

Effect of Health Insurance Program for the Poor on Out-Of-Pocket Inpatient Care Cost in India

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Abstract

Background

In India, Out-of-pocket expenses accounts for about 62.6% of total health expenditure - one of the highest in the world. Lack of health insurance coverage and inadequate coverage are important reasons for high out-of-pocket health expenditures. There are many Public Health Insurance Programs offered by the Government that cover the cost of hospitalization for the people below poverty line (BPL), but their coverage is still not complete. The objective of this research is to examine the effect of Public Health Insurance Programs for the Poor on hospitalizations and inpatient Out-of-Pocket costs.

Methods

Data from the recent national survey by the National Sample Survey Organization, Social Consumption in Health 2014 are used. Propensity score matching was used to identify comparable non-enrolled individuals for individuals enrolled in health insurance programs. Binary logistic regression model, Tobit model, and a Two-part model were used to study the effects of enrolment under Public Health Insurance Programs for the Poor on the incidence of hospitalizations, duration of hospitalization, and Out-of-Pocket payments for inpatient care respectively.

Results

There were 64,270 BPL people in the sample. Individuals enrolled in poor people health insurance program have 1.21 higher odds of incidence of hospitalization compared to matched poor individuals not having health insurance coverage. Enrollment under the poor people health insurance program did not have any effect on duration of hospitalization and inpatient Out-of-Pocket health expenditures. Logistic regression model showed that chronic illness, household size, and age of the individual had significant effects on hospitalization incidence. Tobit model results showed that individuals who had chronic illnesses and belonging to other backward social group had significant effects on duration of hospitalization. Two-part regression model showed that days of hospital stay, graduate level education, specific age groups, using a private hospital for treatment, admission in a paying ward, and having some specific ailments had significant positive effect on out-of-pocket costs.

Conclusions

Enrolment in the public health insurance programs for the poor increased the utilization of inpatient health care facilities. Health insurance coverage must be expanded to cover outpatient services, and the coverage must not be limited by the number of family members.

Background

Achieving Universal Health Coverage (UHC) is the main goal for almost every nation in the world (1). Financial risk protection is an important dimension of UHC. One of the specific targets of the recent

Sustainable Development Goals (SDGs) is to provide financial risk protection (2). The amount of financial protection rendered to population groups will depend on their degree of dependence on out-of-pocket expenditures (OOP) for financing health care (3, 4). The primary conditions that are necessary for the occurrence of high OOP health expenditures are the availability and utilization of health care, poor capacity of households to pay for healthcare, and lack of any risk pooling and prepayment mechanisms (5). Evidence from National Health Account 2017 shows that OOP health expenditures for inpatient care constitutes around 31.96% of the total OOP health expenditures, even after coverage by various health insurance programs (6). The public healthcare system in India with the primary health centers and sub-centers is very weak and lacks basic infrastructure and in addition is plagued by long waiting times, thus making most of the people to choose private providers for their healthcare services (7–9). Lack of health insurance coverage and inadequate coverage are considered important for high OOP health expenditures (10). Protecting households from hospital OOP expenses should significantly improve financial equity in health service delivery. Moreover, access to health care can be improved if the health system can protect the poor households from significant OOP expenses. In order to improve access to health care by the poor, India initiated a number of health insurance programs for the poor since 2008 (10). This paper advances our knowledge about financial risk protection and effect of health insurance programs for the poor in India.

The increase in health insurance coverage may lead to increase in health care utilization because of the change in behavior of the insured as well as the health care provider. A study by Anderson et al. (2012) on the effect of health insurance coverage on the utilization of medical services in the US showed that there was a 61% reduction in inpatient hospital admissions and 40% reduction in emergency department visits among the uninsured population (11). Evidence from literature has shown that increased health insurance coverage leads to increase in utilization of health services, but the effect of health insurance coverage on financial risk protection is less clear, especially for poor beneficiaries (12). The health insurance for the poor in India covers only inpatient services. This creates an incentive for the patients to visit hospitals and get hospitalized, instead of using basic primary health care services. Studies on hospitalization trends in India showed that an annual hospitalization rate increased from 16.6 per 1000 population to 37.0 per 1000 from 1995 to 2014 (13).

There are many Public Health Insurance Programs for the Poor offered by the Government of India (GOI) and individual states cover the cost of hospitalization and inpatient care (14). RSBY is a health insurance program started by the Ministry of Labor and Employment of the Government of India in April 2008 and it provides a wide range of hospital-based healthcare services to Below Poverty Line (BPL) families (15). There are a number of state-run public health insurance programs for the poor in three of the southern states in India which provide higher coverage than RSBY and are exempted from the national program. The programs are the Chief Minister's Comprehensive Health Insurance Scheme in Tamil Nadu State, Rajiv Aarogyasri Community Health Insurance (RACHI) in Andhra Pradesh State, and Vajpayee Aarogyasri Scheme (VAS) in Karnataka State (14). Table 1 summarizes the important features of the RSBY program and the state health insurance programs for the poor in Andhra Pradesh, Karnataka, and Tamil Nadu.

Table 1
Key Parameters under Health Insurance Programs in India

Parameter	Rashtriya Swasthya Bima Yojana (RSBY)		State health insurance programs for the poor (Andhra Pradesh, Tamil Nadu and Karnataka)
	Description	Additional Caveats	Description
Benefits covered	Cost of hospitalization for 725 + procedures at empaneled hospitals up to INR 30,000 per annum per household; INR 100 per visit up to INR 1,000 per year for transport cost	Pre-existing conditions are covered; minimal exclusions; day surgeries covered; outpatient expenditure is not covered	Andhra Pradesh - Families are provided coverage for INR 200,000 per family per year, and there are no restrictions on the number of family members enrolled Karnataka - INR150,000 per year for 5 persons in a family Tamil Nadu – INR100,000 per family per year
Eligibility criteria	Must be on the official state BPL list; Limited to five members of the household including household head, spouse, and three dependents	All enrolled members must be present to be enrolled;	Must be on the official BPL list of the specific state. No restrictions on the number of family members enrolled in Andhra Pradesh, and Tamil Nadu. Covers five members of family in Karnataka.
Premium and fees	INR 30 registration fee per household per annum paid by household.		No specific enrolment fee in the three states of Andhra Pradesh, Karnataka, and Tamil Nadu
Financing	75%/ 25% Government of India/ State Government	The ratio is 90% /10% in Northeast states and Jammu & Kashmir	Completely funded by the respective states
Insurer	Both public and private insurance companies can bid to work in a district or more than a district recommended by state governments	In one district only one insurance company is finally selected	Both public and private insurance companies can bid to work at the state level
Service provider	Both public and private sector service providers can apply to join the network of providers empaneled under the scheme	Minimum eligibility criteria on quality of services to be provided have been laid down by the MoL & E	Both public and private sector service providers in the specific state can join the network of providers empaneled in the program. Minimum eligibility criteria laid down by the respective State Health Ministries
Source: Ministry of Labor and Employment (MoL & E) and State Health Departments			

Around 41 million families are enrolled in RSBY, covering around 150 million poor people as of September 2016. The enrolment under the program has been increasing starting from only 55 districts in 2008–2009. Nationally, around 460 districts participate in the program, with 57% of the eligible households are currently enrolled (16). There is significant inter-district and inter-state variation in the percentage of eligible households enrolled in RSBY. Across states, the degree of enrolment of households varies from a low of 24% in Arunachal Pradesh and 36% in Haryana to more than 75% in Kerala. The degree of enrollment of households by district varies significantly across the country, with a low rate of enrollment of 3% in Kannauj district and 6% in Kanpur district in the Uttar Pradesh state to a high enrollment rate of 90% of households in most of districts in the Chhattisgarh and Kerala states of India. Enrolment is not complete in many states, even a decade after the start of the program. Also, as of September 2016, the state of Rajasthan was still in its early stage for enrolling households in RSBY (16). This shows that enrollment in the RSBY program has been slow in some parts of India. Not all states in India participate in RSBY. The state of Andhra Pradesh has not adopted RSBY as it already has a substantially more generous state level health insurance program than RSBY which pre-dates RSBY with relatively high population coverage, covering nearly 80% of its population (17). Studies show that access is not available to around 50% of the people eligible for RSBY program because they are currently not enrolled in RSBY due to lack of availability of full lists of eligible participants, and high migration rates (16).

