Title: Publicly Financed Health Insurance Schemes and Horizontal Inequity in Inpatient Service Use in India

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Abstract

Equity is a major policy objective of health care reforms across nations. Publicly Financed Health Insurance (PFHI) schemes are one major health care reform that have been adopted across developing countries to address inequity. Existing literature on the effect of PFHIs focuses on out-of-pocket expenditure and utilization of health services, while the effect of PFHIs on equity in health service use remains under-studied, particularly in the Indian context. This study addresses this knowledge gap.

In 2008 India launched a PFHI scheme with an aim to achieve horizontal equity, that is the equal treatment for equal needs, in the utilization of health services. Using data from the National Sample Survey Organization (NSSO), we analyze the extent of inequity in the utilization of inpatient services before (2004) and after (2014) the implementation of the PFHI.

The annual hospitalization rate increased from 2.4 per cent in 2004 to 4.4 per cent in 2014 and the increase is higher for rural population. The proportion of population covered by any health insurance scheme increased from 0.5 per cent to 15.3 per cent post-PFHI implementation. The study finds that PFHIs were associated with reduced inequalities in inpatient service use, but the extent of reduction varied across states and across urban/rural areas. Our inter-state analysis shows that the States with higher concentration of PFHIs among richer quintiles, a possible leakage and exclusion errors, have failed to ensure the needed access for their poor population. This failure reflects in their higher levels of income-based inequity in inpatient service use. This study has implications for the implementers of social security programs adopting targeted approach. There is a need for better strategies for the identification of beneficiaries and ensuring that they receive scheme benefits to have intended welfare effects.

Keywords: PFHI, RSBY, inequity, inpatient use, effective targeting

Introduction

Publicly Financed Health Insurance (PFHI) schemes are one major health care reform that have been adopted across developing countries, including India, to address inequity in healthcare service utilization. Studies from India, as well as other developing countries, report socio-economic inequalities in the utilization of health services [1-4]. PFHIs can help reduce these inequalities by targeting poor people and ensuring need-based access [5]. Inequality and inequity are often used interchangeably in the literature; however, inequity is defined as the inequality that remains after accounting for legitimate factors driving inequality [6]. Legitimate factors might include [1], age, sex, and presence of illness. In this study, we assess inequity in inpatient service use in the pre and post PFHI period in India after accounting for the legitimate factors.

In the year 2008, India launched Rashtriya Swasthya Bima Yojana (RSBY), a publicly financed health insurance programme for poor people. Recently, in the year 2018, the Indian government rechristened and expanded RSBY as World's largest health insurance scheme, popularly known as Pradhan Mantri Jan Arogya Yojana (PMJAY) covering about 100 million poor families and providing insurance coverage up to 7000 USD [2]. The main aim of PFHIs in India is to increase access to inpatient services for poor people and reduce healthcare inequalities, thus this study focuses on the effect of PFHIs on inequalities in inpatient service use [3,4].

Publicly Financed Health Insurance Schemes in India

India's engagement with PFHIs dates to the late 1940s when the central government implemented the Employees' State Insurance Scheme (ESIS) for the private sector workers. Later, in the year 1954, the Central Government Health Scheme (CGHS) was launched to provide comprehensive health care facilities for the central government employees and pensioners and their dependents [5,6]. Both, CGHS and ESIS, provides comprehensive medical coverage including ambulatory care (OPD based care), diagnostics, medicines, surgical and medical care. These schemes are popularly known as social health insurance schemes under which the funds are pooled through employer and employee contributions and supplemented by government subsidies [7]. Though these schemes provide comprehensive medical cover, the population covered under these schemes, even after more than six decades of their presence, is very small. All these central government schemes together cover about 23 million families comprising 82 million persons, which is 6.5 % of India's population [8]. The deficient public health system and very high OOP expenditure in the private sector mandated the Indian government to arrange for the health service provisioning for the poor population and those working in the informal sector. With the global push for UHC and the agenda of protecting the poor families from impoverishing health care expenditures, emerged a new generation of PFHIs for the informal sector workers and poor families.

In India, the first state to launch a PFHI, popularly known as Aarogyasri, was Andhra Pradesh in the year 2007. In the subsequent year, the central government launched Rasthriya Swasthya Bima Yojana (RSBY) across all the states. The RSBY scheme was launched in the year 2008 as a social security scheme by the Ministry of Labor and Employment, later in the year 2015, it was transferred to the health department. RSBY is a centrally-sponsored social program aimed at providing cashless hospitalization services amounting up to rupees 30,000

to poor people [9].The scheme was rolled out in a phased manner and states had discretion in implementing the scheme. In the following years, a number of states, including Tamil Nadu, Karnataka, Kerala, Chhattisgarh, Rajasthan, Maharashtra either extended RSBY coverage or started their own state-specific PFHI [3].

