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ADRI

The Centre for Health Policy
Asian Development Research Institute

CHP

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Authors
Dr. Saswata Ghosh is a Demography & Population Health Specialist currently working with The Centre for Health Policy at Asian Development Research Institute (ADRI), Patna

Dr. Basudeb Guha-Khasnobis is Executive Director, The Centre for Health Policy at Asian Development Research Institute (ADRI), Patna; Corresponding Author; basudeb.chp@adriindia.org

Dr. Zakir Husain is a Associate Professor, Humanities and Social Science Department, Indian Institute of Technology, Kharagpur.

Section 1: Introduction

The Government of Bihar localized the Sustainable Development Goals (SDGs) and is committed to meeting several targets and indicators by the year 2030. These indicators are based on the global SDG framework, but adapted to reflect local realities. Of the many development challenges the state faces, health is one of the foremost. Bihar's malnutrition indicators are significantly below expectations, its total fertility rate is high and so are infant, child and maternal mortalities. Progress is noticeable, at least on average, on some of the key indicators, but inequalities between income and caste-ethnicity based groups are prevalent. Thus, whether interventions by development partners managed to make a difference for the poorest and marginalized sections of the population requires scrutiny – 'leaving no one behind'. The second feature of the SDGs which inspires our research is that of 'inter-connectedness' of the goals through their various targets and indicators. By design, it is close to impossible to achieve any one – or even a subset of the 17 goals – without significant progress in all others. In the case of health (SDG3), there are indisputable linkages with the SDGs related to poverty, gender, education, livelihoods, access to finance, technology and infrastructure. Through this analysis, we uncover the recent trends of health indicators by exploring these interlinkages in full detail. We find that out of pocket expenses on health have increased significantly during 2004-14, at constant prices. These expenses continue to push people below the poverty line, and are also catastrophic (defined later). However, the severity of these two effects, impoverishment and catastrophic expenses have declined somewhat. The sources of health expenses come from people's own income and savings, and also significant borrowings. Coverage and reimbursements from insurance are still extremely inadequate. Worrisome is the finding that having insurance of any kind (public or private, actually leads to higher OOP expenses. Also, the probability of impoverishment increases when people have public insurance. There are also significant differences in these outcomes across socio-economic groups. Our findings have several important policy messages which may be taken on board by all actors in Bihar's health system to sustain and improve outcomes.

Health being a subject in the concurrent list of the Indian constitution, both the union and the state governments possess legislative, executive and financial authority in the field. The reports of periodic advisory committees form an important basis of health planning in India. For example, at the recommendation of the first such committee - the Bhore Committee (1946) - emphasis was laid on integration of curative and preventive medicine at all levels. Based on this, a three-tier health service delivery system started in 1952, which comprised sub-centres (SCs), primary health centres

(PHCs) and community health centres (CHCs) forming the backbone of health infrastructure in India.

A number of initiatives have been introduced in the new millennium and are currently being implemented. The National Rural Health Mission (NRHM) was introduced in April 2005, to provide accessible, affordable and quality health care to the rural population, especially the vulnerable groups. Under the NRHM, the Empowered Action Group (EAG) States as well as North Eastern States, Jammu and Kashmir and Himachal Pradesh receive special focus. The thrust of the mission is on establishing a fully functional, community owned, decentralized health delivery system with inter-sectoral convergence at all levels, to ensure simultaneous action on a wide range of determinants of health such as water, sanitation, education, nutrition, social and gender equality. Institutional integration within the fragmented health sector was expected to provide a focus on outcomes, measured against Indian Public Health Standards for all health facilities. The mission was launched with a commitment of the Government to raise national public spending on health from 0.9 per cent of GDP to 2–3 per cent of GDP.

The Janani Suraksha Yojana (JSY) is a safe motherhood initiative under the NRHM. It is being implemented with the objective of reducing maternal and neonatal mortality by promoting institutional delivery among poor pregnant women. The scheme is under implementation in all states and Union Territories (UTs), with a special focus on Low Performing States (LPS).

In India more than two thirds of expenditure on health is through Out of Pocket (OOP) which inflicts significant financial distress especially among poorer and vulnerable groups. To test the demand side financing approach, the Government of India, introduced Rashtriya Swasthya Bima Yojana (RSBY) in 2008 - health insurance scheme initially for the Below Poverty Line (BPL) families with the objectives to reduce OOP expenditure on health and increase access to health care. The premium cost for enrolled beneficiaries is shared by Government of India and the State Governments and the target is to cover 70 million households by the end of the Twelfth Five Year Plan (2012-17).

RSBY provides the participating BPL household with freedom of choice between public and private hospitals. The possible downside risk is the exposure of households, especially the poorer ones, to a relatively unregulated private sector as it exists at the moment. Every beneficiary family is issued a biometric enabled smart card containing their fingerprints and photographs. All the hospitals empanelled under RSBY are IT enabled and connected to the server at the district level. This ensures a smooth data flow regarding service utilization periodically and the platform can be potentially harnessed to have a clearer mapping of both public and private facilities including their usage, charges, services and quality. However, earlier studies have found that higher insurance coverage in some states have not resulted (yet) either in improved access to care or in reduction of OOP expenditure. But improved in-patient care services was observed with increased insurance coverage in some states (Devadsan 2007; Ghosh 2014).

Section 2 : Materials and Methods

The National Sample Surveys (NSS) are conducted through household interviews, using a random sample of households covering practically the entire geographical area of the country. Our study uses two datasets for analysis: (1) Social Consumption: Health, NSS, 71st Round (January - June 2014), and (2) Morbidity and Health Care: NSS, 60th Round (January - June 2004). Both the surveys focused on covering (i) Morbidity and utilization of health care services including maternal care, (ii) Expenditure of the households for availing the health care services. The 2014 survey included an additional focus on alternative schools of medicine with respect to prevalence of use, cost of treatment and type of ailments covered. The choice of health care facility for treatment of general ailments, and for maternal care-seeking and the associated expenditures are compared through descriptive analyses. We also use discrete choice models to identify the significant predictors of hospitalization, institutional delivery, catastrophic OOP expenses, and impoverishment.

In the 60th round of NSS, 4,174 households were surveyed in Bihar. Out of 4, 174 households, 3, 536 were from rural areas, while 638 households were from urban areas. After using appropriate multiplier (calculated using the methodology provided in NSS report for 60th round) the sample size became 12,388,242; 11,017,764; 1,370,478, respectively, for total, rural and urban areas. In the 71st round, 3,167 households (weighted 18,367,274) were surveyed of which 2,111 (weighted 16,468,769) were from rural and 1,056 (weighted 1,898,505) were from urban areas. It may be noted that there were minor changes between the two rounds as far as recoding of certain variables is concerned. These changes were accounted for in order to ensure comparability of data. For instance, childbirth in institution was included in the hospitalization module in the 71st round, while it was in a separate module in the 60th round, which was not a part of hospitalization. We carved out maternal health care utilization statistics from the 71st round and merged them with the 60th round for comparability.

To compare monthly per capita household expenditure (MPCE), we deflated expenditures using the Tendulkar committee price indices, available for all of India (Ravi et al. 2016). We computed five quintiles (bottom 20 percent to highest 20 percent) of MPCE and used these categories as predictor variables in our bivariate and some of the multivariate analyses. Logarithm of MPCE was also used as one of the explanatory variables in some of the multivariate models.

In addition to bivariate analyses, we carried out several multivariate linear regressions and binary probit models according to the nature of response variables. If the response variable was coded binary (0 and 1), binary probit models were used, while for continuous response variables we used linear regression models. For example, to understand the predictors of hospitalization (0=not-hospitalized; 1=hospitalized) multivariate binary probit model was used, while to explore the predictors of out-of-pocket (OOP) expenditure (both at the household and individual levels) multivariate linear regression models were used because OOP is a continuous variable. Binary probit models were used to understand the predictors of place of delivery (institution overall, public and private sector separately); place of hospitalization (hospitalization overall, public and private separately); catastrophic health expenditure (at 10%, 25%, and 40% thresholds); and impoverishment. Multivariate linear regression models were employed for OOP (in-patient and out-patient at household level and at individual level per episode of illness).

The classical form of multivariate binary probit models used in the analyses is as follows:

$Pr(y_{it} = 1 |$ occurance of the event (e.g. institutional delivery)$)_{it} = \phi\,(\alpha + \beta X_{it})$

Where y_{it} is a dummy variable for institutional delivery for a case *i* in the year *t*, and X_{it} is a vector of predictor variables for different confounding factors that affect institutional delivery. Similarly, for delivery in public sector, y_{it} is a dummy variable for delivery in public sector for a case *i* in the year *t* (i.e. 1= if delivery was conducted in public sector; 0 = otherwise), and X_{it} is a vector as described earlier. These procedures are used to avoid the potential Hausmann selection bias (Hausmann 1978).

The classical form of multivariate linear regression model used in the analyses of OOP expenditure is as follows:

$$y_{it} = \alpha + \beta X_{it} + \varepsilon_{it}$$

Where y_{it} is the tatal real (at constant prices) OOP expenditure for household or individual i in period t, and X_{it} is the vector of explanatory variables pertaining to household and individual level according to model specifications. To note, coefficients obtained from all the regression models have been converted into average marginal effects (AME) for ease of interpretation and clear policy messages, especially for targeting interventions.

