthcare, including the National Health Mission (NHM) and the Ayushman Bharat- Pradhan Mantri Jan Arogya Yojana (PMJAY), which aims to provide health insurance coverage to poor and vulnerable families (National Health Authority, 2022). Despite these efforts, much work remains to be done to ensure that all Indians have access to quality and affordable inpatient care treatment. In that context, monitoring of changes in hospitalisation is seen as a key indicator for assessment of the contribution of the ongoing transformation in the health care delivery system towards ensuring equitable access to health care. Studies assessing the changes in income-related inequalities based on nationally representative data in India remain scarce. Therefore, this study aims to analyze the changes in inpatient care and evaluate the shifts in key factors influencing hospitalisation. Additionally, the study explores the disparities in hospitalisation related to income and evaluates the changes in these disparities over two decades.

2. Data and Methods

The present study is based on data from the 52nd and 75th National Sample Survey (NSS) rounds (NSO, 1998, 2018). This study focuses on two NSS survey rounds for several reasons. First, the NSS 52nd and 75th rounds cover a substantial time frame of around two decades during which social, economic, and healthcare-related changes have occurred in India. This period is likely to encapsulate key shifts in hospitalisation and inequalities. Second, our study also places a significant emphasis on understanding inequalities in inpatient care and by comparing two data points, we can highlight disparities that might have emerged over two decades and explore potential explanations for these disparities. Finally, the intermediate NSS rounds (60th and 71st)

were half-year rounds, and their estimates are not directly comparable with those from the full rounds, limiting their suitability for trend analysis.

These rounds of NSS are nationally representative population-based surveys that provide information on various aspects of health and healthcare utilisation in India, including the prevalence of various illnesses and health conditions, the utilisation of healthcare services, and the cost of healthcare services. The survey encompassed all states and union territories, and the household selection was conducted through a multistage stratified sampling process. Data was collected from a nationally representative sample of 120,942 households with 633,405 members in the 52nd round of the survey. Similarly, the 75th round covered a sample of 1,13,823 households with 5,55,115 members.

The data set provides information on household members who had availed themselves of medical services as indoor patients in any medical institution in the last 365 days before the survey date. Utilisation of inpatient care for childbirth by pregnant women was also collected separately in the same survey, but is not accounted for in this particular analysis. For the independent variables, samples with missing values were excluded, and the analysis was conducted using only the complete cases.

2.1 Outcome variable

The outcome variable in this study is the hospitalisation status of household members in the last 365 days prior to the survey date. The corresponding indicator is the proportion of persons hospitalised per 1000 persons in this one-year reference period. This proportion is expressed as the ratio of the estimated number of cases of admission to hospital as inpatients during a 365-day period to the total estimated population.

2.2 Independent variables

Based on the existing literature on hospitalisation in India, several demographic and socio-economic variables were included in the analysis. These included a categorical variable of age (0-4, 5-14, 15-29, 30-44, 45-59, 60-69), sex (male, female), place of residence (urban, rural), household size (1-5, 5-10, 11+), household type (Self-employed in agriculture, self-employed in non-agriculture, regular wage/salary earning, casual labour in agriculture, casual labour in non-agriculture, other employment), household's usual monthly per-capita consumer expenditure (MPCE) quintile, education (Illiterate, primary, secondary, higher secondary and above), social group (SC/ST, Others), religion (Hindu, Muslim, Others) and coverage of health schemes (Govt. sponsored, govt/PSU as an employee, employer-supported, private, not covered, others). Eight socio-economically backwards states of India, which include Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttaranchal, and Uttar Pradesh, were categorised as Empowered Action Group (EAG) states. Here, household MPCE quintiles were created (poorest, poorer, middle, richer, richest) as an indicator of the economic or wealth status of the individual's households.

2.3 Statistical methods

Descriptive analysis was used to explore the changes in proportion hospitalised for all the selected characteristics of the population, such as age, gender, sector, etc. Logistic regression was applied to examine the impact of the chosen predictors of hospitalisation.

Additionally, a multivariate decomposition analysis was conducted to examine the contribution of various explanatory factors to the change in hospitalisation rates between 1995–96 and 2017–18. This method enables us to quantify how much of the observed change is due to changes in population characteristics (e.g., age, education, income) versus changes in how these characteristics influence hospitalisation behaviour. Specifically, the decomposition separates the total change in the outcome into two components:

Endowment effect (also called "composition effect"): This captures the portion of the change attributable to differences in the distribution of characteristics across the two time points. For instance, if a larger share of the population is elderly in 2017–18 than in 1995–96, and elderly individuals tend to use more hospital services, this will increase hospitalisation rates through the endowment effect.

Coefficient effect (also called "rate effect"): This represents the part of the change due to shifts in the influence or "returns" of characteristics. For example, if having higher education had a stronger positive association with hospitalisation in 1995–96 than in 2017–18, this change in effect contributes to the coefficient effect.

2.4 Concentration index

Further, the concentration index (CI) and concentration curve (CC) were calculated to determine income-related inequality in hospitalisation. The CI is a widely used measure of health inequality that provides a summary of the degree of inequality in the distribution of health outcomes across a population. It is based on the notion of the Lorenz curve, which plots the cumulative distribution of health outcomes against the cumulative distribution of the population. The overall CI measures the degree of deviation of the Lorenz curve from a line of equality, which represents perfect equality in the distribution of health outcomes. It ranges from -1 to +1, with the sign indicating the direction of the relationship and the magnitude reflecting its strength. A value of zero implies complete equality, with no inequality present.