Under the Public Health Insurance Programs for the poor only the hospitalization services and expenses are covered. It is expected that these health insurance for the poor will increase utilization of hospitals by the BPL households who would usually be forced to postpone their non-urgent procedures for a later time because of cost. Even with insurance, there may be OOP payments for drugs, tests and post-treatment care which are not covered by the health insurance that may increase the OOP payments for inpatient and inpatient-related care. Hence the direction of effect of the Poor People Health Insurance Programs on total inpatient OOP health expenditure is unclear. Also, RSBY leads to misuse of services, since both the physician and the patient have the incentive to convert an outpatient case into an inpatient admission, leading to unnecessary utilization (18). The objective of this research is to examine the effect of Public Health Insurance Programs for the Poor on hospitalizations and inpatient OOP health expenditures. Many studies show that people incur high OOP health expenditures despite being covered by the national health insurance program RSBY or other state health insurance programs (19–24). However, studies on state health insurance programs in Karnataka and Andhra Pradesh showed that OOP health expenditures significantly declined with health insurance coverage (17,25,26). Cross-sectional studies done in Tamil Nadu and Maharashtra show that the utilization of healthcare was significantly higher among the insured compared to the uninsured population (27).

Current studies on Poor People's Health Insurance Programs such as RSBY deal with issues in program enrolment (28), barriers in implementation of the program (22), effect of information campaign (29), hospitalization patterns (30), and determinants of participation in the RSBY program (31). There are only two district level studies on RSBY, one done in Amaravati district in Maharashtra (32) and the other in Gujarat (19) showed that RSBY increased hospitalizations and higher OOP health expenditures among the RSBY insured people. The study in Gujarat showed that RSBY enrollees experienced higher OOP

health expenditures because they had to pay for medicines and diagnostics during the hospital admission (25). Another state level study done for the state health insurance program Aarogyasri found different results with insurance significantly reducing the OOP health expenditures for hospitalizations (17). Most of other studies that studied the effect of health insurance on hospitalizations and OOP health expenditures were community-based health insurance programs in different parts of the country (25,33–35) and thus their implications for nation-wide policy interest is limited.

This study is a considerable improvement over other studies on Public Health Insurance Programs for the Poor in India on two important counts: i) the study uses nationally representative dataset which helps in estimating pan-India effects of Public Health Insurance Programs for the Poor ii) the study evaluates the effect of Public Health Insurance Programs for the Poor by comparing outcomes between poor people enrolled and not-enrolled in the insurance program. Many studies are based on RSBY enrollees alone and do not have any controls making it difficult to identify the effects of the Public Health Insurance Programs for the Poor. This study identified comparable control population from among those who are poor but were not enrollment in insurance. The specific research questions that will be addressed in this research are: (i) How do hospitalizations differ between the enrolled and not-enrolled groups under Public Health Insurance Programs for the Poor? and (ii) How does OOP health expenditure for inpatient care differ among people enrolled and not-enrolled under Public Health Insurance Programs for the Poor?

Methods

Data source

The data from the National Sample Survey Organization (NSSO) of the Government of India were used for the study (36). NSSO is a national organization under the Ministry of Statistics and Implementation which was established in 1950 to regularly conduct surveys and provide useful statistics in the field of socio-economic status of households, demography, health, industries, agriculture, consumer expenditure etc. The specific data set from NSSO that was used in this study is the Social Consumption (Health), NSSO 71st Round for 2014, which is the latest nationwide data available in India. The survey covered whole of the Indian Union. The survey used the interview method of data collection from a sample of 65,932 randomly selected households (36,480 in rural India and 29,452 in urban India) and 335,499 individuals, covering the members of the household in all the 36 states (including union territories). The data for the survey were collected over a period of six months, from January to June 2014. The NSSO Social Consumption (Health) collected data on demographic characters, employment, health conditions, source of payments, health insurance coverage, type of coverage, costs of various inpatient services, level of care, type of care and a number of other variables. The survey also collected information on medical care received at inpatient and outpatient facilities of medical institutions including health expenditures for various episodes of illness. This is the first NSSO health survey that collected data on utilization of alternative medicines. The details of hospitalization for all current and former members of the household were collected for the last 365 days (hospitalization occurred from January 2013 to June 2014) and the details of outpatient services were collected for the last 15 days.

Empirical Methodology

The main objective of this study is to estimate the effect of Public Health Insurance Programs for the Poor on hospitalizations and OOP inpatient care costs. The effects of the program were estimated by comparing the probability of hospitalizations and OOP inpatient healthcare costs between the groups who are eligible (poor) and covered by the insurance programs and who are eligible (poor) but not covered. In theory, the best approach of estimating the impact of a program is to adopt a Difference-in-difference (DID) framework with randomized allocation of eligible individuals in the program group and the no-program group. The framework requires data on the two groups in the pre-intervention period and then in the post-intervention period (37). DID estimators compare the change in mean outcomes before and after the intervention among individuals who acquire coverage (treated) and those remaining not exposed.

To estimate the causal effect using DID, the assumptions of DID must be satisfied. The main assumptions are that the treatment and control groups have parallel trends in outcome, the composition of the treatment and control groups are stable for repeated cross-sectional design, the allocation of treatment is unrelated to the outcome at baseline, and there are no spillover effects. The most important assumption for DID is the 'parallel trend assumption'. This means that in the absence of the intervention/treatment, the average difference in the outcome between the treatment and control groups would have remained constant in post-intervention time period as in pre-intervention period. The violation of this assumption will imply that the DID approach will not be able to obtain unbiased estimates of program impacts. The DID model cannot be used if composition of the pre-intervention and post-intervention groups are not stable, if the comparison group has a different outcome trend, and if the allocation of the treatment/intervention is determined by the baseline outcome (37).

However, the treated and untreated may differ in the distribution of both observable and unobservable characteristics. Heckman and Vytlacil (2007) highlighted that unobservable variables may play a bigger (or smaller) role in influencing the with-treatment outcome than the without-treatment outcome (38). Inability to control for them is likely to provide under (over) estimation of the effects of the programs. Since the main assumption of DID is parallel trend assumption and checking for the constant difference in outcome over time is necessary for deriving impact of a program or intervention using DID approach.

For the purpose of this study, a number of simplifying assumptions must be made as the data set is cross-sectional in nature and we only observe the outcomes in the year the data were collected. Therefore, the data set does not provide any information on the individuals who were enrolled in the insurance program in the previous period and those who were not enrolled. The insurance program is designed for the poor households and since belonging to the poverty group is a dynamic event, a household in poverty in pre-insurance period may not necessarily be in poverty in the post-intervention period. Moreover, household in poverty in the current year (the year of data collection) may not have been in poverty in the previous period. Almost all programs also show some degree of mistargeting implying that some poor people may not be offered the insurance while some non-poor are offered the insurance benefit. These

potential deviations from expected enrollment may affect the estimate of outcomes when a post-intervention year's data are used.

In the DID model, the intervention effect will be the difference between the observed outcome in intervention group and the unobserved counterfactual outcome for intervention group as shown in Fig. 1. It is possible to model the unobserved counterfactual outcome for intervention group in the post-intervention period in absence of the intervention if data on pre-intervention period are available. In the cross-sectional data of the study, we do not have information on the intervention and control groups in pre-intervention period and if intervention and control groups differed in terms of outcomes of interests, we have no way of correcting for this. The only alternative approach we can take is to select the comparison groups from the cross-sectional data in such a way that the likelihood of pre-intervention variability would be minimized.

Rather than identifying the economic status of individuals who were actually covered by insurance in the previous period, the implicit assumption we are using is complete absence of mistargeting or simply not allowing the mistargeted individuals in the analysis. It is also assumed the social mobility of poor households in India is relatively low and so the households belonging to poverty category in the current year (the year of the survey) were also poor in the previous few years. Since the sample size is large enough, most of the observed and unobserved characteristics of the poor who are in the program and who are not in the program are likely to be similar. Therefore, the factors other than insurance coverage that may cause differences between the intervention group and control group in terms of utilization of hospital services or out-of-pocket costs should be negligible. If the intervention and control groups are matched in the current year using a list of observable characteristics will further reduce the possibility of biased estimate or unequal starting point for the two groups in terms of outcome variables. Thus, using the cross-sectional post-intervention data, the intervention effect will be the difference between the observed outcome in the intervention group and the observed outcome in the control group as shown in Fig. 2.

Two important assumptions are made in the impact evaluation process when using this cross-sectional data. The assumptions are, at the starting point in the pre-intervention period, the unobservable differences between the intervention and control group are small, if any, and that both the intervention group and the matched control group would show similar trend in terms of outcomes in absence of the intervention.