As per the recent estimates by National Health Accounts, Government of India, the share of Out-of-expenditure (OOP) expenditure in total health expenditure for India is 69% (Government of India, 2017), which is very high in comparison to other developing countries such as Brazil (25%) and China (31%) [10]. The implications of higher levels of OOP expenditure include inequalities in accessing healthcare, contribution to household poverty, and negative impact on demand for health care [3]. PFHIs cover the full cost of hospitalization expenditure for the procedures covered under the schemes, thus removing access barriers for poor people. The objective of PFHIs scheme was to increase access to inpatient care for the poor people and address horizontal inequity in health service utilization [11]. Accordingly, the aim of this study is to analyze the reduction in inequity, if any, in the post-PFHI period. Further, the study aims to explore the inter-state differences in the reduction of horizontal inequity. For the state-level analysis we focus on 21 major states of India (out of 29 states and 7 union territories) constituting 98.44 per cent of the population of India.

Data and Methodology

Data

We use individual level data (excluding deceased members) from the 60th round (Morbidity and Healthcare - 2004) and 71st round (Social Consumption: Health - 2014) of the National Sample Survey Organization (NSSO). NSS rounds are conducted under the Ministry of Statistics and Programme Implementation (MOSPI), Government of India. The data for each round is comparable as both rounds collected information on 'whether the person was hospitalized in the last 365 days' and record the ailment for which treatment was taken. Both rounds collected information on morbidity, particulars of inpatient and outpatient treatment in the last year and last 15 days respectively. This information was collected from a nationally representative sample of 383,338 individuals in the year 2004 and 333,104 individuals in the year 2014. Both rounds used a multistage stratified random sampling method. The details of the sampling methodology, questionnaire, definition of variables and initial findings can be found in reports prepared by MOSPI [12].

Study Variables

The study variables are presented in Table 1. Our dependent variable in the logit model was "Annual Inpatient Service Use". As suggested in the existing literature [14,15,18,19], we have categorized our independent variables as need and non-need factors. We define need based on the individual's age, sex and presence of Non-Communicable Diseases. We chose NCDs as WHO (13) reports that 61% of the mortality in India is attributed to NCDs and it is mainly due to a lack of access to health services. The non-need factors include variables that have been found to consistently affect health service utilization [14,15], including, state identifiers, rural/urban residence, literacy level, occupation of the head of household, marital Status, health insurance status, income (proxied by consumption expenditure).

Table 1: Study Variables

Type of Variable	Factors	Study Variable	Definition
Dependent Variable	Inpatient Service Use	Actual	Use of any health facility for taking in-house treatment in the previous 365 days preceding the survey as reported
		Need-predicted	The utilization predicted from the logit estimation equation
Independent Variables	Need factors	Age	Dummy variables created for each of the five age categories (0-14, 15-29, 30-44, 45-59, 60+)
		Sex	Sex was dichotomous variable with Male=1 and Female=2
		Self-reported presence of Non-Communicable Diseases	Self-reported presence of NCDs a dichotomous variable with yes=1 and No=0
	Non-Need factors	Income Quintile	The sample population was divided into five quintiles (poorest, poor, middle, rich, richest) based on their per capita monthly consumption expenditure
		Residence	Residence was recorded as a dichotomous variable: Rural: 0 and Urban: 1
		Education Status	The education status was categorized into five categories: Illiterate, Primary, Secondary, Higher Secondary, Graduate and Above. A dummy variable was created for each of the category.
		Marital Status	Dummy variables created for each of the category of marital status: Unmarried, Currently Married, Widowed, Divorced/Separated.

	Social Category	Four dummy variables created for SC/ST, OBC, General, Others
	Health Insurance Status	A dummy variable created for "any health insurance scheme".
	Occupation of the head of household	Four dummy variables created for categories: Self-employed, Salaried employee, Casual Labor, and Others.

Analytical Strategy

Data was analyzed using the Stata 15 statistical software package and estimates were weighted to account for the multistage stratified sampling design [16]. We used bivariate analysis and multivariate logit regression to study the income-based inequity in the utilization of health services. We used concentration curves (CC) and concentration indices (CI) to assess the degree of inequity in the health care use [17] and compared these across two time-periods (before and after the introduction of PFHIs).