Although applications of difference-in-difference (DiD) and/or propensity score (P-score) matching would be ideal to evaluate any programme, we cannot use it to evaluate the effect of JSY in the present study. Because, as one of the high-focussed states, JSY was implemented in all the districts and every pregnant woman was eligible for JSY, thereby leaving no room for application of experimental-control (or even quasi-experimental) design. For this reason, Oaxaca decomposition analysis was done to understand the effect of JSY on child birth (Oaxaca 1973; Wagstaff et al. 2003).

Section 3 : Study settings

Bihar has an area of 94,163 sq. km. and a population of 103.8 million (Government of India 2011) in which the male and female populations are 54,185,347 and 49,619,290 respectively. The deficit of female population in Bihar was reported at 4,566,057 in 2011. The state is divided into nine administrative divisions, 38 districts, 101 sub divisions, 534 blocks and 44,874 revenue villages. The State has a population density of 1102 per sq. km. as against the national average of 382. The decadal population growth rate of Bihar was 25.1 per cent against 17.6 per cent for the country and therefore, the population of the state continues to grow at a much faster rate than the national rate (Government of India 2011). It is the second least urbanised state in India, after Himachal Pradesh. For livelihood, there is a heavy dependence on agriculture with significant under employment and hidden unemployment. This gets reflected in the low per capita income of the State and high poverty rate relative to the national average. Thus, the affordability of health expenses is a primary concern for the poor: this aspect has been examined in detail in the analysis to follow. Literacy rates have improved over the years, but are still relatively low compared to the national average. Our analysis shows that poverty and low literacy, compounded by the dominant caste system in the

society interact in complicated ways to determine a number of outcomes related to morbidity and health seeking behaviour.

Table 1: Socio-demographic features

Broad Socio-Demographic Characteristics of Households, Bihar

Socio-demographic characteristics	2004	2014	
Run households (%)	88.9	89.7	
Hindu households (%)	85.5	84.8	
Muslim households (%)	14.2	15.0	a. Households are predominantly rural and Hindu.
SC households (%)	23.7	19.5	
OBC households (%)	55.8	61.7	b. Slight decline in household size from 5.6 to 5.2
Mean households size	5.6	5.2	
Mean age of household members	23.3	24.3	c. Improved sanitation, particularly availability of latrines.
Households with no latrin (%)	80.7	62.9	
Households with improved source of drinking water (%)	95.2	98.4	d. Better access to electricity
			e. Significant improvement in literacy
Households with improved source of energy (%)	7.7	11.1	f. Significant rise in % of population insured from .03 to 6.2
Women in the population (%)	47.8	47.7	
Population aged 60 and above (%)	5.6	5.4	
Population not literate (%)	60.2	39.9	
Average monthly consumption expenditure (constant price in rupees at 2004-05	2297	2812	
Population insured (%)	0.03	6.2	

The broad socio-demographic characteristics of households are given in the table above. Households are predominantly rural, and Hindu. There is a slight decline in household size from 5.6 to 5.2. Sanitation, particularly availability of latrines improved during 2004-14, so did access to electricity. Literacy improved noticeably and there was a significant rise in % of population insured from .03 to 6.2.

Section 4 : Morbidity and health-seeking behaviour

This section describes the top 6 ailments- in case of hospitalisation and in case of out-patient care, health-seeking behaviour as reflected in the proportion of people seeking out-patient care or hospitalization, reasons for not seeking treatment, and reasons for choosing private over public facilities or vice versa.

Table 2a: Out-patient cases

2014		2004	
Ailments (out-patient cases)	%	Ailments (out-patient cases)	%
Fevers (malaria, typhoid, unknown origin,	23.6	Fever of unknown origin	30.4
Acute upper respiratory infections	9.0	Diagnosed ailments other than the listed ailments by NSS	12.7
Joint or bone disease	8.2	Diarrhoea/dysentery	7.8
Cough with sputum NOT diagnosed as TB	7.3	Whooping cough	7.5
Gastric and peptic ulcers/ acid influx/	7.2	Respiratory including ear/nose/throat ailments	5.5
Bronchial asthma/ breathlessness	4.7	Disorders of joints and bones	4.2

Table 2a above shows the top six ailments in 2004 and 2014 for which the surveyed population sought outpatient care. Fevers and respiratory ailments are common at the top in both the years. Table 2b shows the in-patient counterpart of Table 2a. We find that for hospitalization, accidental injury is number one. Fevers are also requiring hospitalization more than it used to. Hypertension, mainly a NCD or a life-style disease, has become serious.

Table 2b: In-patient cases

2014		2004	
Ailments (hospitalised cases)	%	Ailments (hospitalised cases)	%
Accidental injury, road traffic accidents and falls	14.6	Diagnosed ailments other than listed ailments by NSS	16.6
Joint or bone disease/pain or swelling in any of the joints, or swelling or pus from the bones	7.0	Diarrhoea/dysentery	14.5
Pain in abdomen: Gastric and peptic ulcers/ acid reflux/ acute abdomen	6.9	Accidents/Injuries/Burns/Fractures/Poisoning	8.4
Fevers those include malaria, typhoid and fevers of unknown origin, all specific fevers that do not have a confirmed diagnosis	6.7	Gynaecological disorders	7.5
Hypertension	5.6	Gastritis/gastric or peptic ulcers	5.8

According to the recent study by Indian Council for Medical Research (ICMR), the top ten risk factors which drive both death and disability combined in Bihar are malnutrition, air pollution, water and sanitation, dietary risks, high blood pressure, tobacco use, diabetes, high cholesterol, occupational risks and alcohol/drug use. The top 15 causes of years lived with disability (YLD) include anaemia, sense organ diseases (vison and hearing loss), low back and neck pain, migraine,

skin diseases, other musculoskeletal, depressive disorders, chronic obstructive pulmonary disorders, anxiety disorders, pre-term birth complications, oral diseases, falls, diabetes, haemoglobinopathies and diarrhoeal diseases. It is noteworthy that depressive and anxiety related disorders feature in the top 15, of which there is very little data available by age and districts.

Chart 1: Health seeking for in-patient (last one year) in Bihar

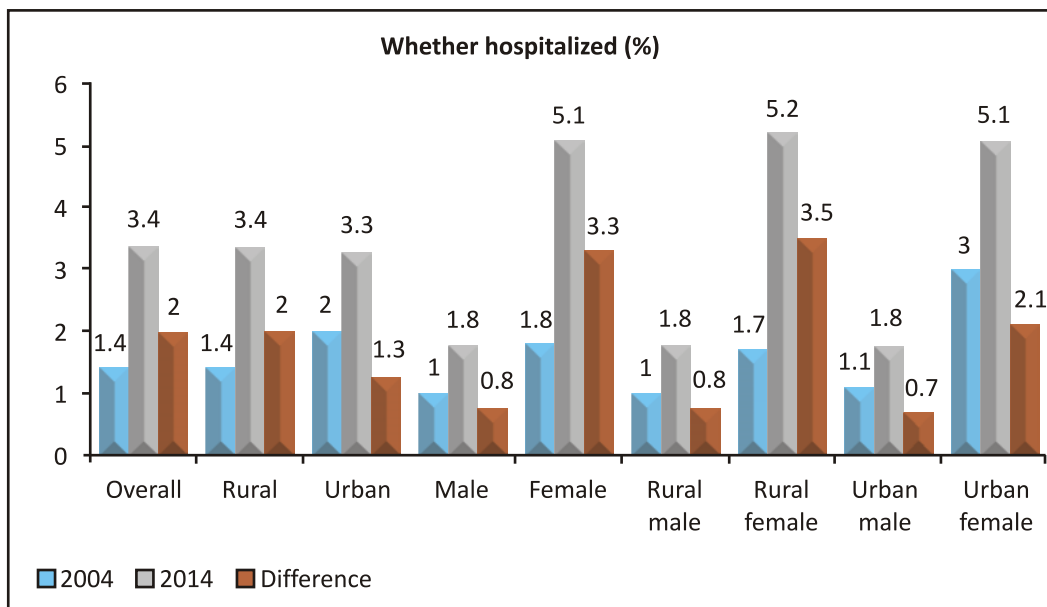Chart 1 above tabulates the health seeking behaviour of the surveyed population for in-patient care (hospitalization) over a recall period of one year. It is disaggregated by location and gender. There is a significant increase in seeking in-patient health care in the case of illness in both rural and urban areas, and for both women and men. The increase was more pronounced in rural areas and among rural women.

Chart 2: Public care
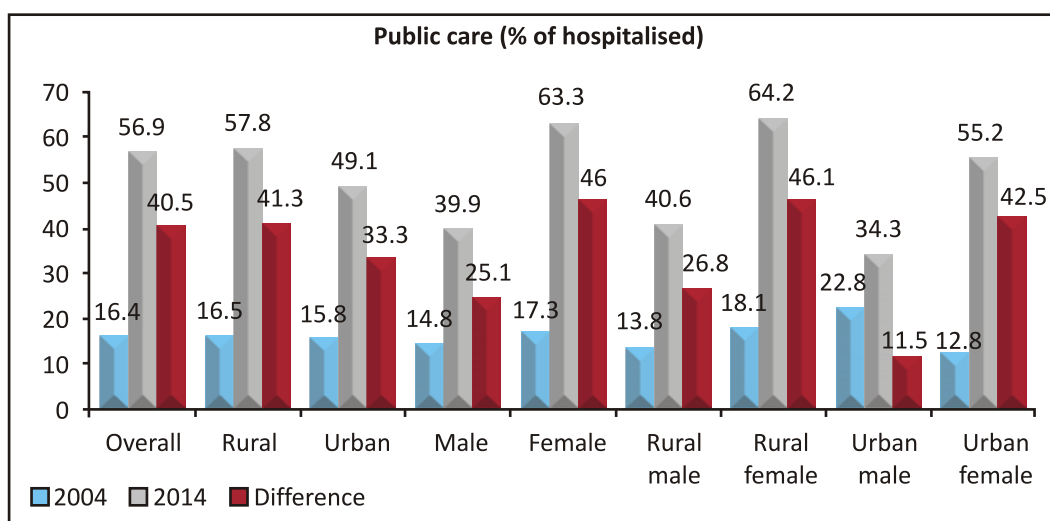
According to Chart 2, the demand for public care, measured as a percentage of those hospitalized increased nearly 3.5 times. There is a clear preference of public sector hospitals over private among the surveyed population. However, the driving force (cost, quality, availability) behind this revealed preference is subject to more investigation. While estimates on cost and quality could be derived from the NSS datasets, data on the location-wise presence of private facilities is not readily available. The patterns are similar for outpatient care.

