Original Article

A Qualitative Comparative Analysis of Healthcare Supply–Demand Side Barriers Under the Publicly Funded Health Insurance Scheme in India

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Abstract

Background: India recently launched *Ayushman Bharat* – National Health Protection Mission – an upgraded version of *Rashtriya Swasthya Bima Yojna* (RSBY), which is projected as world's largest public insurance scheme by numbers. The new scheme can certainly draw learning from the former (RSBY) to ensure better reach and success. RSBY has been extensively analyzed for supply-side barriers but sparsely for demand and supply-side barriers simultaneously. **Objectives:** Through this study, authors intend to determine causality as well as configurations (pathways) of demand and supply barriers that make beneficiary vulnerable even under the scheme. The study explores the interaction of barriers that lead to patient dis/satisfaction, overcharging for a medical procedure and high disease severity among beneficiaries. **Methods:** The study uses RSBY insurance claim records from 2013 to 2015 backed up by posthospitalization survey of the state of Chhattisgarh, India. It employs a fuzzy set qualitative comparative analysis to determine causality and configuration (path-way) of parameters leading to the outcome. **Results:** Provision of medicine emerges as a necessary condition for patient satisfaction. Waiting time did not appear as a necessary parameter of satisfaction. Overcharging the cashless card in case of minor surgical procedures is observed irrespective of beneficiaries' education and occupation status. Urban male and rural female appear to bear high disease severity. **Conclusions:** Results have implication for policymakers and implementors to recognize the segment that remains vulnerable under the scheme and gain insights on the parameters of patient satisfaction.

Key words: Fuzzy set qualitative comparative analysis, insurance, National Health Protection Mission, *Rashtriya Swasthya Bima Yojna*

INTRODUCTION

A decade back, the government launched *Rashtriya Swasthya Bima Yojna* (RSBY) to protect poor from financial hardship and improve access to health. *Ayushman Bharat* (AB), an upgraded version of RSBY, launched recently is being called the world's largest health insurance scheme. With similar policy design, both the schemes aim at reducing out of pocket expenditure (OOPE) which is around 65% of current health expenditure.[1] The latter can certainly draw learning from the former and fuel policy success.

Initially, RSBY was extensively researched for issues in enrolment, utilization, package pricing, access, monitoring, and impact on OOPE. To overcome enrolment issues Sarwa *et al*. recommend a timely update of BPL list, card distribution, and involvement of local leader.[2] Reddy *et al*. reports significant interstate variation in utilization rates ranging from 38 per

thousand in Kerala to 1 per thousand in Assam.[3] Although a cashless insurance scheme, studies report incidences of OOPE of around 58 and 17% in private and public hospitals, respectively.[4] A study by Shahrawat and Rao (2012) raises concern over the inherent design of RSBY asserting that 88% of OOPE by poor is on medicines.[5] A few studies are available that has analyzed demand-side barriers apart from OOP payments. A comparative study between 2004 and 2012 examines the impact of education divide on access to inpatient care before and after the introduction of a health insurance scheme and reports a positive convergence.[6] Another study compares the efficiency and access to the public vs private

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hospitals under the scheme and reports access issues to private hospitals.[7]

Though OOP is the major cause of concern, yet it has been observed that healthcare seeking is often deferred not just by one barrier but by the interplay of multiple barriers. However, there is dearth of studies that have explored the demand-supply barriers interaction simultaneously which leaves the beneficiary susceptible. Through this study, authors intend to determine causality and configurations (pathway) of barriers that make beneficiary vulnerable even under the scheme. A beneficiary can be considered vulnerable if actuals do not comply with scheme design or scheme itself is not comprehensive to cater to her/his healthcare need. The article, as part of a larger work by the authors in the domain of government support for the healthcare of the needy, attempts to assess this by determining the configuration of factors that lead to (1) patient satisfaction, (2) overclaiming for a medical procedure, and (3) high disease severity among beneficiaries.

MATERIALS AND METHODS

Study design

The study examines beneficiaries of public health insurance scheme from three perspectives using fuzzy set qualitative comparative analysis (fsQCA) (based on set relations and determine which logical conclusion a data set supports).

The first question attempts to find factors that lead to beneficiary dis/satisfaction. The dis/satisfaction under the scheme can be influenced by a combination of individual-centric factors (gender, occupation, and education) and scheme-centric factors (waiting time, medicine provision, and diagnosis charges). Even with prestated treatment rates, there have been instances of overclaiming the cashless card under the scheme.[8] Hence the second question pertains to determine characteristics of a beneficiary who is claimed more than the prescribed rate. The third question attempts to identify the characteristics of beneficiaries who bear comparatively higher disease severity. A variable is created for this purpose that maps procedures under the scheme with different "disability weights" according to procedure severity. These weights are proposed by global disease burden enterprise and vary between 0 (perfect health) and 1 (death).