Since the health variable used in this study is binary, the normalised concentration index is used to correct the bounds of the standard CI. The normalised CI rescales the concentration index so that its value remains within the feasible range for bounded variables.

The generalised concentration index is defined as the product of the mean of the health variable and the standard concentration index and represents the absolute measure of inequality.

The mathematical representation of CI is

$$C = \frac{2}{\mu} cov(y_i, R)$$

where C is the concentration index, y_i is the outcome variable, and *cov* denotes covariance. R represents the fractional rank of individuals in the socioeconomic distribution (ranked from poorest to richest), and μ is the mean of the outcome variable.

2.5 Decomposition of the Concentration Index

In this study, the CI decomposition approach proposed by Wagstaff et al., (2003) was utilised to quantify the role of selected explanatory variables in determining inequality. The mathematical expression of decomposition can be written as follows:

$$y_i = \alpha + \sum_k \beta_k x_{ki} + \varepsilon_i$$

where the outcome variable (y) is linked with a set of k explanatory variables (xk) by a linear regression model (Wagstaff et al.,2003). Substituting the regression equation into the covariance-based formula of the CI yields:

$$C = \sum_k \left(\frac{\beta_k \bar{x}_k}{\mu}\right) C_k + \frac{GC_\varepsilon}{\mu}$$

Here, C is the overall CI, β_k is the regression coefficient of the k^{th} explanatory variable, μ is the mean of the outcome variable, C_k is the normalised CI, and GC_ε is the generalised CI for error (ε_i). The first term represents the explained component of inequality, derived from the elasticities of the explanatory variables and their respective concentration indices, while the second term represents the unexplained component captured by the residual.

This shows that the CI consists of explained and residual components. When all factors remain constant, a positive contribution from a factor reduces socioeconomic inequality, while a negative contribution increases it.

All statistical analyses were conducted using Stata v16.0, and appropriate sampling weights were used in the estimations.

3. Results

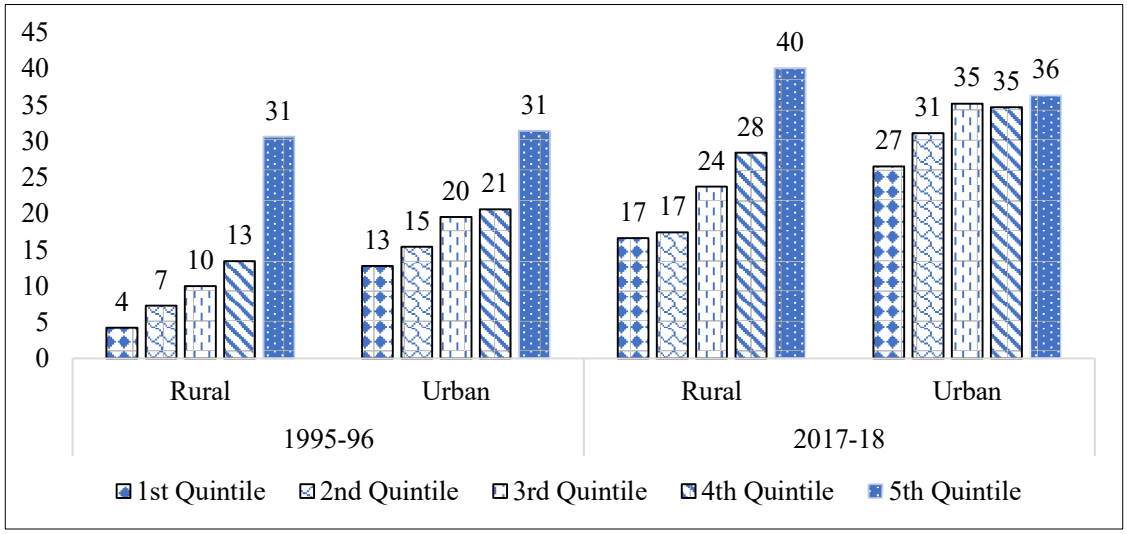
3.1 Bivariate analysis of differentials in hospitalisations in 1995-96 and 2017-18

T**able 1** shows the proportion of persons hospitalised (PPH) in a year per 1000 persons in India in 1995-96 and 2017-18, by selected background characteristics and by rural-urban residence. In 1995-96, the proportion of hospitalised persons per 1000 persons was 14 for rural areas, 21 for urban areas, and 16 for India as a whole. In 2017-18, these proportions increased to 26, 34, and 28, respectively.

The table also provides information on how PPH rates vary across different demographic and socioeconomic groups. For instance, in both years, PPH tended to increase with age, with the highest rates observed among those aged 60-69. PPH were higher for females than for males and for those in larger households. The table also shows variations in PPH by educational level,

social group, and coverage of health schemes. For instance, in 2017-18, hospitalisation rates were highest among those covered by employer-supported health schemes and lowest among those not covered by any health scheme.