Treatment Group, Control Group and Propensity Score Matching

The treatment group consist of all the people currently enrolled under the Public Health Insurance Programs for the Poor namely the RSBY and other state health insurance programs for the poor. The control group will consist of all people who are poor but not enrolled in the Public Health Insurance Programs for the Poor. In order to make both the groups comparable and to avoid selection bias, a propensity score matching was used to match the treatment and control groups. A propensity score is the

conditional probability that a subject receives “treatment” given the subject’s observed covariates. A propensity score matched regression analysis incorporating survey weights can better account for selection bias based on observed variables than an unmatched regression (39,40). The main goal of propensity score is to balance the observed covariates from the individuals in the treatment and control groups in order to imitate a randomized study (41). The variables used to get the propensity scores were education, socioeconomic status, location of household (urban/rural), household size, and age of the individual, using a user-written command psmatch2 in STATA. After matching, a regression analysis was performed.

Data Analysis

Incidence of hospitalization and duration of hospital stay

Hospitalization is determined by several factors. To study the effects of enrolment under Public Health Insurance Programs for the Poor on the incidence of hospitalizations after controlling for other factors, a binary logistic regression model was used. The logistic regression model is preferred since the dependent variable is dichotomous. “Whether the individual was hospitalized during the last 365 days?” was used as the dependent variable. A dichotomous variable for hospitalization was created with 0 for ‘not hospitalized during the last 365 days’ and 1 for ‘hospitalized during the last 365 days’. The independent variables include enrollment under the Poor People Health Insurance Program and other covariates. The model estimated the log odds of incidence of hospitalization adjusted for a set of explanatory variables. Individual is the unit of analysis. The results for the logistic regression have been presented with the help of regression coefficients, odds ratio and 95% confidence intervals. Tobit Regression Model was used to study the association between the Public Health Insurance Programs for the Poor and the duration of hospitalization. The Tobit model is usually estimated when the dependent variable has a large number of observations clustered, usually at zero. For the duration of hospitalization, the dependent variable is either zero or higher than 0 (42). The dependent variable duration of hospitalization is truncated below zero and thus the Tobit model is used.

OOP inpatient healthcare cost

Tobit Regression Model will be used to study the association between Public Health Insurance Programs for the Poor and the OOP cost for inpatient care. The Tobit model is usually used when the dependent variable has a number of values clustered, usually at zero. For the OOP inpatient healthcare cost, the dependent variable is either zero or higher than 0 (42). The dependent variable duration of hospitalization is truncated below zero and thus the Tobit model is used.

The Tobit model will be estimated as:

$$Y^*_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \mu$$

$$Y_i = Y^*_i \text{ if } Y^*_i > 0$$

$$Y_i = 0 \text{ if } Y^*_i \leq 0$$

where Y^*_i is the latent dependent variable, and Y_i is the observed dependent variable.

Results

Descriptive Statistics

The total sample consisted of 336,470 individuals. In the total sample, 42,121 individuals were covered by the government sponsored health insurance programs such as Employee's State Insurance Scheme (ESIS), Central Government Health Scheme (CGHS), and the poor people's health insurance programs such as RSBY and other state health insurance programs. Poverty is a dynamic event where people move in and out of poverty. We used the poverty line for 2014 to find out the individuals who were poor in 2014. Since the data had only one variable for the individuals covered by the government sponsored health insurance programs which included both the poor people health insurance programs and other government health insurance programs for the non-poor, we considered that the people who were below the poverty line and enrolled under the government sponsored health insurance programs to be enrolled under the public health insurance programs for the poor such as RSBY, RACHI etc and the people who were below poverty line and not enrolled as the people who were eligible for the poor people's health insurance program but not enrolled. Only the poor people below the poverty line as of 2014 is used for this study. Descriptive statistics presented in Table 1 are at the individual level, consisting of only poor individuals. There were 64,270 observations. The mean age group of the poor population is 25.29 years. Only 9.55% of the poor individuals in India are enrolled in any type of public health insurance programs for the poor. 9.41% of the poor individuals are enrolled in RSBY all over India except the states of Tamil Nadu, Andhra Pradesh, and Karnataka. In Andhra Pradesh, 39.97% of the poor people are enrolled in RACHI, 5.69% are enrolled in VAS in Karnataka, and only 4.45% are enrolled in CCHIS in Tamil Nadu. Around 41.30% of the poor in the sample is illiterate; 80.57% were of Hindu religion; 85.13% belong to the disadvantaged classes; 64.20% of the individuals were from medium sized households (5 to 8 members). 2.51% of the poor individuals were suffering from chronic illnesses; 3.33% were hospitalized in the previous one year with the mean duration of hospitalization per poor person being 0.1664 days (see below for admission statistics). The yearly OOP health expenditure for inpatient health care for the whole poor population was 269.26 INR.

Table 2
Descriptive Statistics for the poor individuals in the 2014 survey

Variables	Categories	Frequency (%) n = 64,270	Weighted Percentage
Hospitalization	No	56,755 (88.31%)	96.67%
	Yes	7,515 (11.69%)	3.33%
Health Insurance for the Poor	Enrolled	5,917 (9.21%)	9.55%
Sex	Female	32,152 (50.03%)	48.90%
Marital Status	Never married	32,938 (51.25%)	51.81%
	Currently married	28,443 (44.26%)	43.59%
	Widowed/divorced/separated	2,889 (4.50%)	4.60%
Education	Illiterate	26,063 (40.55%)	41.30%
	Primary/middle school	29,240 (45.50%)	47.39%
	Secondary school	4,834 (7.52%)	6.49%
	Higher secondary school	2,795 (4.35%)	3.46%
	Diploma/graduate/post graduate	1,337 (2.08%)	1.36%
Location	Rural	42,590 (66.27%)	80.03%
	Urban	21,680 (33.73%)	19.97%
Religion	Hinduism	46,464 (72.30%)	80.57%
	Islam	11,836 (18.42%)	15.09%
	Christianity	3,988 (6.21%)	2.09%
	Other religions	1,982 (3.08%)	2.25%
Social Group	Scheduled tribes	12,983 (20.20%)	16.65%

Variables	Categories	Frequency (%) n = 64,270	Weighted Percentage
	Scheduled castes	13,759 (21.41%)	25.51%
	Other backward classes	26,105 (40.62%)	42.97%
	Others	11,423 (17.77%)	14.86%
Household size	Small household (1 to 4 members)	8,835 (13.75%)	18.07%
	Medium household (5 to 8 members)	39,009 (60.70%)	64.20%
	Large household (9 and more)	16,426 (25.56%)	17.73%
Household type	Self-employed	33,211 (51.67%)	49.44%
	Regular wage/salary earning	7,794 (12.13%)	9.27%
	Casual labor	21,617 (33.63%)	38.49%
	Others	1,648 (2.56%)	2.80%
Latrine type	Service and pit latrine	13,594 (21.15%)	14.65%
	Septic tank/flush system	16,931 (26.34%)	19.36%
	No latrine and others	33,745 (52.51%)	65.99%
Drainage type	Open	30,535 (47.51%)	44.05%
	Covered	8,543 (13.29%)	10.66%
	No drainage	25,192 (39.20%)	45.29%
Drinking water	Safe water	61,807 (96.17%)	98.36%
	Unsafe water	2,463 (3.83%)	1.64%
Cooking fuel	Unclean fuels	50,913 (79.22%)	84.91%
	Clean fuels	12,802 (19.92%)	13.69%

Variables	Categories	Frequency (%) n = 64,270	Weighted Percentage
	No cooking arrangement	555 (0.86%)	1.40%
Chronic illness	Yes	1,911 (2.97%)	2.51%
Level of care	Sub-center/PHC/CHC	890 (1.38%)	0.42%
	Public hospital	4,005 (6.23%)	1.72%
	Private hospital	2,620 (4.08%)	1.18%
	Did not seek care	56,755(88.31%)	96.67%
Type of ward	Free	4,532 (7.05%)	2.00%
	Paying general	2,672 (4.16%)	1.20%
	Paying special	311 (0.48%)	0.13%
	Did not seek care	56,755 (88.31%)	96.67%
Nature of ailment	Infections	1,518 (2.36%)	0.53%
	Cancers, blood, endocrine, metabolic, eye & ear diseases	486 (0.76%)	0.19%
	Cardiovascular, respiratory diseases	542 (0.84%)	0.22%
	Gastrointestinal diseases	553 (0.86%)	0.22%
	Skin, musculoskeletal, psychiatric & neurological diseases	576 (0.90%)	0.21%
	Genitourinary, obstetric & childbirth	3,204 (4.99%)	1.73%
	Injuries	636 (0.99%)	0.23%
	Did not seek care	56,755 (88.31%)	96.67%
Continuous Variables			
Variables	Mean	Standard Error	95% Confidence Interval