Chart 3: reasons for not availing care in cases of ailment

	People not availing medical services (%)		No medical facility available in the neighbo-urhood	Facilities available but no treatment sought owing to: lack of faith	Facility of satisfa-ctory quality not available	Long waiting	Financial reasons		Overall	By Male	By Female	Other reasons
2004	45.2		10	1.5	0	0.2	26.2		40.6	45.4	35.1	21.5
2014	36.4		12.7	0	2.5	0.01	0.8		78.1	83.4	73.9	5.8
		Reasons for not availing medical services (%)							Ailment not considered serious			

Looking into the reasons for not availing care in the event of an ailment, we find that overall, more people are availing care in the case of ailments (e.g., percentage of ailing population who did not seek care was 45.2 in 2004, but came down to 36.4 in 2014). This is shown in Chart 3.

People who do not seek care for financial reasons has declined sharply. This is an all-India phenomenon reflecting partly a rise in purchasing power, and greater priority towards health.

There is an increase in people who did not consider their ailments as serious, and therefore, did not seek care. Whether they reverted to some form of 'self-care' either by choice or by compulsion requires investigation.

Chart 4: reasons for not availing Government services/facilities

	Required Specific services not available	Available but quality not satisfactory	Quality satisfactory but facility too far	Quality satisfactory but involves long waiting time	Financial constraint	Other
2004	8.5	51.2	23.6	5.6	0	11.1
2014	5.4	63.8	16.4	12.7	0.02	1.76
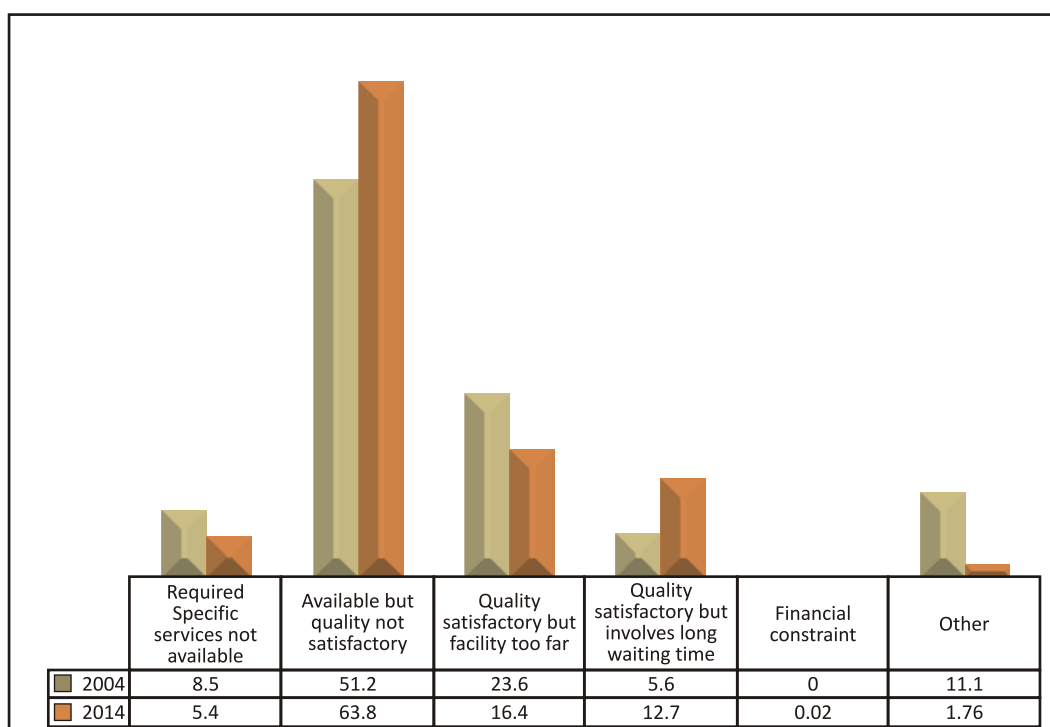
Chart 4 shows the reasons for not availing government medical services for one of more spells of ailment of household members during 15 days preceding the survey (including hospitalization).

Quality of care, and not just availability, is most significant and grown in importance. People are more impatient – want to avoid waiting too long. Financial constraint is almost non-existent.

Section 5 : Affordability : OOP expenditure and its various components

For consistency between definitions used in NSSO Rounds 60 and 71, we measure out of pocket expenses (OOP) as

OOP = User charges – Reimburses from health insurance policies

OOP expenses is a major area of concern in health systems in any country. For a low-income state such as Bihar, high OOP expenses can cause financial distress in any family, especially poor. Where the majority of health care is provided by a largely unregulated private sector, it is determined mainly by the costs incurred in these facilities.

High OOP expenses can affect health seeking behaviour both in cases of ailments (as reported above, the percentage of people not seeking care even when sick has risen) and also for preventive health care.

High OOP expenses can alter expenditure priorities in a family in undesirable ways. There could be instances where a poor family is forced to take a child out of school to meet emergency health costs,

compromise on food quality as well as quantity and so on. Thus, the burden of OOP is an indicator of both efficiency and equity in health systems

With the introduction of the various interventions (NRHM, JSY, RSBY etc.) one of the desired outcomes would be a reduction of OOP expenses. Has it been true for Bihar so far?

Chart 5 shows the comparative OOP expenses for outpatient care in Bihar in 2004 and 2014. Overall, there is an increase of about Rs 14 measured in constant prices over the decade, which is not too much out of line with, e.g., the growth of per capita income over the period – although how inclusive such growth has been may be of concern.

Chart 5: OOP expenses on outpatient care

	Doctor's fee	Medicine	Diagnostic tests	Outpatient expenditure (15 days)
2004	7.1	68.3	5.8	109.6
2014	21.8	81.6	13.3	123.6
Difference	14.7	13.3	7.5	14.0
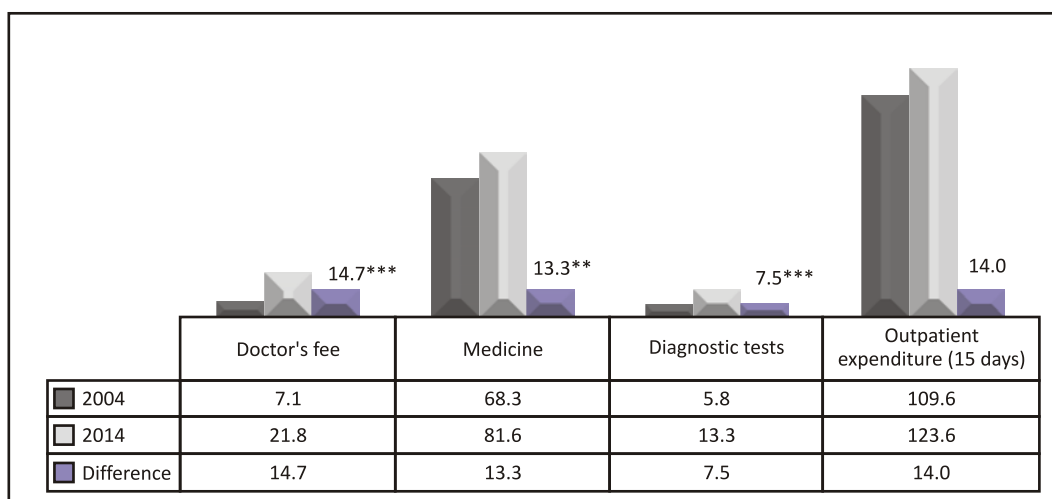
The picture changes rather dramatically for OOP expenses for in-patient, or hospitalization, cases as depicted in Chart 6.