We adopt indirect standardization method to standardize our health variable, inpatient service use, as suggested by Wagstaff and Doorslaer [18]. The generalized relationship between inpatient service utilization, and need factors and control variables is represented by equation [1] and depending on the nature of health variable G can be any functional form. We use logit regression as our health variable, inpatient service use, is dichotomous in nature.

$$y_i = G\left(\alpha + \sum_j \beta_j x_{ji} + \sum_k \gamma_k z_{ki}\right) + \epsilon_i \qquad [1]$$

where y_i is health care utilization variable; i denotes the individual, α, β and γ are parameter vectors; x_{ji} are individual values of the *J (j=1,…J)* confounding variables (need) and z_{ki} are individual values of the *K (k=1,…K)* non-confounding (control) variables. The indirectly standardized utilization $\hat{y_i}^{IS}$ is given by the difference between actual utilization (y_i) and need-based expected utilization $\hat{y_i}^{X}$, plus the mean of actual utilization $\bar{y}$

$$\hat{y_i}^{IS} = y_i - \hat{y_i}^{X} + \bar{y}$$

The Concentration Curve (CC)

We plot Concentration Curve (CC) [17] to visualize the inequality in the utilization of inpatient services. The CC plots the cumulative percentage of the inpatient utilization (on y-axis) against the cumulative percentage of the population, ranked by household per capita monthly expenditure, from poorest to the richest (on x-axis). If everyone, irrespective of his or her income has exactly the same value of the health variable, the concentration curve will lie along a 45-degree line, known as the line of equality. If the health variable is more concentrated among poorer (richer) people, the concentration curve will lie above (below) the line of equality.

Concentration Index

Concentration indices are commonly used for measuring socio-economic related inequality in health [16,19]. The standard concentration index as proposed by Kakwani, Wagstaff and van Doorslaer 1997 [17], can be written as:

$$C = \frac{2}{N\mu}\sum_{i=1}^{n} h_i r_i - 1,$$

where N is the sample size, $h_i$is the health variable for person *i*, μ is the mean of the health variable, and r_i is the fractional rank in the income distribution of the *i*th person.

Horizontal Inequity Index

We measure horizontal inequity index (HI) for inpatient services utilization pre and post PFHI period, to assess the effect of PFHIs on equity in in-patient service use. The Horizontal Inequity Index (HI) indicates health inequality attributable to illegitimate factors and is given by the difference between the concentration indices for actual utilization (C_a) and need standardized utilization (C_n) [16].

$HI = C_a - C_n$

The HI ranges between -2 to 2 and a value of zero indicates utilization is according to need, i.e. there is no inequity. A positive (negative) value of HI indicates presence of inequity which is pro-rich (pro-poor) after controlling for need.

Inter-State Analysis

As PFHIs target poor families we expect that the states with effective targeting under PFHIs would have lower inequity in inpatient service use. For the purpose of our study, we define effectiveness of targeting as 'concentration of PFHIs among poorer households'. We analyze the effectiveness of targeting under PFHIs using concentration index methodology. We expect that States with lower values of CI (negative is pro-poor) for PFHI would exhibit lower inequity in inpatient service use.

Results and Discussion

Descriptive Statistics

Descriptive statistics are presented in Table 2. The mean age of our sample population increased from approximately 26 years in the year 2004 to 29 years in the year 2014. The economically active population (15-59 years) has increased from 58 % in the year 2004 to 63 % in the year 2014 while the dependent age group (0-14 years) has considerably reduced from 35 % to 29 % in the year 2014 (see Table 1). The increased life expectancy is represented by increase in the proportion of the population aged above 60 years (7% in 2004 to 8% in 2014). The sample age-sex distribution is similar to that reported in the census reports of 2011 by the Government of India (2011), supporting the representativeness of our study sample. The proportion of males is higher in both years (51.2 % in 2004 and 51.4 % in 2014) and the majority of the population (75 % in 2004 and 70% in 2014) resides in rural areas, though this reduced somewhat by the year 2014. The persons reporting the presence of NCDs has shown significant increase from 3.2 percent to nearly 6 per cent during 2004 to 2014. The increased reporting of NCDs can be attributed to increased awareness about NCDs, increased access to diagnostics and also the shift in disease pattern from

communicable to non-communicable diseases [13]. The variables that have shown significant increases between the periods include the proportion of persons with health insurance (increasing from 0.6 percent to 15.1 per cent), the proportion completing secondary education (increasing from 7 per cent to 46 per cent) and the proportion of salaried persons in the sample (increasing from 10 per cent to 18 per cent). In the analysis of equity differences between the two study periods, we control for all these differences while estimating horizontal inequity index.