Variables	Categories	Frequency (%) n = 64,270	Weighted Percentage
Age	25.29	0.1719	24.95 –
Age Groups	9.21	0.0685	25.63
0–18 years	29.41	0.1003	9.08–9.35
19–40 years	50.06	0.1431	29.21–
41–60 years	67.71	0.2262	29.60
61–80 years	86.62	0.5686	49.78–
80+ years	0.1664	0.0067	50.34
Duration of hospitalization	269.26	12.13	67.27–
Yearly inpatient OOP health expenditure	22.43	1.01	68.16
Monthly inpatient OOP health expenditure	8305.62	18.5608	85.50–
Yearly individual consumption expenditure	692.13	1.5467	87.74
Monthly individual consumption expenditure			0.1532–
			0.1796
			245.47–
			293.04
			20.45–
			24.42
			8269.24–
			8342.00
			689.10–
			695.16

Table 2 shows the descriptive statistics for the poor individuals who were hospitalized. The mean age of hospitalized individuals is 30.92 years; mean yearly individual consumption expenditure is 8449.03 INR; mean duration of hospitalization is 5.009 days; yearly inpatient OOP health expenditure is 8149.41 INR.

Table 3
Descriptive Statistics of Variables when Hospitalization = 1

Variable	Mean	Standard Error	95% Confidence Interval
Duration of hospitalization	5.009	0.1605	4.686–5.315
Yearly Inpatient OOP health expenditure	8149.415	317.9662	7526.11–8772.71
Age	30.927	0.3844	30.174–31.681
Yearly individual consumption expenditure	8449.035	46.2932	8358.287–8539.782
Monthly individual consumption expenditure	704.086	3.8577	696.523–711.648

Propensity score matching was done using the variables such as education, socioeconomic status, location of household (urban/rural), household size, and age of the individual, using a user-written command psmatch2 as shown in Table 3. 5,917 samples in the intervention group were matched with 5,917 samples in the control group. Thus, the total matched sample consisted of 11,834 observations. After matching, different types of regression analysis were performed using the total matched sample.

Table 4
One-One Propensity Score Matching

	Treated	Control	Difference	T statistics	S. E
Total sample	5917	5917			
Average Treatment on Treated (ATT)	0.1407	0.1191	0.0216	2.89	0.0074
Propensity Score Testing of Two Groups					
	Treated (Mean)	Control (Mean)	% Bias	T statistics	Probability(t)
Age	26.821	26.426	2.0	1.10	0.269
Individual Consumption Expenditure	8588.9	8595.4	-0.3	-0.17	0.866
Household size	2.0255	2.014	1.9	1.04	0.299
Location	1.2505	1.2525	-0.4	-0.25	0.799
Education	1.7828	1.7725	1.2	0.67	0.503

Multivariate analysis

The logistic regression model results for the effects of poor people health insurance program on incidence of hospitalization are shown in Table 4. People enrolled in poor people health insurance program have 1.21 higher odds of incidence of hospitalization compared to poor people not having health insurance coverage. Chronic illness, household size, and age of the individual had significant effects on incidence of hospitalization. The presence of chronic illness increased the probability of hospitalization, and the different age groups categories for individuals 19 years and above had higher probability of hospitalization compared to less than 18 years' age group. However, individuals belonging to the medium and large households had lower probability of incidence of hospitalization compared to individuals from small households. Social group, religion, urban/rural location, household type, marital status, education, number of hospital beds in the state had insignificant effects on the incidence of hospitalization. Average marginal effects of each of the independent variables on the probability of the incidence of hospitalization are presented in Table 4. Fixed effects for state of residence of the individual was used in the model. No significant effects for the state of residence were found.

Table 5

Logistic Regression Results for the Effect of Poor People Health Insurance Program on the Incidence of Hospitalization

Incidence of Hospitalization	Odds Ratio	95% Confidence Interval	P value
Public Health Insurance for the Poor Not enrolled (Reference) Enrolled	1.23	1.06–1.44	0.007
Social Group Other Backward Classes (Reference) Scheduled tribes Scheduled castes Others	1.01 1.01 1.17	0.85–1.19 0.86–1.19 0.96–1.42	0.878 0.859 0.103
Chronic Illness No Chronic illness (Reference) Chronic Illness	3.55	2.87–4.45	0.000
Age Groups 0 to 18 years (Reference) 19 to 40 years 41 to 60 years 61 to 80 years Older than 80 years	1.06 2.44 2.99 4.85	0.82–1.36 1.89–3.15 2.14–4.17 1.71–13.69	0.635 0.000 0.000 0.003
Interaction Age Group* Sex Female and Age Group (19 to 40 years) Female and Age Group (41 to 60 years) Female and Age Group (61 to 80 years) Female and Older than 80 years	6.81 0.91 0.82 0.76	4.95–9.36 0.63–1.30 0.51–1.30 0.19–3.04	0.000 0.617 0.411 0.703
Household Size Small household (Reference) Medium household (5 to 8 members) Large household (9 & more members)	0.77 0.47	0.66–0.89 0.39–0.58	0.000 0.000
Hospital beds per 1000 population More than 1 bed per 1000 (Reference) 0.5 to 1 per 1000 population Less than 0.5 per 1000 population	1.59 1.16	0.34–7.40 0.26–5.05	0.551 0.843
Constant	0.15	0.03–0.68	0.013

Table 5 includes Tobit model results on the effect of poor people health insurance program on the duration of hospitalization. Being enrolled in health insurance for the poor had no significant effect on duration of hospitalization. People who did not have chronic illnesses had significantly lower duration of hospitalization compared to people with chronic illnesses. People belonging to the other backward classes social group category had significantly higher duration of hospitalization compared to the reference group (scheduled tribes). Other covariates such as household type, religion, age, urban/rural location, household type, household size, marital status, education, and number of hospital beds had no significant effect on the duration of hospitalization. Fixed effects for state of residence of the individual

was used. Rajasthan, Uttar Pradesh, and Gujarat were the only three state showing significant results. Average marginal effects of each of the independent variables on the duration of hospitalization are presented in Table 5.

Table 6
Tobit Regression Results for the Effect of Poor People Health Insurance Program on the
Duration of Hospitalization

Duration of Hospitalization	Coefficient	95% Confidence Interval	P value
Public Health Insurance for the Poor Not enrolled (Reference) Enrolled	0.44	-0.47–1.35	0.346
Social Group Other Backward Classes (Reference) Scheduled Tribes Scheduled Castes Others	-1.20 -0.08 -0.56	-2.21–0.20 -1.07–0.90 -1.72–0.60	0.019 0.870 0.344
Chronic Illness No Chronic illness (Reference) Chronic Illness	3.15	1.96–4.33	0.000
Household Type Self-employed (Reference) Regular wage/Salary earning Casual labor Others	0.38 0.45 -0.03	-0.72–1.48 -0.34–1.26 -2.02–1.92	0.497 0.263 0.970
Age Groups 0 to 18 years (Reference) 19 to 40 years 41 to 60 years 61 to 80 years Older than 80 years	-0.90 1.08 0.36 0.44	-1.87–0.05 -0.09–2.25 -1.14–1.88 -3.45–4.33	0.065 0.072 0.631 0.825
Household Size Small household (Reference) Medium household (5 to 8 members) Large household (9 & more members)	-0.15 -0.98	-0.99–0.68 -2.22–0.26	0.723 0.124
Number of Hospital Beds in States Less than 10,000 beds (Reference) 10,000 to 20,000 beds Greater than 20,000 beds	0.38 4.28	-7.86–8.64 -3.69–12.26	0.927 0.292
Constant	3.35	-4.47–11.18	0.401

Results of the two-part regression model on the effects of poor people health insurance program on inpatient out-of-pocket health expenditures are shown in Table 6. Enrollment under the poor people health insurance program did not have any effect on inpatient OOP health expenditures. Duration of stay in hospital, graduate level education, age groups of 19 to 60 years, using a private hospital for treatment,

admission in paying ward (general and special), and having ailments such as cancers, blood, endocrine, metabolic, eye, ear diseases, cardiovascular, respiratory diseases, skin, musculoskeletal, psychiatric, neurological diseases, and injuries had significant positive effect on the amount of OOP health expenditures experienced by the individual. Utilization of AYUSH type of treatment had significant negative effect of OOP health expenditures compared to individuals using allopathic treatment. Factors such as location, social group, household type, household size, and number of hospital beds in states had no significant effect on OOP health expenditures. Gujarat, and Kerala were the only two states showing significant results in the state fixed effects model.