Chart 6: OOP expenses for in-patient care

	Doctor's fee	Medicine	Diagnostic tests	Inpatient exp (annual)	insurance reimb	OOP on in patient
2004	314.0	702.0	183.4	2900.2	0.8	2899.4
2014	1213.3	2197.0	727.0	9428.3	193.0	9235.3
Difference	899.3	1495.0	543.6	6528.1	192.2	6335.9
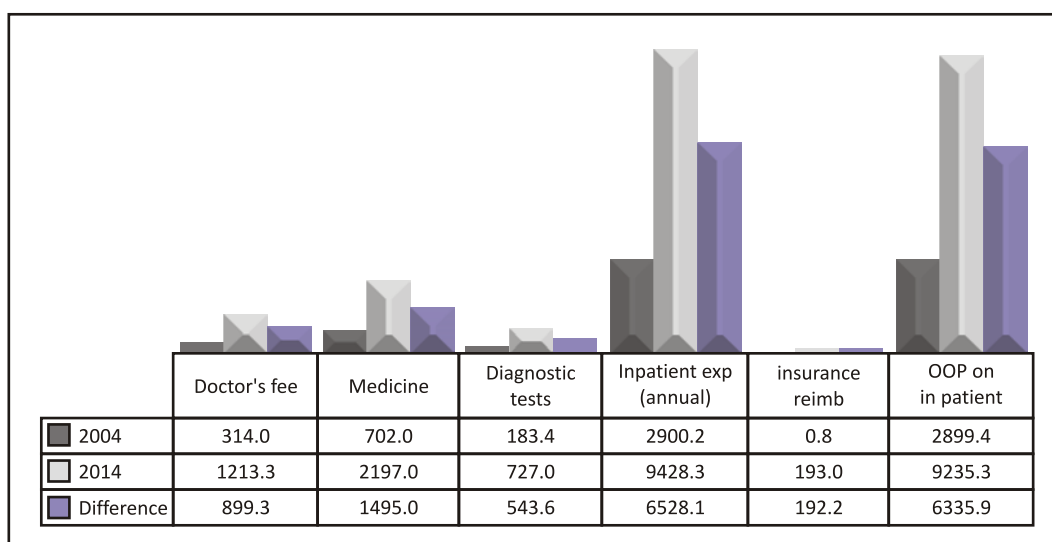
OOP for in-patient care rose significantly, by 228%. Cost of all components of OOP have gone up: doctor's fees and diagnostics tests by 4 times and medicines by 3 times.

We examined annual OOP expenses by location and income quintiles. Annual OOP has increased by 35% in urban areas and 41% in rural. In rural areas, OOP has increased significantly for the bottom (poorest) total monthly expenditure quintile – from 3595 to 15447. In urban areas, on the other hand, OOP has increased significantly only for the richest quintile. Chart 7 provides the detailed break-up. It shows that the second quintile benefitted the most in terms of reduction of OOP and the third quintile registered a very small increase. Ideally, one would expect a significant reduction of OOP for the poorest (first quintile), which is not the case. Also, OOP for the richest rural quintile shows a decline which is surprising, given their ability to pay is supposedly the highest.

Chart 7: Average OOP expenditure on health by households according to consumption quintiles and place of residence

Average OOP expenditure on health by households according to consumption quintiles

Category	2004	2014	Difference
Annual Out of Pocket...	5562.5	8498.7	2936.2***
URBAN	8173.6	11110.0	2936.4***
First Quintile	3936.9	4858.4	921.5
Second Quintile	11429.1	6120.0	-5309.1
Third Quintile	9219.5	9925.3	705.8
Fourth Quintile	12915.0	18526.9	5611.9
Fifth Quintile	5088.4	7252.1	2063.7
RURAL	5091.3	7192.1	2100.8***
First Quintile	3595.6	15447.8	11852.3***
Second Quintile	6428.2	5757.9	-670.3
Third Quintile	4079.9	5141.4	1061.6
Fourth Quintile	6005.8	5435.4	-570.4
Fifth Quintile	10994.3	9135.1	-1859.2***

In Chart 8, we looked at OOP expenses per episode as opposed to per household. Annual OOP per patient shows a slight decline, particularly in rural areas and for outpatients. But for in-patients it shows a rise, in all components, and significantly so for rural women.

Chart 8: OOP expenses per episode

Average OOP expenditure on health by per episode (by sex and location)

		Total	Rural	Urban	Male	Female		Total	Rural	Urban	Male	Female		Total	Rural	Urban	Male	Female
2004		977	900	1387	1078	865		489	448	703	546	425		489	452	684	532	440
2014		944	758	1307	910	980		355	247	565	359	351		589	510	742	551	629
Difference		-34	-142	-18	-168	115		-134	-201	-138	-187	-74		100	58.9	57.6	19	189
		Annual OOPE (AOOP)						AOOP : Outpatient						AOOP : Inpatient				

Chart 9

Item-wise out-of-pocket expenditure in out-patient expenditure per case in Bihar

Chart 9 shows the item-wise OOP expenses for out-patient care per case. The main items covered are diagnostic tests, doctor's fees and medicine costs. Interestingly, the costs of all three components were higher in rural areas compared to urban in 2004. While they all rose significantly in 2014, the rural levels were below urban levels in 2014 which may be attributed to NRHM.

Section 6: Catastrophic health expenditure and impoverishment

"Health spending is taken to be catastrophic when a household must reduce its basic expenditure over a period of time to cope with health costs, but there is no consensus on the threshold proportion of household expenditure"

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In this study we have used threshold levels of 10, 25 and 40 percent reduction of monthly household expenditure for health costs to be defined as catastrophic.

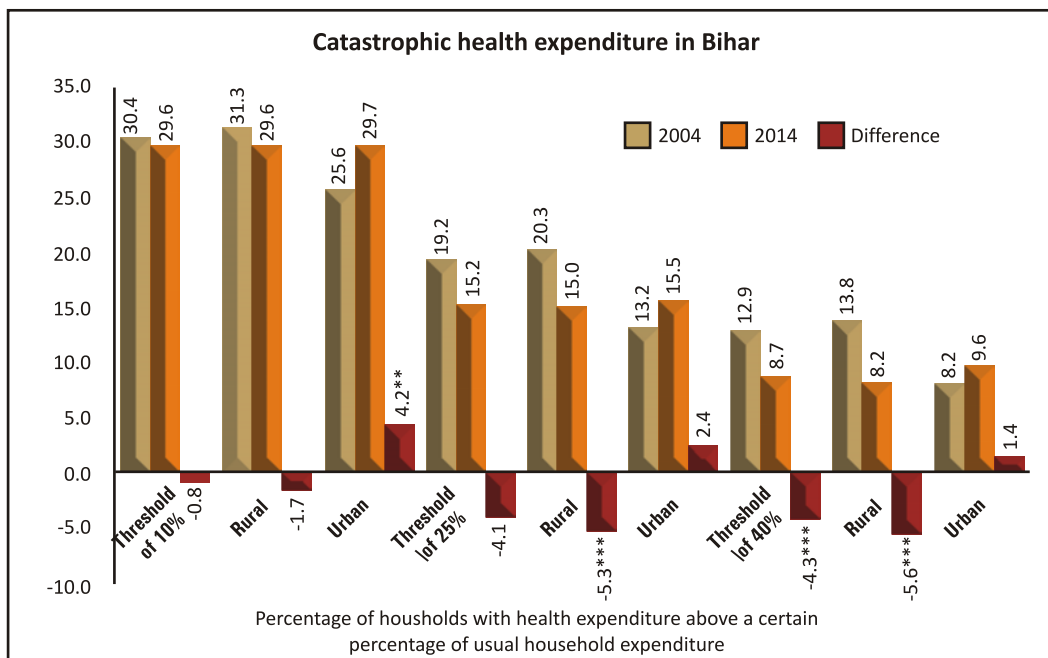At the state level, it has gone down – more for higher threshold levels, which is expected. In rural areas, there is a clear decline (success of NRHM), but increased in urban areas, as shown in Chart 9.

Chart 9: Catastrophic health costs for different thresholds

It is important, however, to note that all the households which reported catastrophic expenditure at any threshold, had at least one episode of hospitalization during the recall period, implying a significant increase compared to 2004. This, in conjunction with our finding on the exorbitant rise in in-patient OOP expenses reaffirms the financial burden of hospitalization (Chart 10).

Chart 10: Percentage of catastrophically affected households reporting at least one episode of outpatient/in-patient expenditure
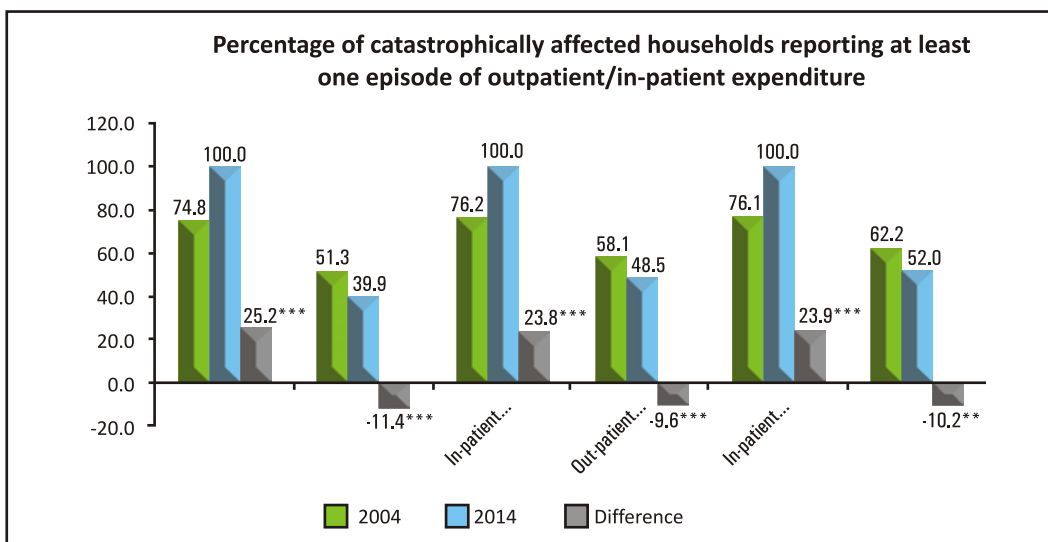
An alternative way to gauge the burden of health expenses is 'impoverishment', which shows the number/percentage of households pushed below the poverty line when health expenses are deducted from their overall expenses. The poverty line can be measured in several ways: we have used the head-count ratio, the Foster-Greer-Thorbecke measure and Sen's index. Table 3 shows the results. As far as head count ratio is concerned, it increased by 4.07 %-age points in 2004 in rural Bihar. The increase was only 1.23 %-age points in 2014. Similarly, the head count ratio increased by only .99 %-age points in 2014 in urban areas as opposed to 4.03 in 2004. The same patterns prevail for the two other measures of impoverishment used. These are welcome developments attributable to the various initiatives described in the beginning.