Table 2: Descriptive statistics of the study variables				
Variables	**Year 2004**		**Year 2014**	
	N	**Percentage**	**N**	**Percentage**
Total sample size	383338	100	3,33,104	100
Utilized inpatient services in last 365	29,036	2.4	49,823	4.4
Need Variables				
Age (years)				
0-14	1,33,622	34.86	96,590	29
15-29	1,00,704	26.27	90,045	27.03
30-44	76,231	19.89	72,032	21.62
45-59	46,246	12.06	48,419	14.54
60+	26,535	6.92	26,018	7.81
Gender				
Male	1,96,384	51.23	1,71,445	51.47
Female	1,86,954	48.77	1,61,659	48.53
Self-reported presence of NCDs	12,556	3.28	19,637	5.9
Control Variables				
Residence				
Rural	2,85,859	74.57	2,33,227	70.02
Urban	97,479	25.43	99,877	29.98
Employment (Head of household)				
Self-employed	1,97,114	51.42	1,73,067	51.96
Salaried employee	37,397	9.76	60,414	18.14
Casual Labor	1,16,810	30.47	84,313	25.31
Others	32,017	8.35	15,310	4.6
Marital Status				
Unmarried	1,88,792	49.25	1,53,346	46.04
Currently Married	1,73,981	45.39	1,61,785	48.57
Widowed	19,057	4.97	16,891	5.07
Divorced/Separated	1,508	0.39	1,082	0.32
Educational Status*				
Illiterate	1,47,617	38.51	1,02,994	30.9
Primary	1,71,911	44.85	50,332	15.1
Secondary	28,654	7.47	1,52,060	45.6
Higher Secondary	16,090	4.2	1,672	0.5
Graduate and above	19,066	4.97	26,046	7.8
Household size (number of members in the house)				
1 to 3	50,096	13.07	53,248	15.98
4 to 7	2,45,167	63.95	2,22,564	66.82
8 to 10	60,373	15.75	45,169	13.57
More than 10	27,702	7.23	12,124	3.61
Health Insurance				
Government Funded (RSBY etc)	NA		41,027	12.3
Employer supported	1,669	0.44	4,230	1.3
Private Insurance	1,016	0.27	4,332	1.3
Others	NA		645	0.2
Not covered	3,80,653	99.3	2,82,868	84.9

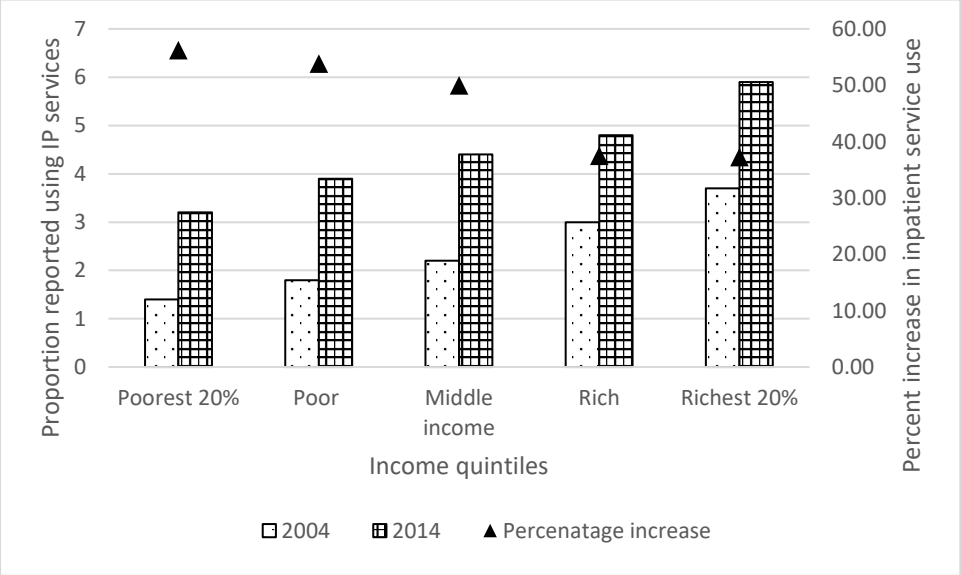
Social Category				
Scheduled Tribe	31,332	8.17	30,841	9.26
Scheduled Caste	76,848	20.05	62,754	18.84
Other Backward Classes	1,54,609	40.33	1,47,392	44.25
General Category	1,20,548	31.45	92,117	27.65
Wealth quintiles				
Poorest quintile 1	77,269	20.16	68,268	20.49
Quintile 2	76,752	20.02	64,996	19.51
Quintile 3	77,779	20.29	79,745	23.94
Quintile 4	75,255	19.63	56,061	16.83
Richest quintile 5	76,284	19.9	64,035	19.22