Figure 2- Number per 1000 persons hospitalised in the last 365 days by wealth quintile and place of residence, 1995-96 and 2017-18



In 1995-96, the PPH rate for the 1st quintile was 4 per 1000 in rural areas and 13 per 1000 in urban areas, with an overall rate of 6 per 1000. By 2017-18, these rates had increased to 17, 27, and 20 per 1000, respectively. The 4th and 5th quintiles also experienced an increase in hospitalisation rates, although their rates were substantially higher than those of the other quintiles. However, significant disparities remain despite the increases, with the higher quintiles experiencing hospitalisation rates more than two times higher than the lower quintiles in 2017-18 (Figure 2).

Table 1 – Proportion of persons hospitalised per 1000 persons by selected background characteristics in India, 1995-96 and 2017-18

Characteristics	1995-96			2017-18		
	Rural	Urban	Total	Rural	Urban	Total
Age						
0-4	12	22	14	23	34	26
5-14	6	10	7	12	18	14
15-29	11	14	12	18	20	18
30-44	16	21	17	25	28	26
45-59	25	39	28	37	47	40
60+	45	75	51	71	91	77
Gender						
Male	16	23	18	26	33	28
Female	12	20	14	27	35	29
Household size						
1-5	17	23	19	29	34	31

Characteristics	1995-96			2017-18		
	Rural	Urban	Total	Rural	Urban	Total
5-10	11	19	13	21	29	23
11+	13	15	13	18	24	20
Household type						
Self-employed in agriculture	12	-	12	22	-	22
Self-employed in non-agriculture	16	20	18	28	30	29
Regular wage/salary earning		21	21	28	32	32
Casual labour in agriculture	13	-	13	32	-	32
Casual labour in non-agriculture	22	20	21	24	33	27
Others employment	19	27	21	43	49	46
Education						
Illiterate	11	14	11	32	43	34
Primary	16	19	17	22	32	25
Secondary	22	27	24	23	35	26
Higher secondary and above	26	29	28	22	26	24
Social Group*						
SC/ST	11	20	13	22	33	24
Others	15	21	17	27	34	39
Religion**						
Hindu	-	-	-	24	33	27
Muslim	-	-	-	27	30	28
Others	-	-	-	34	41	37
Coverage of health schemes**						
Government	-	-	-	37	47	39
Employee	-	-	-	45	38	40
Private/Others	-	-	-	69	53	56
None	-	-	-	23	30	25
Region						
North	15	17	16	26	30	28
East	8	18	10	24	35	26
North-east	13	20	13	15	22	16
South	25	26	25	40	40	40
West	19	27	22	27	32	29
Central	9	15	10	20	30	22
EAG States						
Yes	8	14	9	21	30	23
No	20	25	22	31	34	32
Total	**14**	**21**	**16**	**26**	**34**	**28**
Age-adjusted prevalence*	**-**	**-**	**17**	**-**	**-**	**27**

Caste - Estimates for Other Backward Class (OBC) are not presented, as the 52nd round did not include OBC as a distinct response category. ** Information on religion and coverage under health schemes was not collected in the NSS 52nd round. * Age-adjusted prevalence calculated using direct standardization method with 2011 Census age distribution as the standard population.*

3.2 Determinants of hospitalisation

Table 2 presents the results of a logistic regression analysis conducted to identify the determinants of hospitalisation in India during the periods 1995-96 and 2017-18. The results of the bivariate logistic regression analysis reveal several consistent and shifting patterns in the determinants of hospitalisation in India between 1995–96 and 2017–18. Age remains a strong predictor in both periods, with older adults (60+) showing significantly higher odds of hospitalisation compared to children aged 0–4 (aOR=2.39 in 1995–96 and aOR=2.71 in 2017–18). There is also a modest urban advantage in 2017–18 (aOR=1.21), which was not observed in 1995–96. Females had lower odds of hospitalisation in 1995–96 (aOR=0.89), but this gap appears to have narrowed by 2017–18 (aOR=0.98, not significant).

Economic and educational gradients show notable shifts. In 1995–96, higher education levels and wealth were strongly associated with increased odds of hospitalisation, suggesting better access or utilisation among the more privileged. By 2017–18, while the wealth gradient persisted (e.g., aOR=1.60 for the richest), the education gradient flattened, and even reversed for the highest education group (aOR=0.76). Household size also shows changing effects—larger households were associated with higher hospitalisation in 1995–96 but lower odds in 2017–18. Additionally, disparities by religion and region became more pronounced in the later period, with Muslims and other religious groups having higher odds compared to Hindus, and residents in the southern and eastern regions showing increased likelihood of hospitalisation. Importantly, health insurance coverage in 2017–18 played a role, with uninsured individuals having significantly lower odds of hospitalisation (aOR=0.75), indicating persistent access barriers.