Table 3: Impoverishment due to health care costs

Place of residence	2004			2014		
	Initial	Deducting OOP expense	Difference	Initial	Deducting OOP expense	Difference
Head Count Ratio						
Rural	73.7	77.8	4.0	29.1	30.3	1.2
Urban	49.4	53.4	4.0	28.3	29.3	0.9
Total	71.1	75.2	4.0	29.0	30.2	1.2
Foster Greer Thorbecke (a = 2)						
Rural	6.5	15.5	9.0	1.5	1.9	0.4
Urban	5.5	19.6	14.0	1.5	1.8	0.3
Sen's Index						
Rural	25.1	35.0	9.8	7.4	8.2	0.8
Urban	18.8	28.2	9.4	7.5	8.1	0.6

Section 7: Maternal Health Care Seeking Behaviour

Table 4 shows the incidence of hospitalization due to various reasons. The numbers are 'per thousand' population. Clearly, pregnancy related causes were dominant both in 2004 as well as 2014.

Table 4: Incidence (%) of hospitalization per 1000 population in public and private facility in Bihar

	2004		2014	
	Public	Private	Public	Private
All other ailments	1.5	8.5	5.7	4.3
Childbirth/stillbirth/abortion/complications arose at the time of delivery and post-natal period	2.2	7.8	7.5	2.5

From Table 4, we note that there is a distinct shift in preference for public hospitals in 2014, compared to 2004. For example, while 7.8% of women in 2004 sought private care for pregnancy related factors, it came down to 2.5% in 2014 – the corresponding increase for public care was from 2.2% to 7.5%.

With this background, we explore in this section maternal health care seeking including places and costs of ante-natal care, delivery and post-natal care. Discrete choice econometric models are used to identify predictors of child-birth. We also used a decomposition method to isolate the effect of JSY on place of delivery. Chart 11 shows the tremendous increase across all indicators including institutional delivery in government facilities and receipt of pre and post-natal care. Institutional delivery grew from 18.4% in 2004 to an impressive 70.5% in 2014 – by 52.1 -age points%. Of this, delivery in government institution grew from a mere 4.1% in 2004 to 52.51% in 2014.

Chart 11: Maternal health care seeking
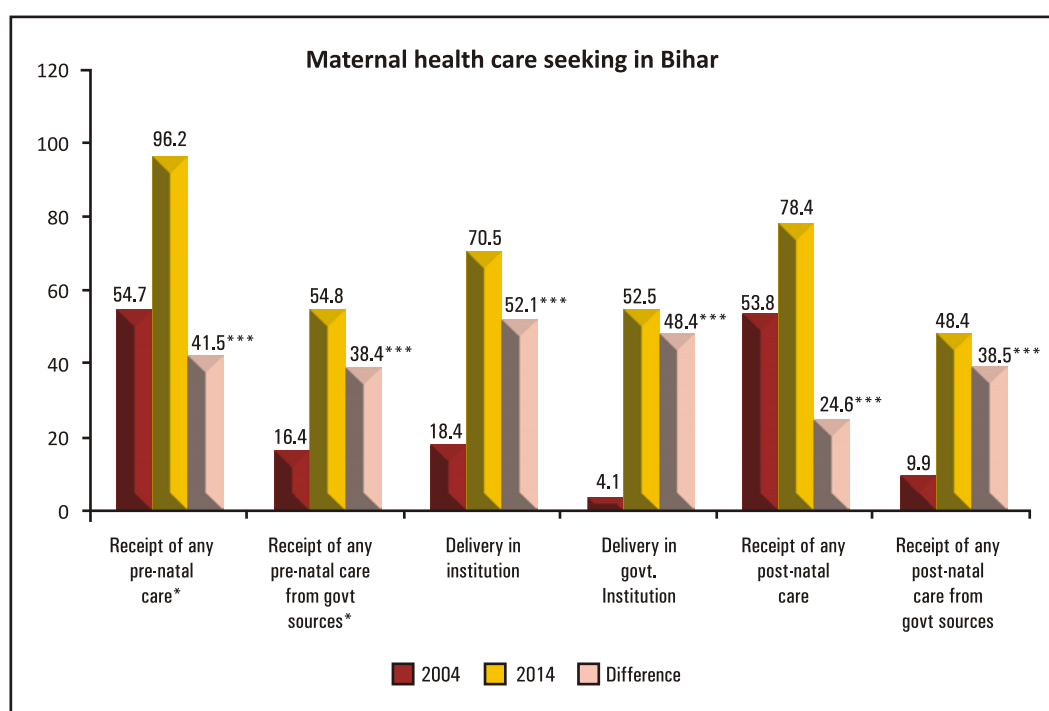
However, the costs of seeking such care gives a mixed picture (Chart 12). Only costs of delivery in government facilities declined – all other components show a rise.

Chart 12: costs of maternal health seeking

Mean out of pocket expenditure of maternal health care seeking in Bihar (at constant price 2004-05 in rupee)

All differences are statistically significant (P < 0,001)
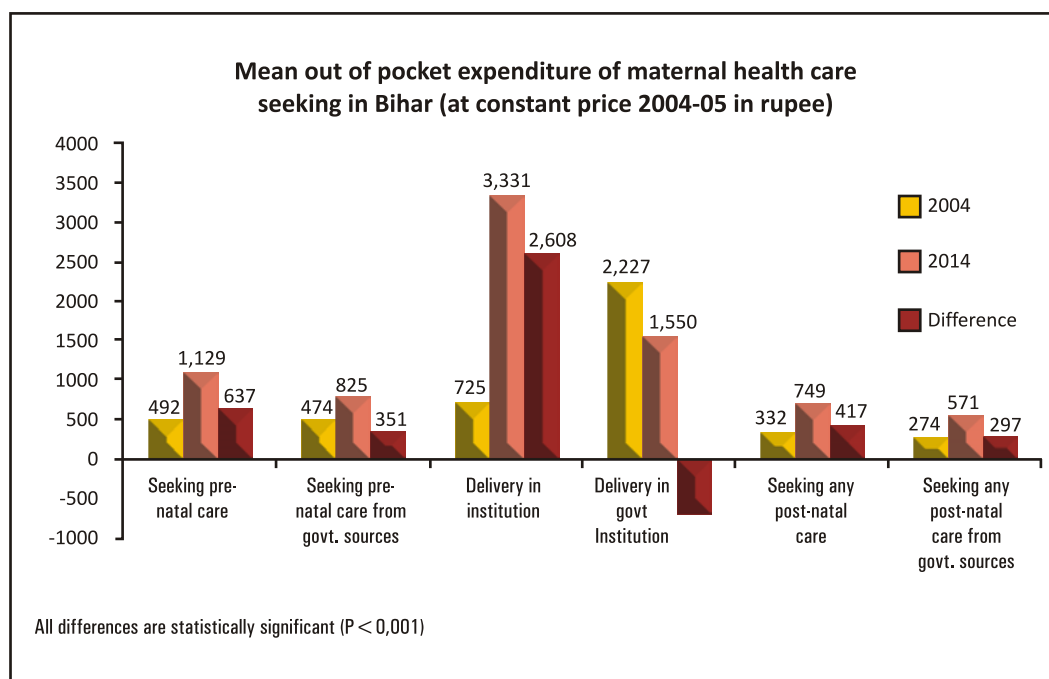
Section 8 : Predictors of place of child birth and effect of JSY

Using binary probit regression models, in this section, we report the predictors of place of child birth, OOP expenses, catastrophic expenses as well as impoverishment due to health costs. From the co-efficient estimates, we calculated the marginal probabilities across various dimensions to get an intuitive sense of the differential effects of the interventions as well as several contextual variables. The detailed regression results are provided in the appendix. We present the results in the main text. Appendix Table 1 provides the estimates for institutional delivery.

(i)   Institutional delivery

A woman,

    a.   having insurance is about 5 percentage-points more likely to deliver in institution

    b.   having 10 or more years of schooling is about 16 percentage-points more likely to deliver in institution compared to her not-literate counterparts

    c.   belonging to SC/ST community is 15 percentage-points more likely to deliver in institution compared to Muslims

    d.   belonging to highest MPCE is 15 percentage-points more likely to deliver in institution compared to lowest MPCE

    e.   belonging to rural area is 11 percentage-points less likely to deliver in institution

    f.   delivery in 2014 was about 50-percentage points likelier to be institutional compared to 2004.

(ii) Delivery in public facility:

A woman

a. having insurance is about 2 percentage-points less likely to deliver in public institution

b. having 10 or more years of schooling is about 9 percentage-points less likely to deliver in public institution

c. belonging to SC/ST community is 4 percentage-points more likely to deliver in public institution compared to Muslims

d. belonging to highest MPCE is 10 percentage-points more likely to deliver in public institution compared to lowest MPCE

e. belonging to rural are 3 percentage-points more likely to deliver in public institution

f. delivery in 2014 was about 47-percentage points more likely in public institution compared to 2004.