Table 7

Tobit Regression Results for the Effect of Poor People Health Insurance Program on Inpatient Out-of-Pocket Health Expenditures

Out-of-Pocket Health Expenditures	Coefficient	95% Confidence Interval	P value
Public Health Insurance for the Poor Not enrolled (Reference) Enrolled	-950.36	-2501.48–600.75	0.230
Duration of Stay in Hospital	521.40	435.30–607.50	0.000
Social Group Other Backward Classes (Reference) Scheduled Tribes Scheduled Castes Others	-1073.94 -664.54 -273.32	-2818.92–671.04 -2328.89–999.81 -2251.07–1704.43	0.228 0.434 0.786
Education Illiterate (Reference) Primary/middle school educated Secondary school educated Higher secondary school educated Diploma/graduate/post graduate educated	1104.02 285.39 -1972.92 7634.86	-232.77–2440.81 -2359.45–2930.25 -5096.84–1150.99 2798.47–12471.25	0.105 0.832 0.216 0.002
Household Type Self-employed (Reference) Regular wage/Salary earning Casual labor Others	1034.10 -1275.76 140.24	-903.67–2971.88 -2654.16–102.62 -3201.46–3481.95	0.295 0.070 0.934
Age Groups 0–18 years (Reference) 19 to 40 years 41 to 60 years 61 to 80 years Older than 80 years	1857.13 2231.96 87.75 -1018.33	-68.31–3782.58 234.30–4229.63 -2479.51–2655.01 -7587.77–5551.11	0.059 0.029 0.947 0.761
Household Size Small household (Reference) Medium household (5 to 8 members) Large household (9 & more members)	352.09 2008.08	-1064.15–1768.33 -79.56–4095.74	0.626 0.059
Number of Hospital Beds in States Less than 10,000 beds (Reference) 10,000 to 20,000 beds Greater than 20,000 beds	5850.75 7440.12	-7936.70–19638.20 -5846.08–20726.34	0.405 0.272
Nature of Treatment Allopathic treatment (Reference) AYUSH	-9020.48	-16223.98 --1816.99	0.014
Level of Care Inpatient Sub-center/PHC/CHC (Reference) Public Hospital Private Hospital	949.24 3772.82	-958.03–2856.53 1004.01–6541.63	0.329 0.008

Out-of-Pocket Health Expenditures	Coefficient	95% Confidence Interval	P value
Type of Ward Free (Reference)	9095.49	6978.86–11212.12	0.000
Paying General	13642.31	9856.36–17428.27	0.000
Paying Special			
Sector Rural (Reference)	-309.89	-1754.49–1134.70	0.674
Urban			
Nature of Ailment Infections (Reference)	3012.40	538.72 - 5486.08	0.017
Cancers, blood, endocrine,	3741.79	1137.12–6346.47	0.005
metabolic, eye, ear diseases,	-1184.58	-3789.95 -1420.78	0.373
Cardiovascular, respiratory diseases	2798.06	381.21 - 5214.90	0.023
Gastrointestinal disease	21.09	-1858.70–1900.90	0.982
Skin, musculoskeletal, psychiatric & neurological diseases	4338.32	1727.14–6949.50	0.001
Genitourinary, obstetric & childbirth Injuries			
Constant	-5660.85	-18905.18–7583.47	0.402

Discussion

Our study showed that poor people enrolled in the health insurance programs for the poor have higher incidence of hospitalization, but the health insurance enrolment had no effect on the duration of hospitalization. The increase in health insurance coverage may lead to increase in health care utilization because of higher access to care and due to changes in utilization behavior both by the insured and the provider. The results of our study are consistent with findings from other cross-sectional studies in Tamil Nadu and Maharashtra (27) which showed that utilization of healthcare was significantly higher among the insured compared to the uninsured. Globally, evidence from the US showed that there was a 61% reduction in inpatient hospital admissions and 40% reduction in emergency department visits among the uninsured population (11). Lack of health insurance coverage usually forces people to delay or postpone medical care even when the medical care needed is of emergency type. However, with health insurance coverage, people can utilize healthcare with potentially lower financial risk. Currently, the health insurance for the poor people in India covers only inpatient services. This creates an incentive for the patients to visit hospitals and get hospitalized, instead of using basic primary health care services. Also, it creates a financial incentive for the provider to admit poor patients in the hospitals. Studies on hospitalization trends in India showed that annual hospitalization rate increased from 16.6 to 37.0 per 1000 population from 1995 to 2014 (13). Although evidence from literature has shown that increased health insurance coverage leads to increase in utilization of health services, but the effect of health insurance coverage on financial risk protection is less clear, especially for poor beneficiaries (12).

Our study shows that chronic illnesses increase both the probability and duration of hospitalizations. The findings are consistent with other results in the literature which show chronic diseases are important

determinants of hospitalizations (43). Since the health insurance programs for the poor do not cover outpatient services, people do not get preventive services or outpatient treatment for their illnesses during the initial stages of disease to prevent disease progression and development of chronic diseases. Although, public primary health care facilities provide free outpatient and preventive healthcare services, there may still be significant access barriers. In India, only 37% of the population in the rural areas have access to health care services within 5-kilometer radius and only 68% of the population have access to basic out-patient health facility (44). Further, India is facing demographic transition with increasing old population and epidemiological transition with increasing burden of non-communicable and chronic diseases (45). Incidence of hospitalization among poor people is also found to increase with age in our study. Elderly people over 80 years of age have the highest incidence of hospitalization. These findings are consistent with another study in India which showed that age is an important predictor for hospitalization (46). Hospital readmissions (47) and increase in the number of comorbidities in an individual also increase with age (48). Women in the age group of 19 to 40 years have higher incidence of hospitalization. This is consistent with other studies which show that women in the reproductive age group have higher rates of hospitalizations and incur higher health expenditures (49,50).

Our results show that medium and larger households have lower probability of hospitalization compared to smaller households. The odds of hospitalization for medium households is 0.77 and for the large households is 0.48. One of the probable reasons may be that larger households can arrange someone within the family to act as a caregiver in the case of illness or disability. This family caregiving may prevent hospitalization for many common conditions. Evidence from US have shown that home health provision has reduced both the number of visits and duration of stay in the hospital (51). The other reason may be due to problems in the design of the health insurance programs for the poor in India which causes difficulties in health care utilization (hospitalization) for households with large number of members. Poor people health insurance programs in India cover hospitalization costs only for limited number of household members. For example, health insurance programs such as RSBY and VAS in Karnataka are limited to maximum of five members in the household, but some of the state health insurance programs in Andhra Pradesh and Tamil Nadu cover the whole family irrespective of the number of the members (14,16,17). The RSBY program has a threshold ceiling of INR 30,000 and some of the state health insurance programs have much higher coverage limits of up to INR 200,000 in Andhra Pradesh (14). These enrolment restrictions and limited coverage threshold in the current health insurance programs will adversely affect the households with higher number of members by reducing their healthcare utilization and hospitalization, which may be one of the reasons for lower probability of hospitalizations among members from larger households.

People belonging to the scheduled tribe social group category had significantly lower duration of hospitalization compared to the other backward classes (reference group). Scheduled tribes have poor access to healthcare facilities since they live far away from the nearest health facility (52). This may one of the reasons for individuals belonging to the scheduled tribes to have lower duration of hospitalizations. People belonging to the other disadvantaged groups including the backward classes and scheduled classes live in the cities and villages and do not live in the inaccessible tribal areas like the

scheduled tribal people. Thus, the access to the healthcare facilities and coverage by health insurance programs will be much better for the other disadvantaged groups thus increasing their healthcare utilization and duration of hospitalizations.

Our study showed that coverage under the public health insurance programs for the poor had no significant effect on OOP health expenditures for inpatient care. This is contradictory to the studies done in Andhra Pradesh (17,20), Karnataka (26) which showed that coverage under health insurance programs reduced OOP health expenditures for hospitalizations. However, other studies in Tamil Nadu and Andhra Pradesh (24) showed that households with health insurance coverage had higher OOP health expenditures. At the national level, another study by Karan et al. (2017) showed that the likelihood of incurring OOP health expenditures increased by 30% due to RSBY program and that RSBY has not been effective in reducing the burden of OOP health expenditures for poor households (16). However, the wellbeing of the poor increased due to the program, despite higher OOP health expenditure. Even the evidence found internationally on the effect of health insurance on OOP health expenditures is also mixed with studies from Indonesia, and Laos showing that health insurance programs reduced OOP health expenditures (53), but evidence from Vietnam showed that the health insurance program had no effect on OOP health expenditures (54). OOP health expenditures are found to be increasing with increasing duration of stay in the hospital. A report from the World Bank in India (55) and study of low and middle income countries (56) showed that hospitalizations are significantly associated with higher OOP health expenditures.