*For all children 0-14 years of age, the education status is reported for head of the household

Income inequality in the utilization of inpatient services

The annual inpatient rate (defined as the percentage use of inpatient services at the individual level over last one year) has almost doubled from 2.4 (in the year 2004) to 4.4 percent in the year 2014. Figure 1 displays the proportion of the sample population reporting inpatient service use (IP) in last one year by income status in the year 2004 and 2014. It also reports percentage increase in the IP across income quintiles. Though, the annual inpatient rate is higher for the richest quintiles in both the years (2004: 3.7 %; 2014: 5.9%), the increase is higher for the poorest quintile (57 %) in the post-reform period, indicating possible increase in the access to IP services for poor people.

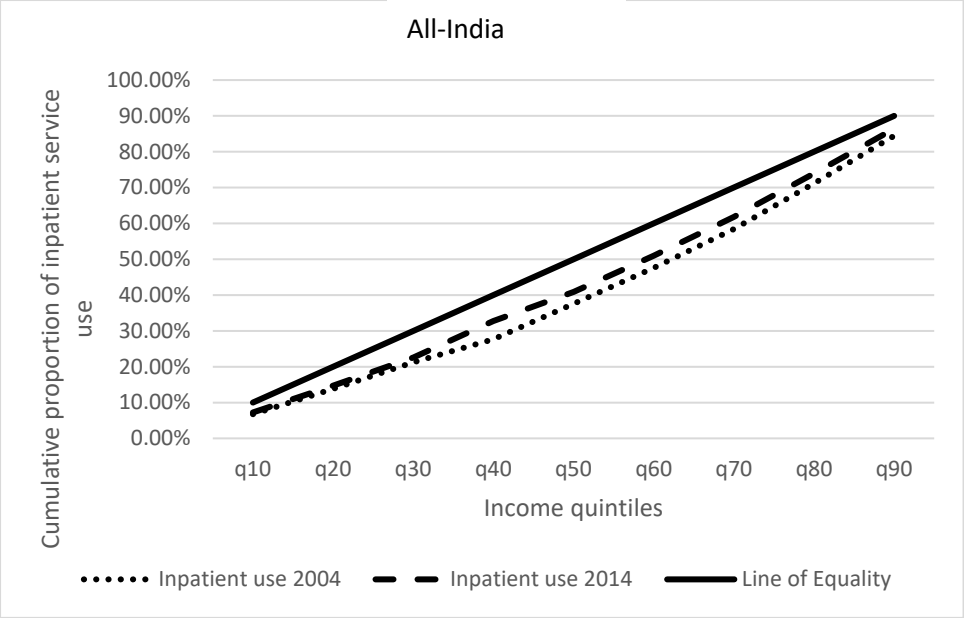
Figure 1: Inpatient service use by income quintiles, year 2004 and 2014

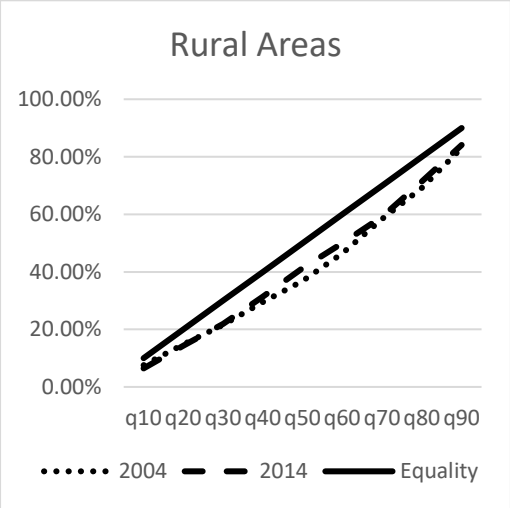


The analysis of CC (figure 2) also reflects the presence of income inequality and the use of inpatient services concentrated among rich, though reduced in the post PFHI. Figure 2 compares the concentration curves of actual inpatient service use for the year 2004 and 2014. It reflects a reduction in inequality however, utilization remains pro-rich as the curve lies below the line of equality. A dominance test [16] confirms that the distribution of the inpatient service use is less pro-rich in the year 2014 than it was in the year 2004. Figure 3 clearly suggests that though urban areas are more equitable (the curve is closer to line of

equality for both the years) but the reduction in inequality is higher for rural areas. At the same time, the mean of inpatient service use has also increased and the increase is higher for rural areas. Analyzing these two changes together we can say that the increased utilization over time has disproportionately benefitted the poor in rural areas relative to urban areas. Studies that have looked at impact of PFHIs/RSBY in India also report positive impact of PFHIs on health service utilization for rural areas but not for urban areas [20].