Table 2 – Results of bivariate logistic regression analysis for determinants of hospitalisation, 1995-96 and 2017-18, India

Predictors	1995-96		2017-18	
	aOR	95% CI	aOR	95% CI
Age group				
0-4 (ref)	1	(1.00,1.00)	1	(1.00,1.00)
5-14	0.27***	(0.24,0.32)	0.47***	(0.42,0.52)
15-29	0.41***	(0.35,0.47)	0.68***	(0.62,0.75)
30-44	0.67***	(0.59,0.76)	0.91*	(0.82,1.00)
45-59	1.16*	(1.03,1.31)	1.39***	(1.27,1.51)
60+	2.39***	(2.12,2.69)	2.71***	(2.48,2.97)
Sector				
Rural (ref)	1	(1.00,1.00)	1	(1.00,1.00)
Urban	1.03	(0.95,1.12)	1.21***	(1.14,1.27)
Gender				
Male (ref)	1	(1.00,1.00)	1	(1.00,1.00)
Female	0.89***	(0.84,0.94)	0.98	(0.95,1.03)
Education				
Illiterate (ref)	1	(1.00,1.00)	1	(1.00,1.00)
Primary	1.92***	(1.75,2.10)	1.13***	(1.06,1.21)

Predictors	1995-96		2017-18	
	aOR	95% CI	aOR	95% CI
Secondary	2.06***	(1.85,2.29)	1	(0.94,1.07)
Higher secondary and above	1.74***	(1.49,2.03)	0.76***	(0.70,0.82)
MPCE quintile				
Poorest (ref)	1	(1.00,1.00)	1	(1.00,1.00)
Poorer	1.39***	(1.25,1.55)	1.07	(0.99,1.15)
Middle	1.76***	(1.59,1.96)	1.28***	(1.18,1.38)
Richer	2.03***	(1.83,2.25)	1.34***	(1.24,1.45)
Richest	3.81***	(3.44,4.22)	1.60***	(1.48,1.73)
Size of the household				
1-5 (ref)	1	(1.00,1.00)	1	(1.00,1.00)
5-10	1.09**	(1.03,1.15)	0.89***	(0.85,0.94)
11+	1.30***	(1.15,1.46)	0.84**	(0.75,0.93)
Type of household				
Agriculture (ref)	1	(1.00,1.00)	1	(1.00,1.00)
Non-agriculture	1.25***	(1.15,1.36)	1.08*	(1.02,1.14)
Others	1.01	(0.91,1.13)	1.16***	(1.07,1.26)
Religion				
Hindu (ref)	-	-	1	(1.00,1.00)
Muslim	-	-	1.19***	(1.12,1.26)
Others	-	-	1.27***	(1.17,1.38)
Social Group				
SC/ST (ref)	1	(1.00,1.00)	1	(1.00,1.00)
Others	0.83***	(0.78,0.89)	1.01	(0.96,1.07)
Health insurance scheme				
Government (ref)	-	-	1	(1.00,1.00)
Employee	-	-	0.93	(0.82,1.06)
Private/Others	-	-	1.29***	(1.14,1.46)
None	-	-	0.75***	(0.71,0.79)
EAG States				
Yes (ref)	1	(1.00,1.00)	1	(1.00,1.00)
No	1.36***	(1.25,1.48)	0.98	(0.88, 1.10)
Region				
North (ref)	1	(1.00,1.00)	1	(1.00,1.00)
East	1.03	(0.95,1.13)	1.17***	(1.09,1.26)
North-east	1.15*	(1.03,1.28)	0.66***	(0.61,0.71)
South	1.82***	(1.67,1.98)	1.30***	(1.21,1.38)
West	1.34***	(1.23,1.46)	1.08*	(1.01,1.17)
Central	1.14*	(1.02,1.27)	1.07	(0.99,1.16)

aOR – Adjusted Odds Ratio, CI - Confidence Interval

3.3 Decomposition of changes in the proportion of persons hospitalised in 1995-96 and 2017-18

The multivariate decomposition results show that the overall increase in hospitalization rates between 1995–96 and 2017–18 is primarily driven by changes in the effects of explanatory variables (coefficient effects), which account for 63.6% of the total change, while changes in the distribution of population characteristics (endowment effects) explain the remaining 36.4%. Among the endowment components, rising household economic status (MPCE quintile) and population ageing contributed positively to the increase in hospitalisation, while improved education exerted a negative effect. In terms of coefficient effects, substantial negative contributions were observed for education and MPCE, indicating a declining influence of these factors on hospitalisation over time. Conversely, the effect of gender and place of residence on hospitalisation increased, contributing positively to the overall change.

For example, education is associated with a negative endowment effect of –10.53%, indicating that the shift in the population's educational composition, i.e., a greater share of individuals attaining formal education, was associated with a reduction in hospitalisation rates. This may be due to better health awareness and preventive practices among the educated population, leading to reduced reliance on inpatient care. Simultaneously, the coefficient effect for education is –81.14%, implying a substantial decline in the strength of the association between educational attainment and hospitalisation over time. In other words, while education may have strongly influenced hospitalisation behaviour in 1995–96 (possibly due to better access among the educated), its predictive power diminished by 2017–18, likely due to broader health system reforms, expanded insurance coverage, and improved healthcare access across education levels.

Additionally, the constant term explains a large portion of the change, suggesting that unobserved factors, such as healthcare policy reforms, expansion of health insurance coverage, or increased healthcare infrastructure, may have played a significant role in driving hospitalisation trends.