India has a pluralistic system of medical culture with a number of different types of alternative medical systems (apart from the allopathic systems of medicine) that are practiced widely all over the country (57). The AYUSH training programs are officially regulated by the government of India, but there are many healers all over the country who practice these traditional systems of medicine without any formal qualifications in the field. In our study people who are using the alternate systems of medicine (AYUSH) for their treatment incur lower OOP health expenditures compared to people using the western (allopathic) systems of medicine. The findings of our study contrast with other studies done in Tanzania (49) and Sri Lanka (58) which show that utilization of traditional systems of medicine were associated with higher OOP health expenditures. The reason may be that in India, the people who use alternate systems of medicine usually use them for minor ailments and people with complex conditions usually use the allopathic systems of medicine.

Our results showed that people who were admitted to a private tertiary hospital incurred higher OOP health expenditures compared people admitted to a primary healthcare facility such as a primary health center or community health center. A systematic review assessing OOP health expenditures across a number of countries found that the use of private healthcare facilities and inpatient admissions in private sector hospitals were both associated with higher OOP health expenditures (59). Also, evidence from Thailand support our finding of higher OOP health expenditures in private hospitals (60). Even the use of the private sector hospitals for specific health services such as maternal health (61,62), chronic disease treatment (63) were associated higher OOP health expenditures. Apart from private ownership incurring

higher OOP costs, the level of care in hospitals (i.e., primary, secondary, and tertiary care) increased OOP costs with higher likelihood of referral (tertiary) hospital expenditures being catastrophic (63). People who are getting admitted to a paying ward incur higher OOP expenses compared to getting admitted to a free ward. Most of the public health facilities in India provide inpatient admission free or at a very subsidized cost, but with basic facilities. Poor people who are getting admitted in the paying wards incur higher OOP costs because their ability to pay will be lesser and also the coverage by the poor people health insurance program is limited. Also, India also has a wide network of unregulated private sector hospitals with around 49% of total available hospitals being in the private sector (64).

In our study, ailments such as cancers, blood, endocrine, metabolic, eye, ear diseases, cardiovascular, respiratory diseases, skin, musculoskeletal, psychiatric, neurological diseases, and injuries incur OOP inpatient health expenditures compared to infections. India is facing an epidemiological transition from infectious diseases to chronic and non-communicable diseases (65). The higher incidence and duration of hospitalizations for chronic diseases may be associated with higher OOP costs. Our results are consistent with other studies from India and other countries have shown that households with members with disabilities, injuries due to road traffic accidents, and chronic illnesses were positively associated with high OOP health expenditures, due to the severity of the illness and long treatment duration (60,66–71).

Poor people with a diploma/graduate/post graduate level of education were having higher OOP health expenditures compared to poor people who were illiterate. The results of our study are consistent with the evidence from China which showed that better educated had higher OOP health expenditures for healthcare (70). Also, education had an effect on OOP costs for specific services. Studies in India (72), and in Brazil (73) show that educated mothers reported higher OOP health expenditures. Our study showed that people who were between 41 to 60 years had higher OOP health expenditures compared to the less than 18 years' age group. The odds of experiencing chronic diseases increase with age and chronic diseases are also important determinants of hospitalizations which also increase OOP costs. A number of studies from Bangladesh and China showed that healthcare expenditures were significantly associated with age, and the effect of age on health expenditures was highest among the elderly (66,74–77). This is particularly important for India, since it does not have any specific health insurance programs or social security programs providing health coverage for older people who are more susceptible to chronic diseases, hospitalizations, and also higher burden of high OOP health expenditures.

Conclusions

The first set of analysis examined the differences in hospital utilization by health insurance status of the poor individuals. There are two aspects of hospital utilization – incidence of hospitalization and duration of hospitalization. The incidence indicates need and/or willingness to get admitted into a hospital. Decision to become hospitalized is often not made by the patients; in most cases, individuals follow the instructions of physicians and other health care providers. Recommendation by health care providers is the triggering factor for being admitted in hospitals but some individuals may decide not to seek care

from hospitals due to other barriers even though the hospitalization may be considered medically necessary. Once the patients decide to get admitted in the hospital, the length of stay is most likely determined by the health care providers and hospital managers.

The empirical results imply that the poor individuals enrolled in health insurance program are more likely to get admitted in a hospital than those who are not covered by health insurance. Incidence of hospitalization is a reflection of access to inpatient hospital services and it is not surprising to find that having insurance increases the likelihood of hospitalization. Even though the regression models, strictly speaking, do not show causal relationship, in this case it probably indicates causal pathway. Enrollment in insurance happens before utilization of hospital services and there exists no mechanism of obtaining insurance because of need for hospitalization. Therefore, only reasonable implication of the result would be that having insurance for inpatient services increases the incidence of hospitalization among poor individuals in India.

The second aspect of hospital service use is the intensity of service utilization after the patients are admitted. The empirical model indicates that insurance status had no relationship on the level of utilization of hospital services, measured by the length of stay. Again, most logical explanation would be that if insurance status has any relationship with duration of stay, the causal relationship should be from insurance status to duration, not the other way round. Since insurance status had no effect on duration of hospital stay, health care providers did not discriminate between insured and uninsured once they are admitted in the hospitals. Again, this is not surprising for a number of reasons. The coverage limits in the health insurance programs for the poor is low and this low coverage limits did not create any incentive for increasing the duration of hospitalizations by the physician. The other reason may be that physicians are driven by the intrinsic motivation to provide better care for the patients, irrespective of their health insurance coverage or their capacity to pay. There is always the possibility that the clinicians are unaware of the insurance status of the patient, which are usually handled by the administrative divisions of the hospitals, and thus their clinical decisions are independent of any health insurance enrolment status.

Apart from the insurance status of individuals, a number of other factors affect hospitalization and hospital duration. Chronic illnesses increase both the incidence and duration of hospitalization. Early detection by preventive screenings and early treatment initiation will help in decreasing disease progression, and thus reduce preventable hospitalizations to a large extent. This early detection and treatment initiation could be delivered through the PHC system in India. India has a wide network of PHCs and the PHCs should be upgraded adequately with diagnostic and treatment facilities to detect and treat chronic diseases which will help in reducing hospital rates, the duration of hospitalizations, and the associated higher OOP healthcare costs for inpatient care. Many chronic diseases can be treated effectively in the ambulatory setting. Thus, better approaches to manage the chronic diseases in the outpatient settings must be implemented nationally to reduce hospitalizations for conditions that could be treated in the outpatient setting.

Lower incidence of hospitalization is seen among the larger households. The insurance for the poor may not cover all individuals in the household. In some states of India, enrollment is limited to five members of household and the five members must be selected at enrollment. Therefore, for large households, many members may not be covered by the program even though the household is enrolled in the insurance plan. Lack of insurance coverage of some members may prevent access and service usage by those non-covered members. Since the non-covered members cannot utilize the healthcare delivery system for their health needs, they may end up showing lower rates of hospitalizations. This barrier in using the hospitals may adversely affect the health status of patients and overall health status of members in larger households may suffer. Thus, removing these enrolment restrictions will be helpful in improving hospital utilizations especially for the members of the larger households.

Our study shows that the Scheduled tribes in India have lower duration of hospitalization. Scheduled tribes have been traditionally neglected in the country who have lower capacity to pay because of their limited employment opportunities in the formal sector, lack of access to cash, and their area of residence which is mostly located in the hilly and remote tribal areas of India. They also have poor access to healthcare facilities since they live far away from the nearest health facility (52). In addition to this, the enrolment of tribal people in the health insurance programs for the poor is also quite low, both because of the presence of access barriers to reach them and enroll them under insurance programs, and of the problem of acceptability with some of the tribal groups who actively try to avoid participation in any governmental programs. Access barriers should be reduced for the Scheduled tribes and their enrolment in health insurance programs needs to be improved. Government should initiate outreach program to reach this hard-to-reach group so that their enrollment in insurance program can be expanded.