Figure 2: Concentration Curve (CC) for inpatient service use, by year





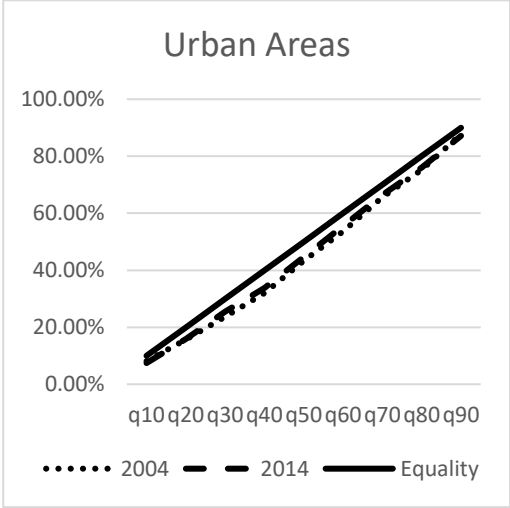


Table 3 presents the values of CI for urban and rural India. In the year 2004, the CI for actual utilization was 0.165 for India (mean of actual utilization: 0.024), which reduced to 0.121 (mean of actual utilization: 0.044) in 2014, suggestive of reduced, but not eliminated, pro-rich inequality. When we compare rural India and urban India, we find that though the rural areas are more inequitable (higher CI values) the reduction in inequality is higher for rural

areas. In the year 2004, the CI for rural areas was 0.165 (mean = 0.022) that significantly reduced to 0.136 (mean = 0.042) while for urban areas the CI reduced from 0.082 (mean = 0.03) to 0.069 (mean = 0.043). These CI values suggests that the proportion of people utilizing inpatient services tend to be less concentrated amongst the rich overtime and the reduction in concentration is larger for rural areas.

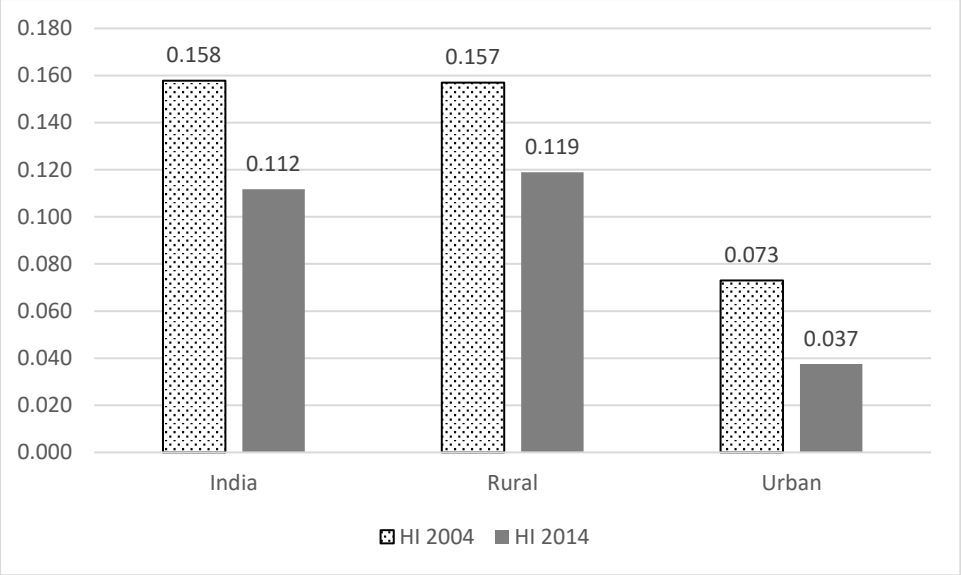
Table 3 Concentration Indices (CIs) for actual and need standardized utilization, 2004 and 2014

	Index value	Robust std.	Index value	Robust std.	Test of significance for difference between 2004 and 2014 (p-value)
Actual CI					
India	0.165	0.007	0.121	0.007	0.0
Rural	0.165	0.009	0.136	0.010	0.0
Urban	0.082	0.011	0.069	0.011	0.3
Need Standardized CI					
India	0.007	0.000	0.009	0.000	0.013
Rural	0.008	0.000	0.017	0.000	0.0
Urban	0.009	0.001	0.032	0.001	0.0

Income inequity in inpatient service use

The inequality observed may be legitimate [1] if it is driven by need factors alone, thus we analyze inequity. Horizontal inequity is the difference between the concentration of actual and need-standardized use. The horizontal inequity analysis (see Figure 3) for India suggests that inequity in inpatient service use has become less pro-rich post-PFHI implementation (2004 HI: 0.158; 2014 HI: 0.112), and the reduction in inequity is greater for rural areas (2004 HI: 0.157; 2014 HI: 0.119).