(iii) Delivery in private facility

A woman

a. having insurance is about 7 percentage-points more likely to deliver in private institution

b. having 10 or more years of schooling is about 18 percentage-points more likely to deliver in private institution

c. belonging to SC/ST community is 5 percentage-points more likely to deliver in private institution compared to Muslims

d. belonging to highest MPCE is 8 percentage-points more likely to deliver in private institution compared to lowest MPCE

e. belonging to rural area is 13 percentage-points less likely to deliver in private institution

f. delivery in 2014 was about 3-percentage points more likely to be in a private institution compared to 2004.

The above three sets of results are based on three different models, but some comparative insights can be drawn. For example, a woman having insurance is 5 percentage points likelier to deliver in an *institution.* But a woman with insurance is 7 percentage points likelier to deliver in a private institution and 2 percentage points less likely to opt for a public institution. A woman in a rural area is in 11 percentage points less likely to deliver in an institution. When the distinction is made between public and private, she is 3 percentage points more likely to go for a public facility and 13 percentage points less likely to go with a private one.

It is noteworthy that women belonging to the highest wealth quintile are 15 percentage points likelier to deliver in institutions, and 10 percentage points likelier to deliver in private institutions, compared to her counterpart in the lowest quintile. These are expected. The finding that they are also 8 percentage points likelier to deliver in public institutions seems counter-intuitive. Could it be the case that women coming from wealthier – hence, presumably with better access to care of the desired quality where available in public facilities, opt for those as they are considerably cheaper?

(iv) Effect of Janani Suraksha Yojana (JSY) on child birth

Institutional delivery in Bihar increased from 12.1% (in 1992-93) to 14.6% (in 1998-99) to 22.0% (in 2005-06), i.e. by only 10 percentage points in 13 years before the implementation of JSY.

According to NFHS-4 (2015-16) it has increased to about 63%, i.e., almost 3-times within 10 years.

The Oaxaca decomposition was carried out by year (2004 and 2014) by employing probit regression models after controlling for the variables included in the models for child birth. District fixed-effects and interactions between socio-religious category and MPCE quintiles were not controlled in the decomposition models to avoid zero-cells.

We find that 94% of this increase in institutional delivery (broken into 96% increase in public institution and 36% decline in private institution) can be attributed to JSY (and the year of survey and omitted variables).

Thus, without JSY, the increase of institutional delivery could not have been possible.

Section 9 : Predictors of OOP expenses, Catastrophic expenses, and Impoverishment: Role of insurance and other factors

A. Predictors of hospitalisation in Bihar: The role of insurance and other factors

Table 5 provides the sources of finance for hospitalization costs. Household current income and/or savings was the predominant source in both the years – obviously a major trigger for both catastrophic and impoverishing health costs. This was followed by borrowings, leading to indebtedness.

Table 5: source of finance

	2004	2014
Household income/savings (%)	**55.0**	**72.6**
Rural	53.3	72.0
Urban	68.2	78.0
Borrowings (%)	**33.2**	**23.8**
Rural	34.5	24.2
Urban	23.4	20.3
Contributions from friends/relatives (%)	**8.4**	**1.8**
Rural	8.5	1.9
Urban	7.6	0.6
Other (including sale of physical assets) (%)	**3.4**	**1.8**
Rural	3.8	1.9
Urban	0.8	1.1

Table 6 gives the extent of insurance coverage in Bihar. Although still small in absolute terms, it shows a significant rise in the period 2004-2014. Only .03% of the surveyed people had insurance in 2004, which went up to 6.2% in 2014. In 2004, .09% of the people who were hospitalized had insurance coverage, which went up to 7.5% in 2014.

Table 6: Insurance coverage in Bihar (%)

	Among all surveyed individuals			Among hospitalised cases		
	2004	2014	Diff	2004	2014	Diff
Rural	0.03	6.5	6.5***	0.0	8.0	8.0***
Urban	0.09	3.4	3.3***	0.6	4.5	3.9***
Male	0.05	5.8	5.8***	0.2	7.7	7.5***
Female	0.02	6.6	6.6***	0.0	7.6	7.6***
Rural male	0.04	6.1	6.1***	0.0	7.7	7.7***
Rural female	0.02	7.0	7.0***	0.0	8.0	8.0***
Urban male	0.13	3.5	3.4***	2.0	7.1	5.1***
Urban female	0.04	3.3	3.3***	0.0	3.3	3.3***
Total	0.03	6.2	6.2***	0.09	7.6	7.5***

Using a methodology similar as in the case of predictors of place of child birth, we analysed the predictors of hospitalization in Bihar. The statistical details are provided in Appendix Table2. The findings may be summarized as follows.

(i) Hospitalization (2004-2014)

a. An insured person's likelihood of being hospitalized increased from 2.5% to 4.3%.

b. Females are more likely to be hospitalized (3.3%) compared to males (1.7%).

c. Females with insurance have the highest probability of hospitalization (5.8%), while males with no insurance have the lowest (1.7%).

d. Likelihood of hospitalization increases from 1.9% to 5.3% once MPCE increases from Rs.250 to Rs.2000 in a household (not shown in the tables).

e. Probability of hospitalization increases from 2.4% to 2.8% as a person's educational attainment increases from non-literate to secondary completed and above.

f. A person belonging to OBC has the highest likelihood of being hospitalized (3.4%), while Muslims have the lowest (2.1%).

g. A person belonging to rural areas is slightly more likely to be hospitalized (2.5%) compared to urban areas (2.3%).

h. A person's likelihood of being hospitalized increased from 1.6% to 3.2% between 2004 and 2014.

(ii) Hospitalization in public hospital

    a.   An insured person's likelihood of being hospitalized in public hospital increases from 1.1% to 1.7%

    b.   Females are more likely to be hospitalized (1.6%) in public hospitals compared to males (0.6%).

    c.   Females with insurance have the highest probability of hospitalization in public sector (2.5%), while males with no insurance have the lowest (0.6%).

    d.   Likelihood of hospitalization in public sector increases from 0.9% to 1.9% once MPCE increases from Rs. 250 to Rs. 2000 in a household (not shown in the tables).

    e.   Probability of hospitalization in public sector increases from 1.1% to 1.4% as a person's educational attainment increases from non-literate to secondary completed and above.

    f.   A person belonging to OBC has the highest likelihood of being hospitalized in public sector (1.8%), while SC/ST and Muslims both have the lowest (0.9%).

    g.   A person belonging to rural areas is slightly more likely to be hospitalized in public sector (1.2%) compared to urban areas (1.1%).

    h.   A person's likelihood of being hospitalized in public sector has increased from 0.2% to 1.9% between 2004 and 2014.

(iii) Hospitalization in private hospital

    a.   An insured person's likelihood of being hospitalized in private hospital increases from 1.2% to 2.3%.

    b.   Females are more likely to be hospitalized (1.4%) in private hospitals compared to males (1.0%).

    c.   Females with insurance have the highest probability of hospitalization in private sector (2.7%), while males with no insurance have the lowest (1.0%).

    d.   Likelihood of hospitalization in private sector increases from 0.8% to 2.9% once MPCE increases from Rs.250 to Rs.2000 in a household (not shown in the tables).

    e.   Probability of hospitalization in private sector increases from 1.1% to 1.3% as a person's educational attainment increases from non-literate to secondary completed and above.

    f.   A person belonging to Hindu upper caste has the highest likelihood of being hospitalized in private sector (1.5%), while Muslims have the lowest (1.0%).

    g.   A person belonging to urban areas is slightly more likely to be hospitalized in private sector (1.2%) compared to rural areas (1.0%).

    h.   A person's likelihood of being hospitalized in private sector has increased from 1.0% to 1.4% between 2004 and 2014.

A. Predictors of out-of-pocket expenditure in healthcare – household level

Next, we analysed the predictors of OOP expenditure in Bihar. The statistical details are provided in Appendix Table A3. The findings may be summarized as follows.

a. Contrary to expectation, having insurance increases the amount of OOP by 129% in case of hospitalization at household level even after adjusting for other potential confounders.

b. From 2004 to 2014, amount of OOP expenses in seeking care at household level increased significantly for in-patient care by 892%, and by 48% in case of out-patient care.

c. Amount spent by a household belonging to SC/ST is 56% lesser for in-patient care, while 44% more for out-patient care compared to a household belonging to Hindu upper caste. Similarly, amount spent by a Muslim household is 47% more for out-patient care, while 44% less in in-patient care with respect to the same comparator. On the other hand, amount spent by an OBC household is 76% less to obtain out-patient care and 105% less to obtain in-patient care even after controlling other confounding variables when compared to Hindu upper caste households. These imply increasing inequity in treatment-seeking behaviour across socio-economic categories.

d. For a household, being urban is positively associated with OOP as it spent 16% more in out-patient care and about 27% more in in-patient care compared to rural areas.

e. If household occupation is labour, then amount spent from OOP is about 45% more in case of out-patient care and 49% less in case of in-patient care compared to a household which is self-employed. The amount spent by wage/salaried households is about 18% more for out-patient care and 5% more for in-patient care compared to the same reference category.