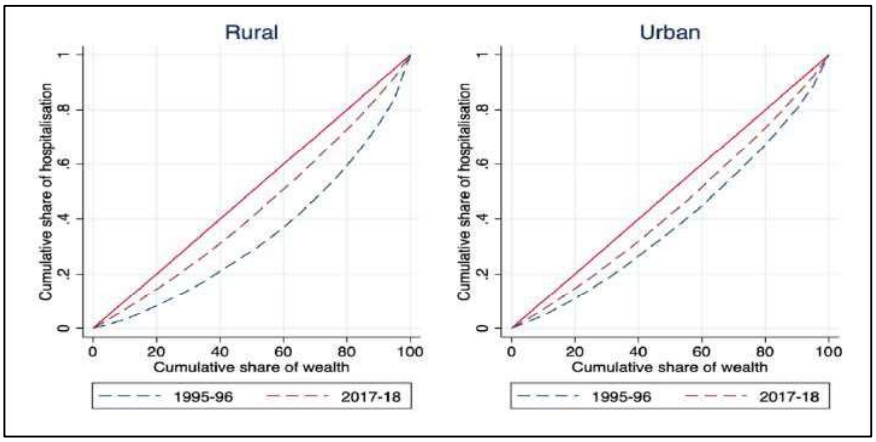
Table 3 - Result of multivariate decomposition analysis examining the individual contribution of correlates of the change in hospitalisation between 1995-96 and 2017-18

Characteristics	Endowment	%	Coefficients	%
Age	0.00118	10.39	-0.00199	-17.46
Place of residence	0.00012	1.03	0.00209	18.4
Education	-0.0012	-10.53	-0.00923	-81.14
Gender	0.00003	0.26	0.00261	22.97
MPCE quintile	0.00179	15.7	-0.00345	-30.37
Household size	0.00054	4.78	-0.00213	-18.69
Household type	-0.00007	-0.58	-0.0009	-7.91
Constant	*NA*	*NA*	0.02022	177.76
Percentage of total change due to component	36.4		63.6	
Total change	**0.011***			

3.4 Concentration Index

The concentration curves (**Figure 3**) show the existence of pro-rich inequality in hospitalisation in rural and urban areas. The estimates from two rounds over two decades show a reduction in this inequality in both areas. Similarly, the summary measure (**Table 4**) of concentration indices shows that in 1995-96, the concentration index for hospitalisation cases in rural areas was 0.38, which means that healthcare utilisation was relatively more concentrated among higher-income groups at that time. However, in 2017-18, the concentration index declined by half to 0.19, compared to 1995-96, indicating that healthcare utilisation in rural areas was relatively less concentrated among higher-income groups in 2017-18. Additionally, the concentration curves for urban areas also show similar results, where the shift in the curve to the line of equality was greater in comparison with rural areas. These non-zero positive indices support the results of the concentration curves in **Figure 3,** where the concentration indices for urban areas decline from 0.19 to 0.05 between 1995-96 and 2017-18, respectively.

Figure 3 – Concentration curve of the inequality in hospitalisation cases by place of residence, 1995-96 and 2017-18, India



The results of **Appendix Table A1 show** that the concentration index for hospitalisation rates has improved for most states between 1995-96 and 2017-18, with some exceptions. In 2017-18, the states with the highest pro-rich concentration indices for hospitalisation rates were Daman & Diu, Jharkhand, and Uttar Pradesh. Among the larger states, Madhya Pradesh, Bihar, Rajasthan, Uttar Pradesh, and Orissa had relatively high pro-rich concentration indices in 1995-96, which decreased substantially in 2017-18. The results suggest that while there has been progress in reducing pro-rich concentration in hospitalisation rates in most states over time, there are still several states where the distribution of hospitalisation rates remains skewed towards the rich. The top five states with high concentration indices for hospitalisation rates have experienced a significant change over time. The states of Madhya Pradesh, Bihar, and Andhra Pradesh had the highest concentration indices in 1995-96, whereas, in 2017-18, these states did not feature among the top five. In contrast, Jharkhand, Uttar Pradesh, and Assam emerged as states with high inequality in hospitalisation rates in 2017-18.

Table 4 - Concentration index of hospitalisation cases 1995-96 and 2017-18, India

Year		Concentration Index	95% CI	Std. Error	p-value
1995-96	Urban	0.191	(0.176, 0.206)	0.00790	<0.001
	Rural	0.389	(0.374, 0.405)	0.00780	<0.001
	Total	0.347	(0.336, 0.358)	0.00573	<0.001
2017-18	Urban	0.059	(0.046, 0.072)	0.00669	<0.001
	Rural	0.197	(0.185, 0.210)	0.00641	<0.001
	Total	0.172	(0.162, 0.181)	0.00470	<0.001

CI - Confidence Interval

3.5 Decomposition of inequalities in hospitalisation

Table 5 shows the decomposition of hospitalisation inequality for 1995-96 and 2017-18. The positive or negative direction of the CI indicates whether the factors were more prevalent in the wealthy or poor group. The percentage contribution indicates how much each variable in the model contributes to socioeconomic disparities as a whole. A positive percentage contribution indicates that a factor contributes to the increase in observed socioeconomic gaps in hospitalisation. A negative percentage contribution, on the other hand, indicates a component that is anticipated to reduce socioeconomic inequalities connected to hospitalisation.