Figure 3: Horizontal Inequity Index in the year 2004 and 2014 by rural-urban

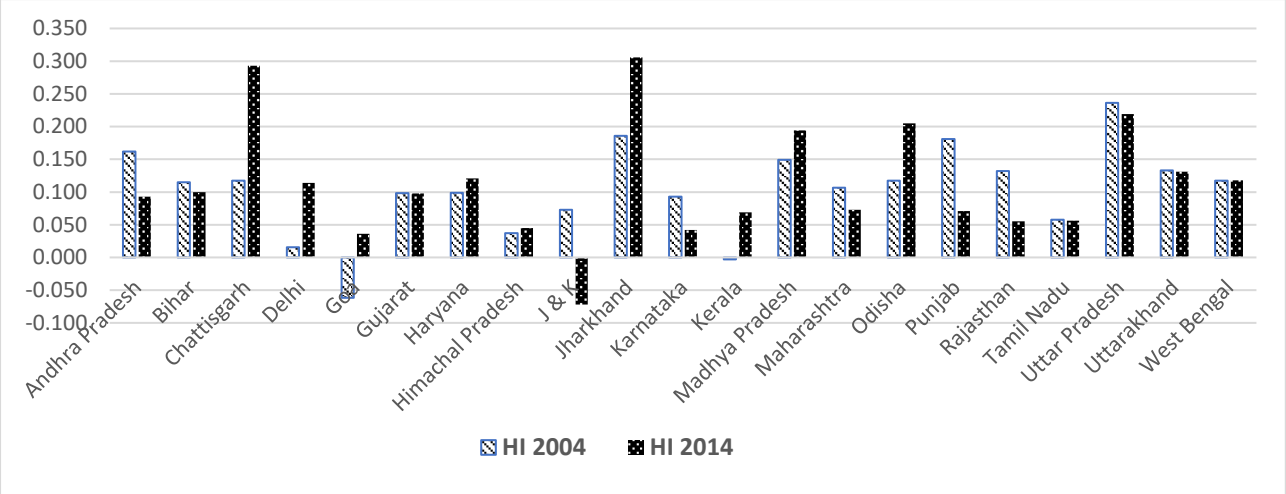


Inter-State Analysis

In figure 4, we compare the HI index across states. There are significant variations across states in the level of horizontal inequity in inpatient service use. States which show significant increase in inequity includes Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha (see figure 4). The inter-state differences in the levels of inequity reduction could be explained by the differences in their public health infrastructure and health outcomes. The inter-state disparities in the health system performance are well highlighted by stark differences in the Infant Mortality Rate (IMR), considered as an sensitive indicator of health system performance [21]. The IMR in better performing states such as Kerala and Goa are as low as 9 per 1000 live births, while, for the poor performing states such as Uttar Pradesh, Bihar, Madhya Pradesh, Chhattisgarh, Rajasthan, Orissa, Jharkhand, Assam it lies in the range of 50-65 per 1000 live births [22]. These are the states that have very high levels of inequity even post PFHI (see figure 4).Similar differences have been observed between rural and urban areas in India [23,24] which perhaps explain the higher levels of inequity in rural areas. This discussion highlights the need to address inter-state differences and urban-rural differences in healthcare access as implementing PFHIs without a well-functioning health system would be a challenge and waste of resources.