Both men and women who are 40 years or older have higher incidence of hospitalizations. This is expected since there is a declining stock of health capital with age and the severity of illness may also increase with age requiring higher number of hospitalizations. However, only women in the age groups of 19 to 40 years have higher incidence of hospitalizations, while men in the same group do not have higher incidence of hospitalizations. The main reason for this may be that women in the reproductive age group of 19 to 40 years have higher hospital admissions related to childbirth in healthcare institutions. In order to have safe deliveries, the Government of India promotes institutional deliveries through the Janani Suraksha Yojana (JSY) conditional cash transfer scheme, which may explain higher hospitalizations among women in the reproductive age group.

Utilization of private hospitals have higher OOP health expenditures. Utilization of private hospitals is not a problem if the richer households are using the private hospitals to get access to better quality services, but when the poor households obtain care from private hospitals, out-of-pocket expenses may become too high for the poor households to afford. The poor households need to be protected from the high OOP health expenditures when they are forced to use private hospitals. If the poor households needing hospital services do not have access to governmental facilities, they may decide to seek care from private hospitals.

The private healthcare system in India is highly unregulated. Regulation of private sector can be done by fixing prices for different diagnosis groups so that households would become fully aware of the total hospital bill for the medical condition at the time of utilization of services. Making the charges of hospitals more transparent will be another way of protecting households from uncertainty related to hospital service expenses. The government sector hospitals act as an important source of healthcare delivery in India, especially for the poor people. Many poor people do not use the government healthcare facilities because of their perceived low quality, poor infrastructure, absences of health care providers and significant travel distances. Strengthening of government health facilities with better infrastructure and facilities is needed. Reducing access barriers to help the poor to reach the public health facilities should be done in order to protect the poor households from making high OOP health expenditures at private sector hospitals.

Increased duration of hospital stay leads to experiencing higher OOP health expenditures. Duration of hospital stay can be reduced either by reducing the severity of illness, so that people do not have to stay longer in the hospitals or by reducing the cost of services, so that they do not incur higher health expenditures. Increasing health insurance coverage limits and a defined benefit package for different types of medical conditions will also help in reducing the higher OOP health expenditures due to increased hospital stay.

This research finds that specific diseases such as cancers, cardiovascular, endocrine, respiratory, neurological, obstetric and childbirth, and injuries have higher OOP inpatient health expenditures. Specific national health programs can be established to include people affected by these diseases, and also provide them with disease-specific healthcare services. India is currently establishing a national health program for non-communicable diseases which is being piloted in some districts. Faster nation-wide implementation of this program will help the poor individuals suffering from these diseases to get specific health service package. Also, the health insurance coverage limits may be increased for the poor individuals who are suffering from these specific diseases. Increasing coverage limits may also encourage “up coding” of health conditions and without a rigorous monitoring system, disease-specific limits may encourage reporting of high revenue earning health conditions at a higher rate.

Health insurance programs for the poor increase the incidence of hospitalization but has no effect on the duration of hospitalizations and inpatient OOP health expenditures. Presence of chronic illness, belonging to older age groups, women in the reproductive age group, and belonging to a small household have higher hospitalization. People who have higher duration of hospital stay, admitted to a private hospital, using allopathic treatment, having chronic illnesses, having higher level of education and belonging to the middle age group experienced higher OOP inpatient health expenditures. By identifying the groups most affected, this research aids the designers of the national insurance programs to design better benefit packages for those population groups. This investigation will serve as a basis for assessing India’s policy options to reduce financial burden due to OOP health expenditures.

Limitations

The main limitations of this study arise from the use of secondary data. Any study that uses secondary data suffers from this limitation, i.e., the study becomes limited by the data collected and survey methodology used. The contents and the questions asked in the survey are not what an assessment of a program would have done to explore the specific research questions of this study. One of the most important concern is the lack of information on the coverage of public health insurance for the poor. The NSSO dataset includes a variable that indicates insurance coverage by all public health insurance schemes, i.e., all the people covered by the government sponsored health insurance programs. Government sponsored health insurance schemes are many in India and includes insurance programs like Employee's State Insurance Scheme (ESIS), Central Government Health Scheme (CGHS), and the poor people's health insurance programs such as RSBY and other state health insurance programs. Clearly, government sponsored health insurance programs cover poor as well as non-poor households. Employees of the central and state governments are covered by government insurance and none of them likely to be below the poverty line. It is also likely that many households covered by the insurance for the poor are not below the poverty line at any specific point in time. Since the enrollment into the insurance for the poor happens infrequently, economic status of households may change from enrollment date to the date of the survey.

This research needed to identify the individuals and households who are covered by the government sponsored insurance for the poor. Since many of those covered by public or government health insurance schemes are not poor by design, using all households/ individuals covered by public insurance will not provide the "target group" the study would like to examine. To identify the group covered by public insurance for the poor, a number of implicit assumptions were made: first, it is assumed that no insurance schemes of the government, other than the insurance program designed for the poor, covers the households or individuals below the poverty lines defined by the states. This conjecture is likely to be valid because governmental salary structure is such that almost no one covered by government employee health insurance program should be below the poverty line, irrespective of the size of the household. Second assumption is that the people who are below the poverty line and enrolled in a government sponsored health insurance program, they must be enrolled in the public health insurance programs for the poor such as RSBY, RACHI etc.

These assumptions do not identify all the households and individuals covered under the government insurance schemes for the poor but identifies only those who are covered by the insurance scheme and are below the poverty line. The households that are below poverty line and not enrolled in the government sponsored health insurance programs are assumed to be the control group, i.e., the households that are eligible for participation in the poor people's health insurance program but were not enrolled. Poverty is a dynamic event where people move in and out of poverty and it is almost impossible for any program to be as dynamic as the underlying dynamics of social mobility and poverty dynamics. The households who were covered by the insurance for the poor at the time of the survey but were not below the poverty line at the time can happen for two very different reasons. The first reason could be simple mis-targeting, i.e., the household should not be in the program based on the economic status of the household but were enrolled in the program. The second reason could be that the household belonged to the poverty category

when the household got enrolled but the household graduated from poverty to above the poverty line during the intervening period. Since enrollment in the program and disenrollment from the program happens only infrequently, a certain percent of enrollees will be above the poverty line. This group was targeted correctly but they moved up the economic ladder since enrollment. Given the data we have, it is not possible to identify households who were covered by the insurance for the poor even though they were not poor.

In the empirical analysis, we have used the poverty line for 2014 to identify the individuals who were poor in 2014. Thus, our study focuses on the group who was below the poverty line and enrolled in any government health insurance program. Since the government health insurance scheme that covers individuals below the poverty line are the insurance schemes for the poor, it is likely that all those who are poor and covered by government health insurance are actually covered by the public health insurance for the poor. The implication of these implicit assumptions is that the study cannot conduct an assessment or evaluation of the insurance program for the poor. It is only assessing the differences in utilization and out-of-pocket expenses between the poor households and individuals covered by the public health insurance schemes for the poor and those not covered by the scheme. Therefore, it is not an assessment of those who are covered by the insurance schemes for the poor and those not covered but at similar socioeconomic situations.

Also, the cross-sectional nature of the data creates an important limitation that it allows us to study only the association of health insurance with the various outcomes, and not the actual evaluation of the program. Cross-sectional data cannot infer causal association mainly because temporality is not known and thus cannot assess the change in outcomes over a period of time. Thus, the availability of data over time is required to effectively evaluate the program. Data were not collected from the floating population (people without any normal residence), but households residing in open spaces, roadside shelters and people who reside in the same place were listed. People residing in the protected residential areas of military, paramilitary, police areas and people in orphanages, rescue homes, etc., were not covered. The NSSO health survey data does not collect detailed consumption expenditure and the consumption expenditure in the NSSO survey does not differentiate between food and non-food expenditures. It should also be noted that all information is reported by the surveyed individuals in the households and some information required quite long recall time. Therefore, the data is prone to strategic, recall and other types of biases.

Abbreviations

OOP:Out-of-Pocket; UHC:Universal Health Coverage; SDGs:Sustainable Development Goals; GOI:Government of India; RSBY:Rashtriya Swasthya Bima Yojana; RACHl:Rajiv Aarogyasri Community Health Insurance; VAS:Vajpayee Aarogyasri Scheme; BPL:Below-Poverty-Line; NSSO:National Sample Survey Organization; DID:Difference-in-Difference; ESIS:Employee's State Insurance Scheme; CGHS:Central Government Health Scheme; AYUSH:Ayurveda, Yoga, Unani, Siddha and Homeopathy; INR:Indian Rupee; PHC:Primary Health Center; JSY:Janani Suraksha Yojana;

Declarations

Ethical Approval

The dataset is available in the public domain after removing all individual level identification variables. It is not possible to identify the residence of any of the households as well. Therefore, ethical approval is not needed for the study. Permission has been obtained from the Ministry of Statistics and Implementation of the Government of India for this research and potential future publications using the data set.