B. Predictors of out-of-pocket expenditure in healthcare: individual level (Table A4)

a. At the individual level, expenditure on in-patient decreased by 70%, while on out-patient care increased by 130% from 2004 to 2014 *per episode* of illness even after controlling other confounding variables.

b. out of pocket expenditure for in-patient care is 89% more if a person has insurance compared to an uninsured person per episode of illness after controlling other factors.

c. An individual from urban areas is likely to pay 65% more from out of pocket for in-patient care, while 17% more for out-patient care compared to rural areas after controlling a range of other factors.

d. An individual belonging to OBC community pays about 32% less for in-patient care and about 38% less for out-patient care compared to an individual belonging to upper caste Hindu. However, in-patient and out-patient expenditures of an individual belonging to minority community are about 11% and 43% more compared to the same reference category. At the same time, in-patient expenditure is 28% less, while out-patient expenditure is about 43% more for a person belonging to SC/ST community compared to

upper caste Hindu. Increasing expenditure on out-patient care among SC/ST and minorities indicate increasing inequity in health system.

e. Educational attainment of an individual is found to have significant influence in seeking in-patient as well as out-patient care. It is interesting to note that expenditure on out-patient care monotonically increases with educational attainment, while it declines uniformly in case of out-patient care. For example, an individual who has completed secondary or higher education is more likely to spend 156% more on in-patient care, but 72% less in seeking out-patient care. It reflects as educational attainment increases, perceived severity of the disease changes: for minor ailments educated individuals prefer not to seek out-patient treatment, while for major illness they would like to seek hospitalization.

f. individuals belonging to wage/salaried households tend to spend about 20% and 27% more on in-patient and out-patient care, respectively, compared to the individuals belong to self-employed households. However, individuals from labourer households are likely to pay about 6% and 60% more from their out of pocket to seek in-patient and out-patient care compared to same reference category, respectively.

C. Predictors of catastrophic out-of-pocket expenditure (Table A5)

Two separate models are estimated to understand the effects of various predictor variables on catastrophic health expenditure. In Model 1, we have incorporated the variable indicating year of survey, while logarithm of MPCE has been dropped. In Model 2, we have included logarithm of MPCE, dropping year of survey from our model. lMPCE has been taken as continuous variable and so marginal effect has not been calculated in Model 2. Multicollinearity (colinear relationship between two or more variables) between lMPCE and year of survey compelled us to estimate two separate models.

Key findings:

a. At 10% threshold, Model 1 suggests that there is a drop of catastrophic expenditure on health by 10 percentage-points from 2004 to 2014 after controlling other confounding factors. At the same time, having public insurance increases the risk of catastrophic expenditure by 5 percentage-points. However, in Model 2, we found that such risk increases only by 1 percentage-point as we drop year of survey from our model. Significant association of other predictor variables is also observed with respect to catastrophic expenditure, though differences are not very sharp. For example, urban households are 2 percentage-points more likely to spend catastrophically compared to rural households in Model 1, however, such differences are further minimized in Model 2.

b. At 25% threshold, Model 1 implies 7 percentage-points decline of catastrophic health expenditure from 2004 to 2014. As observed earlier, having public insurance increases the risk of catastrophic expenditure by 5 percentage-points. In Model 2, we found that such risk increased by 3 percentage-points. Direction and significance of association of other confounders are found to be similar at this threshold as well, though values differ.

c. At 40% threshold, we found 4 percentage-points decline of catastrophic expenditure

during 2004-14 years, while increase in such expenditure by 4 percentage-points if a household has public insurance even after controlling other potential confounding factors (Model 1). We also found the risk of such expenditure increases by 2 percentage-points in Model 2 once we exclude year of survey from our model. Similar effect of other confounding variables is also seen as observed for 10% and 25% level of threshold.

d.   Our findings suggest that although the likelihood of catastrophic health expenditure in Bihar has declined to a significant extent at different threshold levels, having public health insurance enhanced the probability of such expenditure.

D. Predictors of impoverishment due to out-of-pocket expenditure (Table A6)

Two separate models were estimated to find predictors of impoverishment because of multicollinearity as in the previous case.

Key findings:

a.   In Model 1, where year of survey is included but lMPCE is not, we found that year of survey has a significant negative effect on impoverishment even after controlling other potential confounders. The likelihood of being impoverished due to OOP declined by 25 percentage-points between 2004 and 2014. At the same time, having public insurance also increases the probability of being impoverished by 3 percentage-points. Households from rural areas and of backward sections including minorities are significantly more likely to be impoverished compared to respective reference categories.

b.   In Model 2 (where we exclude year of survey but incorporate lMPCE) having public insurance increases the likelihood of impoverishment by 2 percentage-points. In addition, probability of impoverishment increased by 19 percentage-points for the rural households compared to urban households; however, effect of socio-religious category is not very pronounced in this case.

Section 10 : Conclusions & Policy Implications

Bihar has made progress improving its health indicators with proactive interventions by the GoB and other stakeholders. With a high and rapidly growing population, combined with relatively low resources, challenges remain. The objective of this study was to assess the impact of the various policies described above along with several contextual factors on morbidity and health seeking behaviour of the population of Bihar over the period 2004-2014.

We observed a reduction of both catastrophic as well as impoverishing health costs which can be attributed to NRHM. However, the natural growth rate of per capita income also has an effect here. JSY led to a huge increase in institutional delivery. The role of insurance is unclear. While more people are now insured, our regression analysis shows that it also results in higher OOP expenses. This is particularly true of public insurance. People with public health insurance appear to be more likely to incur higher OOP expenses leading to higher probabilities of both catastrophic expenses as well as impoverishment. Similar findings were obtained by Ravi et al. (2016) for all India. Thus, the coverage, clientele and usage of public insurance should be thoroughly assessed with fresh surveys.

The positive effects of the three main initiatives seem to have left out the bottom 20% of the population. In fact, their OOP expenses have increased dramatically at constant prices, but that of the next quintile fell significantly. Again, the targeting of interventions is a matter of concern. One needs to find out if the poorest people, who are often under-privileged in several other ways including education, awareness and connections are being effectively reached out to with these interventions. Given that 'leave no one behind' is the driving philosophy of the Sustainable Development Goals, correcting this anomaly is absolutely critical for Bihar's progress in meeting its SDG commitments.

From the comparative state-level analysis of Bihar and Kerala, literacy and health status were found to have a strong correlation (Jana and Basu, 2017). 'Increased perception and awareness about different illnesses is associated with rise in literacy, along with augmented desire to utilize the available health care options.' We also found a significant increase in health care seeking over 20014-14 across various indicators which is associated with an increase in literacy rate. However, Bihar still lags some way behind other states and the national average in terms of literacy – an issue which should be addressed urgently to promote both curative and preventive health care seeking.

The first part of this study provides full details of the status of the many indicators which are of concern and interest to policymakers. The key findings of the regression models are interpreted in a way which enables effective targeting according to a number of relevant dimensions: caste, literacy, employment status, to name a few. They emphasize the inter-connectedness of development indicators, which indeed is the hallmark of the SDG framework. The SDGs cannot be achieved individually. They are, by design, inter-connected (through the targets and indicators of the framework) which requires synergies between development partners and most critically, different department of the government machinery.

Future research requires a strong database of the demographic profile of the state. It is important to know at various disaggregated levels how the status of various health indicators, and the several contextual socio-economic factors which interact with those.

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Appendix

Table A1: Average marginal effects (AME) (in percent) of various predictor variables on child birth in Bihar as obtained from binary probit regression analyses

	Institutional delivery		Delivery in public facilities		Delivery in private facilities	
Predictors	AME	Z-Stat	AME	Z-Stat	AME	Z-Stat
Insurance						
No	49.9		33.8		16.8	
Yes	54.5	50.51***	32.3	-17.83***	24.4	80.18***
Year			4.3		15.3	
Year- 2004	20.1					
Year- 2014	69.0	861.10***	51.0	809.93***	18.2	73.13***
Age		211.39***		229.02***		38.26***
15	8.8		1.2		10.7	
25	47.4		34.6		16.7	
35	83.3		80.1		24.5	
Education						
Not-literate	47.8		36.1		12.8	
Primary	50.1	38.52***	36.0	-1.36	14.9	42.83***
Middle	48.6	9.27***	26.1	-129.01***	22.8	137.66***
Secondary & above	63.6	201.84***	27.3	-124.01***	31.3	271.95***
Household occupation						
Self employed	47.3		29.3		18.0	
Labour	49.9	50.64***	36.5	152.00***	13.7	-100.98***
Others	60.9	203.98***	39.6	162.70***	20.5	45.37***
Socio-religious category						
H-FC	49.7		31.3		17.2	
H-SC/ST	54.5	107.42***	35.3	63.98***	15.2	-68.10***
H-OBC	47.4	60.15***	33.4	71.55***	16.1	-36.22***
Muslims/Others	39.5	43.40***	26.8	32.46***	12.2	-10.30***
MPCE quintiles						
Bottom quintile	43.9		29.7		13.4	
Second lowest quintile	45.7	30.70***	30.7	32.89***	15.2	20.37***

Middle quintile	47.9	154.91***	31.8	62.16***	15.8	97.14***
Upper quintile	56.4	137.68***	34.3	94.07***	20.6	48.93***
Highest quintile	59.0	127.23***	40.0	103.61***	21.3	52.00***
Sector	49.3		34.0		15.8	
Rural						
Urban	60.5	144.50***	31.4	-31.92***	28.9	190.94***
District fixed-effect	Yes	Yes	Yes			

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$

Table A1a: Understanding effect of Janani Suraksha Yojona (JSY) on child birth in Bihar: A Decomposition Analysis

	Institutional delivery		Delivery in public sector		Delivery in private sector	
	Coefficient	Percentage	Coefficient	Percentage	Coefficient	Percentage
Omega = 1						
Character	0.039	7.48%	0.022	4.68%	0.012	31.93%
Coefficient	0.479	92.52%	0.457	95.32%	0.026	68.07%
Omega = 0						
Character	0.022	4.24%	0.016	3.30%	0.015	38.90%
Coefficient	0.496	95.76%	0.464	96.70%	0.024	61.10%
Raw	0.518	100%	0.480	100%	0.039	100%

Note: The decompositions were carried out by year (2004 and 2014) by employing for probit regression models after controlling for the variables included in the models for child birth. District fixed-effects and interactions between socio-religious category and MPCE quintiles were not controlled in the decomposition models to avoid zero-cells.