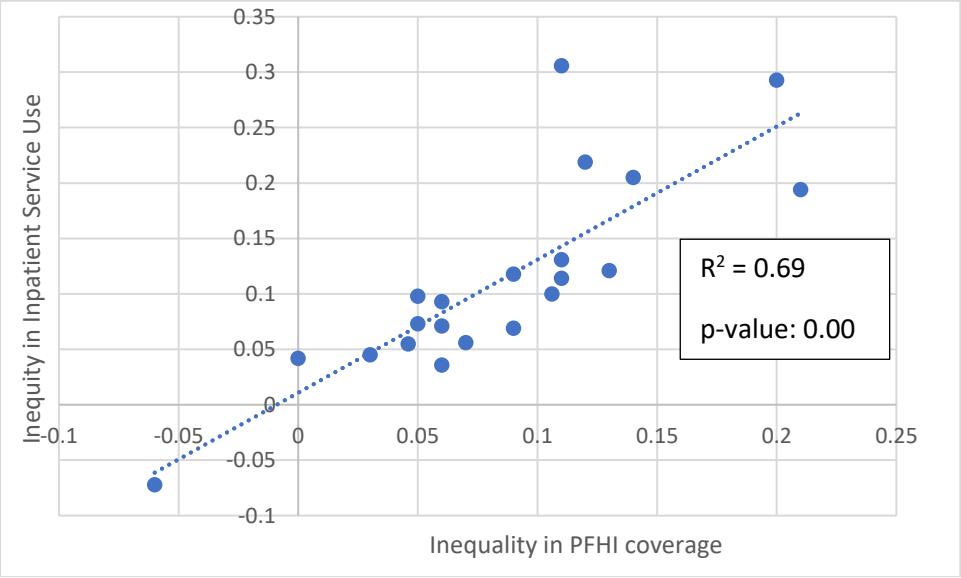
Further, the existing studies have highlighted that poor performing states not only lack public health infrastructure but also efficiency to use increased funds [25,26]. All these factors taken together could explain the higher levels of inequity in poorer states. PFHIs provide access to private health system for the poorer population, thus they have the potential to reduce access inequalities only if they serve the poorer population. The existing studies have highlighted issues of mistargeting under PFHIs [24]. We hypothesize that states with effective targeting (concentration of PFHIs among poorer population) would have lower levels of inequity.

Figure 4: Comparing Horizontal Inequity Index Across States before and after PFHI



To test our hypothesis, we examine the correlation between the level of horizontal inequity and the concentration index of PFHIs. The results show significant ($p<.000$) positive effect of targeting effectiveness on the level of equity (figure 5). Almost 70% of the variation in HI index is explained by concentration index of PFHI. These results support our hypothesis and helps us explain the inter-state variation in inequity reduction.

Figure 5: Relationship between inequality in PFHI coverage and inequity in inpatient service use



The issues of targeting and leakage in social security schemes have been reported by a number of researchers [11,27]. Studies analyzing the performance of RSBY/state-run PFHIs found that targeting is weak, as the list of eligible beneficiaries (below poverty line households) is either not updated or manipulated by socially advantaged people [11]. Such targeting issues and leakage could also explain the persistent pro-rich inequity in the utilization of inpatient services post RSBY/PFHI. There is need for the Indian government to fix such issues and achieve equity, as a huge amount of tax-money is directed to finance these schemes within limited fiscal space.

Limitations of the study

Though the study results have major implications in current Indian context, few limitations are acknowledged. Firstly, the need-standardized utilization is based on self-reported morbidity and the utilization itself may have been affected by the perception of need. There could be bias in the measurement of inequality due to differences in the conception of illness across income levels. However, researchers have found that poor people report morbidity less often when compared with the rich [17], suggesting our estimates of the degree of pro-rich inequity may be conservative. Secondly, we have used two time periods, 2004 and 2014, to capture the association of inequity with PFHIs. Post 2004, there have been many reforms in sectors other than health care, which coupled with economic growth can also explain the reduction in inequity, therefore we do not make any claims of causality, such claims may best be supported through natural experiments.

There is need to analyze the reduction in inequity using latest data available. Moreover, the inter-state differences in the reduction of inequity could be explained by the differences in implementation/ and or governance structure of PFHIs. There is need for future studies to study the inter-state implementation differences.

Conclusion

PFHIs were launched with the main objective of improving access to inpatient services and reducing inequities in the utilization of health services. Our findings indicate a positive effect of PFHIs on the equality of utilization of inpatient services. There is an overall increase in the utilization of inpatient services, which is higher for the poorer quintiles and rural areas, which is consistent with a positive effect of PFHIs as these schemes target poor people and remove access barriers for them. This study has highlighted the role of effective targeting and responsive public health system in reducing inequity. There is need for sustained efforts to reduce health care access inequity by ensuring access to poor people either through PFHIs or through strengthened public health system. Perhaps, the recent launch of PMJAY, India's latest PFHI by Indian government is one step towards sustaining the efforts towards inequity reduction, the results of which are yet to be seen. This study findings provide two critical insights for the success of PMJAY one is effective coverage of poorer population under PMJAY and other is the need to address inter-state variations in the health system functioning. Perhaps the poorer states need greater implementation support and managerial capacity to run PFHIs as they are already struggling with a poor public health system. The effectiveness of targeting approach for PMJAY, including identification of beneficiaries, preventing exclusion errors and leakage would determine the success of this flagship program of Indian government.

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