In 1995-96, approximately 91% of the observed inequality was explained by factors such as household economic status (MPCE quintile), education, region, and household type, with MPCE alone accounting for over 50% of the inequality. Education and region also contributed significantly, indicating that hospitalization was concentrated among wealthier, more educated individuals and in more developed regions like the South. However, by 2017-18, the share of explained inequality declined substantially to 40%, suggesting that a growing proportion of inequality is attributable to unobserved or structural factors. Notably, the contribution of economic status dropped to 18.5%, and that of education to just 1.7%, indicating some narrowing of traditional socioeconomic disparities in access to hospitalization. Meanwhile, regional and household-level factors remained relevant, and the role of age became more pronounced, especially for older adults. Overall, the analysis found that the contributing factors explained 91.0% and 40% of hospitalization inequality in 1995-96 and 2017-18, respectively.

Table 5 – Decomposition Concentration Index for inequality in hospitalisation, 1995-96 and 2017-18, India

Variables	1995-96			2017-18		
	Coefficients	Concentration Index	% contribution	Coefficients	Concentration Index	% contribution
Age group						
0-4 (ref)						
5-14	-0.226	-0.090	-22.576	-0.116	-0.116	-11.580
15-29	-0.202	0.068	-20.194	-0.086	0.014	-8.620
30-44	-0.056	0.033	-5.604	-0.023	0.028	-2.311
45-59	0.052	0.099	5.205	0.067	0.079	6.664

Variables	1995-96			2017-18		
	Coeffic ients	**Concentratio n Index**	**% contribut ion**	**Coeffic ients**	**Concentratio n Index**	**% contribut ion**
60+	0.107	0.083	10.720	0.124	0.112	12.358
Total			***-32.45***			**-3.490**
Sector						
Rural						
Urban	0.042	0.391	4.192	0.051	0.460	5.141
Total			***4.192***			***5.141***
Education						
Illiterate (ref)						
Primary	0.165	0.039	16.448	0.050	-0.083	4.985
Secondary	0.125	0.279	12.480	0.008	0.034	0.830
Higher secondary and above	0.034	0.568	3.404	-0.042	0.337	-4.151
Total			***32.331***			***1.664***
Gender						
Male (ref)						
Female	-0.054	-0.010	-5.365	-0.004	0.000	-0.365
Total			***-5.365***			***-0.37***
MPCE Quintile						
Poorest (ref)						
Poorer	0.028	-0.420	2.758	0.007	-0.259	0.720
Middle	0.060	-0.075	5.991	0.037	0.034	3.646
Richer	0.092	0.275	9.226	0.047	0.308	4.654
Richest	0.329	0.689	32.933	0.095	0.656	9.472
Total			***50.908***			***18.492***
Social group						
SC/ST (ref)						
Others	-0.083	0.088	-8.282	0.015	0.079	1.522
Total			***-8.282***			***1.522***
Household size						
1-5 (ref)						
5-10	0.039	-0.134	3.932	-0.033	-0.192	-3.291
11+	0.019	-0.224	1.918	-0.005	-0.296	-0.471
Total			***5.850***			***-3.762***
Household type						
Self-employed in agriculture (ref)						
Self-employed in non-agriculture	0.038	0.134	3.796	0.038	0.153	3.837
Regular wage/salary earning	0.006	0.533	0.604	0.020	0.503	2.044
Casual labour in agriculture	0.047	-0.335	4.721	0.018	0.035	1.763
Casual labour in non-agriculture	0.047	-0.077	4.659	0.015	-0.218	1.527
Others employment	0.002	0.243	0.225	0.015	0.237	1.488
Total			***14.005***			***10.659***
Region						
North						
East	0.028	-0.212	2.806	0.029	-0.249	2.848

Variables	1995-96			2017-18		
	Coefficients	Concentration Index	% contribution	Coefficients	Concentration Index	% contribution
North-east	0.004	0.006	0.401	-0.010	-0.112	-0.987
South	0.187	0.017	18.691	0.077	0.290	7.667
West	0.060	0.199	6.004	0.008	0.206	0.789
Central	0.019	-0.116	1.923	0.016	-0.275	1.555
Total			***29.825***			***11.873***
Overall contribution			***91.01***			***40.07***

4. Discussion

This study investigated the nature of changes in access to inpatient care across various sub-groups in India, when there was an overall increase in the proportion hospitalised in a year from 16 persons hospitalised per 1000 persons in 1995-96 to 28 per 1000 in 2017-18. By nearly every characteristic studied, greater proportions of hospitalisation were observed in 2017–2018 than in 1995–96.

This increase in hospitalisation was almost twice in both urban and rural areas. Males had higher hospitalisation rates in 1995-96, whereas in 2017-18, the proportion of hospitalisations was almost equal for both males and females. There is evidence to suggest that the gender gap in hospitalisation has reduced in India, albeit slowly (Sriram, 2018). One of the contributing factors to this change is the increasing awareness and efforts to address gender inequality and improve women's access to healthcare. The increase in hospitalisation in recent years can be attributed largely to a significant increase in the number of government schemes and initiatives aimed at improving healthcare infrastructure. Additionally, the increasing availability of health insurance coverage and several central and state government-sponsored health schemes, such as Rashtriya Swasthya Bima Yojana (RSBY), Rajiv Aarogyasri (Andhra Pradesh and Telangana), CMCHIS (Tamil Nadu), Mahatma Jyotiba Phule Jan Arogya Yojana (Maharashtra), and Vajpayee Arogyashree (Karnataka), appear to have contributed to increased hospitalisation rates among beneficiaries during the survey period.