Consent for Publication

Not Applicable

Availability of data and materials

The datasets used for the current study is available from the corresponding author on reasonable request

Competing interests

Dr. Mahmud Khan is an associate editor of BMC Health Services Research. The authors declare that they have no competing interests.

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Author's contributions

SS was involved in the conception of the study, design, analysis and writing of the manuscript. MK helped in the analysis framework and writing the manuscript. All the authors have read and approved the manuscript.

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Figures

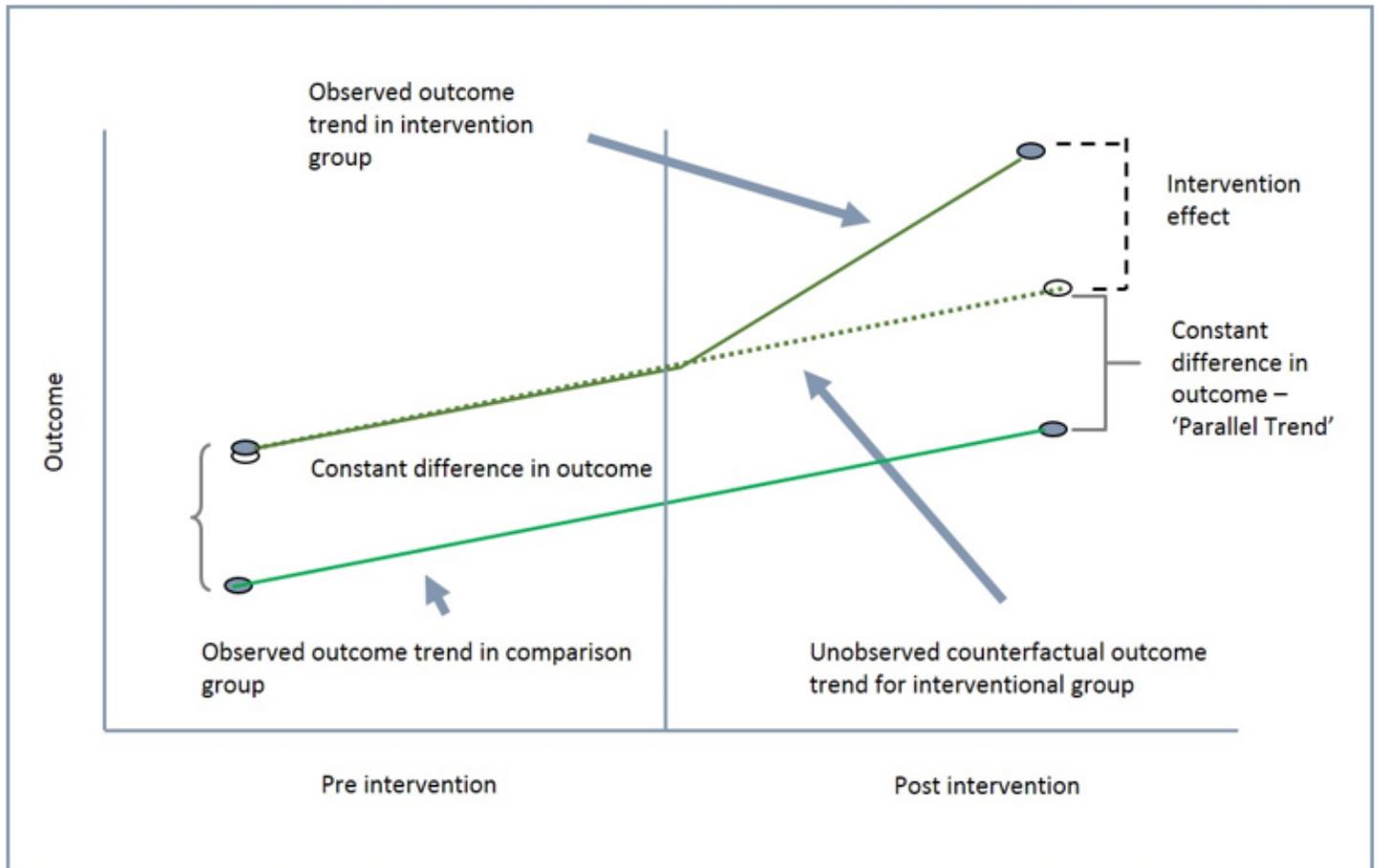


Figure 1

Intervention Effect using Difference-in-Difference Method

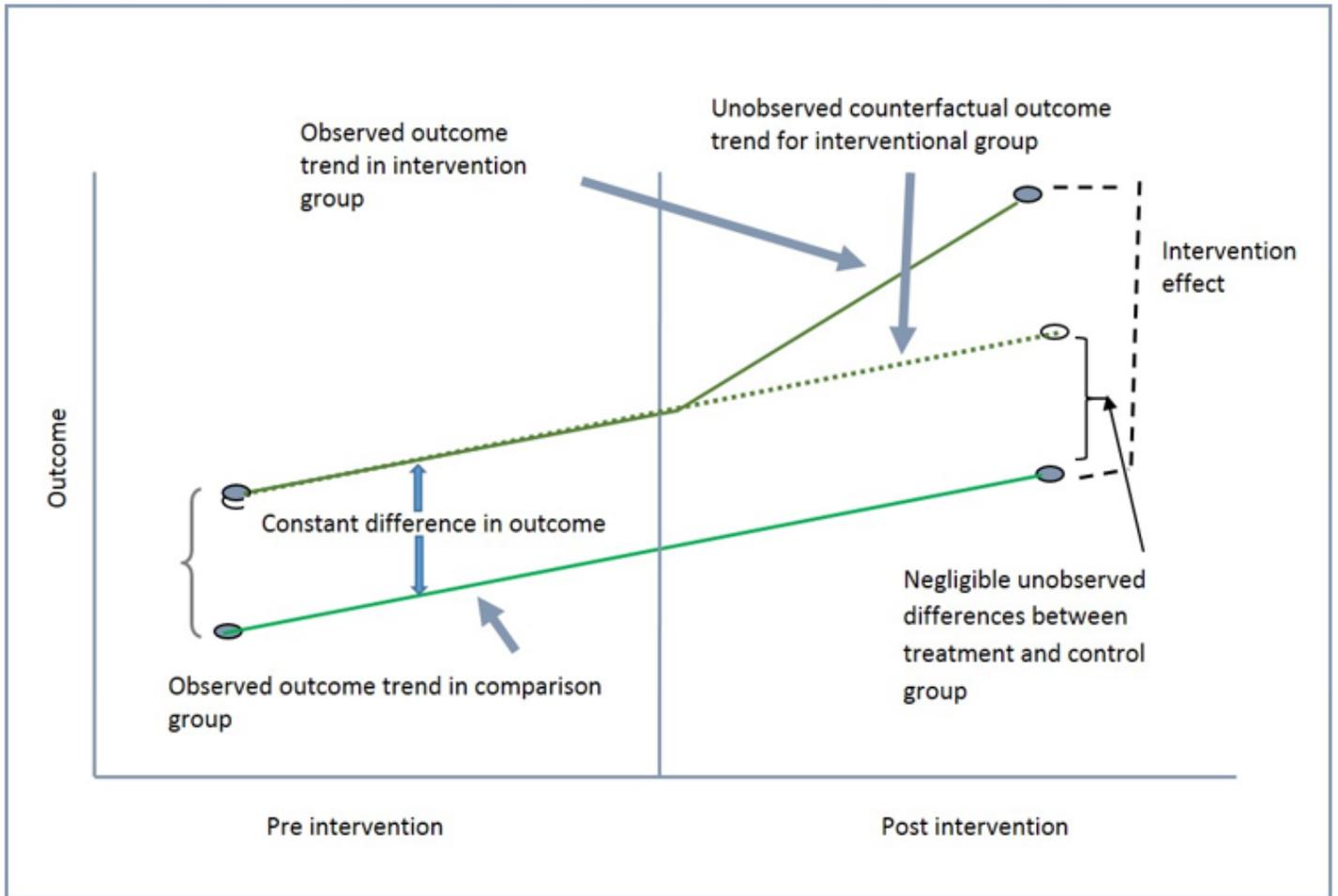


Figure 2

Intervention Effect using Cross-sectional data