Table A2: Average marginal effects (AME) (in percent) of various predictor variables on hospitalization in Bihar as obtained from binary probit regression analyses

	Hospitalization		Public Hospital		Private Hospital	
	AME	Z-Stat	AME	Z-Stat	AME	Z-Stat
Insurance						
No	2.5		1.1		1.2	
Yes	4.3	155.17***	1.7	78.14***	2.3	146.22***
Year						
Year- 2004	1.6		0.2		1.0	

Year- 2014	3.2	597.83***	1.9	750.32***	1.4	209.94***
Sex						
Male	1.7		0.6		1.0	
Female	3.3	627.94***	1.6	602.92***	1.4	170.34***
Sex#Insurance						
Male#No insurance	1.7		0.6		1.0	
Male#with insurance	2.8		0.9		1.9	
Female#No insurance	3.2		1.6		1.3	
Female#with insurance	5.8		2.5		2.7	
Marital status						
Never Married	0.6		0.2		0.5	
Currently married	6.7	723.74***	4.4	892.20***	2.0	340.29***
Divorced/Separated	6.2	596.68***	3.2	454.16***	2.3	290.96***
Education						
Not-literate	2.4		1.1		1.1	
Primary	2.5	7.70***	1.2	131.99***	1.2	81.66***
Middle	2.9	97.32***	1.4	117.17***	1.3	22.80***
Secondary & above	2.8	43.43***	1.2	-20.11***	1.3	41.20***
Household occupation						
Self employed	2.5		1.0		1.3	
Labour	2.5	110.89***	1.3	80.20***	1.1	-68.80***
Others	2.8	83.42***	1.3	36.06***	1.2	-60.58***
Socio-religious category						
H-FC	2.7		0.9		1.5	
H-SC/ST	2.4	-15.33***	1.0	72.15***	1.2	-60.21***
H-OBC	3.2	-130.91***	1.8	9.34***	1.4	-121.48***
Muslims/Others	2.1	-179.24***	0.9	-53.86***	1.1	-150.12***
Sector						
Rural	2.5		1.2		1.2	
Urban	2.3	-28.03***	1.1	-37.42***	1.0	-65.65***

***p<0.001; **p<0.01; *p<0.05

Table A3: Average marginal effects (AME) (in rupees) of different predictors of OOP expenses at household level

Variables	Inpatient		Out patient	
	AME	P > t	AME	P > t
Year				
2004	601.97	0.00	1768.11	0.00
2014	5968.90	0.00	2614.45	0.00
Insurance				
No	1602.23	0.00	...	...
Yes	3676.45	0.00	...	...
Place of residence				
Urban	2016.73	0.00	2594.80	0.00
Rural	1583.59	0.00	2236.20	0.00
Socio-religious category				
Hindu-UC	2482.66	0.00	1911.04	0.00
Hindu-SCST	1595.37	0.00	2748.79	0.00
Hindu-OBC	1212.95	0.00	1086.85	0.00
Minorities	1721.66	0.00	2818.37	0.00
Household occupation				
Self-employed	1837.50	0.00	1924.49	0.00
Labour	1236.61	0.00	2785.68	0.00
Wage & Salary	1934.69	0.00	2263.62	0.00

Table A4: Average marginal effects (AME) (in rupees) of different predictors of OOP expenses at individual level

Variable	Inpatient		Outpatient	
	AME	P > t	AME	P > t
Year				
2004	119.68	0.00	245.04	0.00
2014	36.08	0.00	564.05	0.00
Insurance				
No	69.41	0.00	...	...
Yes	131.31	0.00	...	...
Place of residence				
Rural	66.81	0.00	422.77	0.00
Urban	110.30	0.00	493.63	0.00
Socio-religious category				
HFC	88.22	0.00	360.02	0.00
HSCST	63.68	0.00	513.64	0.00
HOBC	59.66	0.00	224.67	0.00
Minorities	98.13	0.00	514.78	0.00
Household occupation				
Self-employed	70.63	0.00	348.64	0.00
Labourer	66.90	0.00	558.19	0.00
Wage & Salaried	84.86	0.00	442.47	0.00
Educational attainment				
Not-literate	43.71	0.00	598.14	0.00
Primary	58.93	0.00	575.06	0.00
Middle	63.24	0.00	468.77	0.00
Secondary & above	111.79	0.00	169.71	0.00
Marital status				
Never married	17.97	0.00	354.97	0.00
Currently married	132.06	0.00	404.53	0.00
Divorced/separated	109.84	0.00	2082.75	0.00

Table A5: Average marginal effects (AME) of predictors of catastrophic out of pocket expenses

	Model 1: With year, Without IMPCE		Model 2: Without year, with IMPCE	
Variables	AME	P > z	AME	P > z
Year				
2004	0.16	0.00	...	...
2014	0.06	0.00	...	...
Catastrophic expenditure: 10%				
Public insurance				
No	0.10	0.00	0.10	0.00
Yes	0.15	0.00	0.11	0.00
Place of residence				
Rural	0.08	0.00	0.10	0.00
Urban	0.10	0.00	0.10	0.00
Socio-religious category				
HFC	0.11	0.00	0.11	0.00
HSCST	0.11	0.00	0.10	0.00
HOBC	0.09	0.00	0.09	0.00
Minorities	0.09	0.00	0.09	0.00
Household occupation				
Self-employed	0.11	0.00	0.11	0.00
Labour	0.08	0.00	0.08	0.00
Wage & Salary	0.13	0.00	0.13	0.00

	Without Impce		Without year	
	Margin	P > z	Margin	P > z
Year				
2004	0.10	0.00	...	...
2014	0.03	0.00	...	...
Public insurance				
No	0.06	0.00	0.05	0.00
Yes	0.11	0.00	0.08	0.00
Place of residence				
Rural	0.04	0.00	0.06	0.00
Urban	0.06	0.00	0.06	0.00
Socio-religious category				
HFC	0.06	0.00	0.06	0.00
HSCST	0.06	0.00	0.06	0.00
HOBC	0.05	0.00	0.05	0.00
Minorities	0.06	0.00	0.06	0.00
Household occupation				
Self-employed	0.06	0.00	0.06	0.00
Labour	0.05	0.00	0.05	0.00
Wage & Salary	0.06	0.00	0.06	0.00
Catastrophic expenditure: 40%				
	Without Impce		Without year	
	Margin	P > z	Margin	P > z
Year				
2004	0.06	0.00	...	...
2014	0.02	0.00	...	...
Public insurance				
No	0.03	0.00	0.03	0.00
Yes	0.07	0.00	0.05	0.00
Place of residence				
Rural	0.03	0.00	0.03	0.00
Urban	0.04	0.00	0.03	0.00

Socio-religious category				
HFC	0.04	0.00	0.04	0.00
HSCST	0.04	0.00	0.03	0.00
HOBC	0.03	0.00	0.03	0.00
Minorities	0.04	0.00	0.04	0.00
Household occupation				
Self-employed	0.04	0.00	0.04	0.00
Labour	0.03	0.00	0.03	0.00
Wage & Salary	0.04	0.00	0.04	0.00

Table A6: Average marginal effects (AME) of predictors of impoverishment due to out of pocket expenses

	With Year, without IMPCE		Without Year, with IMPCE	
Year	AME	P > z	AME	P > z
2004	0.91	0.00	...	...
2014	0.66	0.00	...	...
Public insurance				
No	0.76	0.00	0.77	0.00
Yes	0.79	0.00	0.79	0.00
Place of residence				
Rural	0.79	0.00	0.93	0.00
Urban	0.76	0.00	0.74	0.00
Socio-religious category				
HFC	0.68	0.00	0.80	0.00
HSCST	0.74	0.00	0.75	0.00
HOBC	0.86	0.00	0.79	0.00
Minorities	0.78	0.00	0.76	0.00
Household occupation				
Self-employed	0.76	0.00	0.77	0.00
Labour	0.77	0.00	0.77	0.00
Wage & Salary	0.77	0.00	0.77	0.00

Notes

The Centre for Health Policy (CHP) at the Asian Development Research Institute (ADRI) has been set up with support from the Bill & Melinda Gates Foundation to strengthen the health sector in Bihar with a multidimensional and multi-disciplinary approach. Its aim is to engage in rigorous analysis of the health system and inform policy makers to fine-tune interventions for even stronger outcomes.

- Research and Analytical Studies

  It constitutes the core of CHP's activities. The areas of research include health infrastructure and delivery with emphasis on equity, health outcomes such as IMR, MMR, TFR and its predictors, health financing, private-public partnerships, regulatory framework and its implementation, and other issues which might emerge.

- Informing Policymakers on Strengthening the Existing Health System

  CHP aims to be the trusted partner of the state Government in providing evidence-based inputs in making the health system stronger, resilient and equitable.

- Sustainable Health Solutions

  CHP recognizes the need for establishing a strong health system which will be self-sustaining. It means immunity to natural disasters/calamities, financial uncertainties and other unanticipated factors. These pillars may be interrelated; CHP will provide a framework of synergy among actors working on these pillars.

- Collaboration

  CHP engages in collaboration with an extensive network of academic and policy research institutions both in India and abroad in health and the broader social sciences.