The change in coefficient effects explained a majority of the change in hospitalisation (64%) between 1996-96 and 2017-18. The change in the composition of the population by age, wealth quintile and size of the household contributed to the increase in hospitalisation between the two surveys. Here, changes in household size are potentially due to convergence towards nuclear households with the elderly in the country (Breton, 2019). However, changes in the composition of the population by educational status and type of household decreased the change in hospitalisation.

The effect of education on hospitalisation rates weakens with increasing age; individuals who have completed a college degree or higher education demonstrate a significant decrease in the likelihood of being hospitalised compared to those with lower levels of education. Several studies have examined the relationship between the level of education and hospitalisation and found consistent results. For instance, a study based on middle-aged older adults in the United

States discussed that individuals with higher levels of education had a lower likelihood of getting hospitalised than those with less than a high school education (Yue et al., 2021). There might be several possible explanations for this relationship. One possibility is that individuals with higher education levels may have better health knowledge, skills, and behaviours that help prevent or manage certain health conditions, reducing the need for hospitalisation. Another possibility is that individuals with higher education levels may have better access to healthcare resources and services, enabling them to receive timely and appropriate care that prevents hospitalisation.

In line with our findings, the extant body of literature reveals a positive association between insurance coverage and the utilisation of inpatient services among individuals (Gupta, 2021). Those who have access to health insurance, whether offered by their employer or procured through private means, are more likely to avail themselves of inpatient services compared to those without insurance coverage (Uninsurance, 2002).

This study also attempts to add to the existing literature on healthcare inequalities in India. It is as anticipated, the economic status-induced inequality in hospitalisation cases has reduced significantly over the two decades. The study by Mukherjee et.al. (2010) has also discussed similar findings for rural India. Previous studies have shown that healthcare services in India are unequally distributed across different socio-economic groups and geographic regions (Balarajan et al., 2011; Prinja et al., 2012). There are a number of factors that could explain the inequality in the distribution of hospitalisation cases in India. One factor is the disparity in healthcare access between urban and rural areas (Banerjee, 2021; Basu, 2022). Urban areas typically have better access to healthcare than rural areas. Another factor is the difference in income levels between urban and rural areas. However, the expansion of access to hospitalisation services has played a crucial role in narrowing the gaps in equity within the healthcare system in India. The availability of hospitalisation facilities, particularly among marginalised and underserved populations, has historically been limited, resulting in unequal access to quality healthcare services. However, with the increased provision of hospitalisation services across the country, barriers to healthcare access have gradually diminished. This development has led to a significant reduction in disparities related to socioeconomic status and other determinants of health, ultimately promoting a more equitable healthcare landscape in India.

In states characterized by inadequate healthcare infrastructure, a pronounced inequality emerges between the rich and the poor in terms of access to hospitalization services (Dash & Mohanty, 2019; Purohit, 2004). This discrepancy stems from a variety of factors that impact the economically disadvantaged segment of the population. The issue of accessibility arises as a significant hurdle for individuals residing in rural or remote areas of states lacking in healthcare infrastructure (Balarajan et al., 2011; Dilip, 2002).

5. Conclusion

The findings from the analysis of NSS 52nd and 75th rounds data indicate an increase in hospitalisation rates among most of the sub-groups of the population examined. While there

has been a substantial reduction in inequality in access to inpatient care in most states, it remains inadequate. Concerted efforts are needed to bridge the gap and ensure that healthcare services are accessible and affordable for all, especially the economically vulnerable sections of society. By adopting a comprehensive approach that considers the socioeconomic context of the population and focuses on raising awareness, improving healthcare infrastructure, and promoting health-seeking behaviours, health insurance interventions can play a vital role in increasing the utilisation of healthcare services.

Notes

1. As per the administrative divisions of India, the regions have been defined as follows: North (comprising Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Ladakh, Punjab, Rajasthan, Uttarakhand and Uttar Pradesh); East (comprising Bihar, Jharkhand, Odisha, and West Bengal); West (comprising Dadra and Nagar Haveli and Daman and Diu, Goa, Gujarat, and Maharashtra); Central (comprising Madhya Pradesh and Chhattisgarh); Northeast (comprising Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim); and South (comprising Andhra Pradesh, Karnataka, Kerala, Puducherry, Tamil Nadu, Telangana and Andaman and Nicobar Islands, Lakshadweep).

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Appendix

Figure A1 – Concentration curve of the inequality in hospitalisation cases, India, 1995-96 and 2017-18

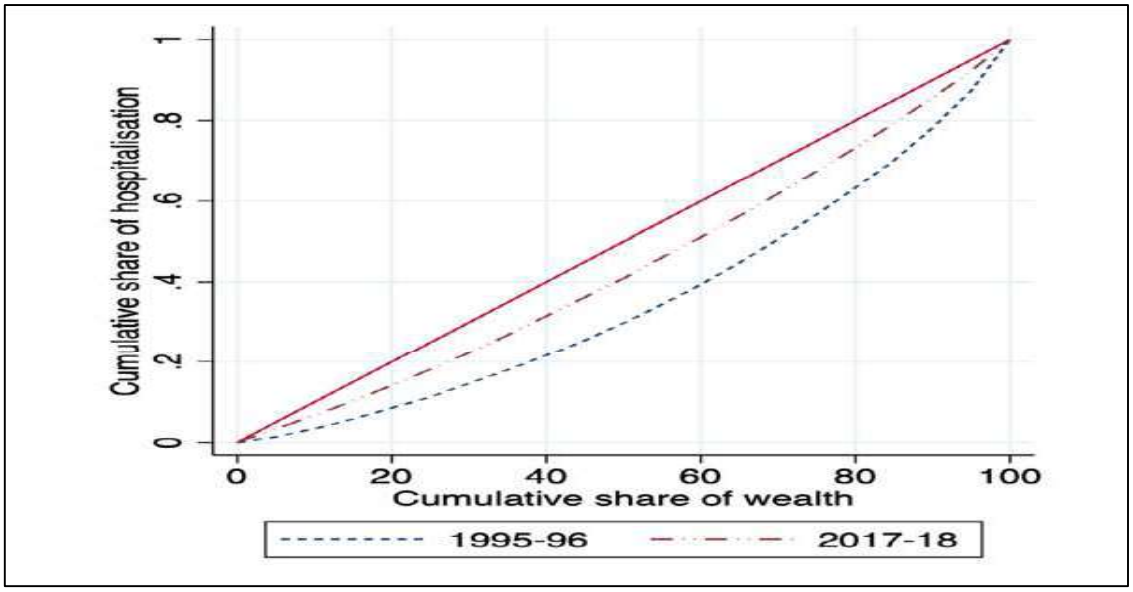


Table A1 - Concentration indices for hospitalisation rates in India and major states, NSS 52nd and 75th rounds

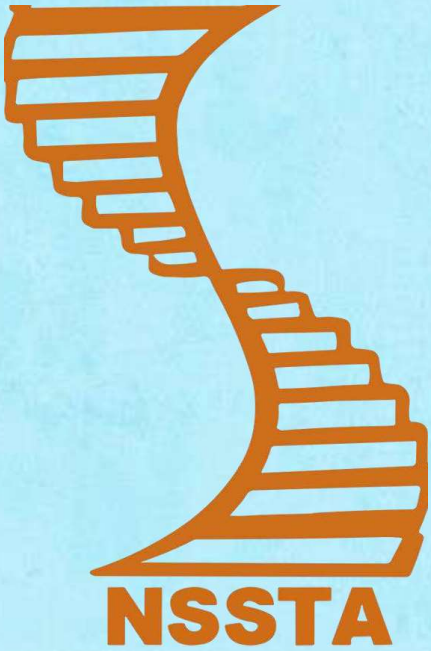
State	1995-96	2017-18
Chhattisgarh	-	0.1602
Jharkhand	-	0.3081
Telangana	-	0.0825
Uttaranchal	-	0.1336
Madhya Pradesh	0.4435	0.1076
Bihar	0.4132	0.1120
Andhra Pradesh	0.4118	0.0810
Karnataka	0.3735	0.0783
Rajasthan	0.3616	0.1828
Orissa	0.3545	0.1549
Uttar Pradesh	0.3388	0.2096
Haryana	0.3378	0.0823
Delhi	0.3002	-0.0895
Nagaland	0.2979	0.1030
Himachal Pradesh	0.2904	0.0276
Jammu & Kashmir*	0.2785	0.0844
West Bengal	0.2666	0.0867
Tamil Nadu	0.2604	0.0431
Goa	0.2578	0.0289
Maharashtra	0.2557	0.0526
Punjab	0.2486	0.0497
Gujarat	0.2443	0.1376
Arunachal Pradesh	0.2249	0.0397
Manipur	0.2241	0.1058

State	1995-96	2017-18
Assam	0.2136	0.1650
Sikkim	0.2067	-0.0495
Meghalaya	0.1438	0.1147
Tripura	0.0896	-0.0165
Kerala	0.0789	0.0330
Mizoram	0.0382	0.0963
India	**0.3471**	**0.1721**

*Jammu and Kashmir identified as a state

Table A2 - State-wise Proportion of persons hospitalised per 1000 persons, 1995-96 and 2017-18

State	1995-96	2017-18
A & N Islands	42	49
Andhra Pradesh	16	38
Arunachal Pradesh	33	36
Assam	10	10
Bihar	6	12
Chandigarh	17	18
Chhattisgarh		19
Dadra & Nagar Haveli	39	26
Daman & Diu	31	10
Delhi	14	31
Goa	27	45
Gujarat	16	24
Haryana	28	27
Himachal Pradesh	22	40
Jammu & Kashmir	13	24
Jharkhand		14
Karnataka	15	28
Kerala	79	100
Lakshadweep	57	55
Madhya Pradesh	11	21
Maharashtra	24	31
Manipur	11	20
Meghalaya	15	17
Mizoram	19	27
Nagaland	13	14
Orissa	14	32
Pondicherry	32	31
Punjab	15	29
Rajasthan	10	24
Sikkim	6	28
Tamil Nadu	21	31
Telangana		23
Tripura	36	54
Uttar Pradesh	9	21
Uttaranchal		16
West Bengal	13	40
India	**16**	**27**



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