The study utilizes data from the Post-hospitalization survey collected by the nodal office and insurance claims data from 2013 to 2015 in the state of Chhattisgarh, India. Since only secondary data is used, ethical committee permission was not required. The data was shared with the authors by the nodal office after the necessary permission. The claim data had records of inpatient treatment taken under RSBY and Mukhyamantri Swasthya Bima Yojna (MSBY) scheme. RSBY (centrally funded) and MSBY (state funded) are different names for the same scheme design with former catering to below poverty and later to above poverty line population and together covers 92% of state population. Substantial coverage provides an apt setting for scheme analysis.

Methodology

The study used the fsQCA 3.0 version (University of Arizona, Department of Sociology, Social Science Building, 400 Tucson, AZ 85721, USA) for the analysis (Ragin *et al*., 2006).[9] fsQCA methodology, grounded in Boolean algebra set-relations, is a bridge between quantitative and qualitative analysis.[9] The method determines the set of logical conclusions that the data support by enlisting all the possible unique combinations of values that variables can take, and backing it up with observed data. The method, along with causality, also provides the path of the variables leading to an outcome which is an advantage over regression,[10] and hence, an advantage for social phenomena research. In fsQCA analysis, outcome and predictor variable can be dichotomous (0/1) or continuous. If all the variables are binary, analysis is carried out as crisp-set QCA. If some of the predictor variables are continuous, it is first scaled down (or calibrated) between "0" and "1" using the tool and analyzed as fsQCA. The calibration of a continuous variable is done using fsQCA tool which utilizes three researcher input: full membership threshold, full nonmembership, and crossover point threshold. The magnitude of the calibrated value indicates the level of membership in the outcome.[11,12] In our study, distance from the hospital, package rate variation and waiting time have been calibrated using this method. Calibration only changes the magnitude of value while it continues to retain their unit (absolute value in our case). Here, package rate variation (overclaiming) refers to the difference between the prestated rate and amount claimed on the cashless card by the hospital. Further, the method considers each data point as a separate case and generates "truth tables" of 2^k rows (k is a number of outcome predictors) with all possible combinations. Next, the truth table is filtered using frequency and consistency score of each row calculated by the tool. Frequency represents the number of cases of each possible combination and consistency measures the percentage of cases in each row displaying the outcome.[12] A cutoff is set for frequency and consistency to filter the number of observations for subsequent fsQCA assessment. Minimally acceptable observation frequency is considered to be three,[13] and 0.85 for consistency[12] which we have used for our study. Finally, the refined table is processed further by the tool to generate solutions (configurations). In the results, raw coverage indicates the extent to which the particular configuration can explain the outcome. And, unique coverage indicates the proportion of cases that can be explained by the particular configuration. The fsQCA analysis is based on researcher assumptions as well as inputs for the cut-off points to evaluate the membershi*P* value in a given set. The researchers in this paper have sufficient experience with prior such studies involving QCA and fsQCA to decide on the appropriate subjective inputs for an efficacious outcome and interpretation.

Data description

The posthospitalization survey (contains a mix of sociodemographic and treatment-related questions) is merged with insurance claim data using a unique key to form a complete dataset with three constructed variables: (a) distance

between respondent residence and hospital, (b) disability weight of disease, and (c) package rate variation between claimed and actual. The final merged dataset has 295 data points [Figure 1].

Observations from claim-data

Two major issues are observed that can delay claim settlement process and diminish trust between hospital and claim settlement body resulting in service denial to the beneficiary. First, an incorrect package has been claimed for a particular procedure from a cashless card. Second, in a few instances, a

card is charged for multiple unrelated treatments during a single visit to the hospital thus exhausting the card limit.

Assignment of disability weights

Global burden of disease study 2010 by Institute for Health Metrics and Evaluation has released diseasewise disability weights as per severity that varies from mild to moderate to severe. In the context of RSBY, which is largely a scheme to cover for inpatient/surgical treatment, it is not incorrect to assume that disease must be at moderate to severe level. The decision between moderate or severe disability weights is decided based on discharge description in consultation with a medical professional.

RESULTS

Tables 1-3 display fsQCA output of possible configurations for (a) patient satisfaction level, (b) overclaiming, and (c) high-disease severity. Consistency measures the degree of overlap between outcome set and solution variables along with complete configuration (path of variables that lead to an outcome).[11] The overall solution coverage, similar to R-square, represents the extent to which these configurations can explain patient satisfaction under the scheme.[14] In Table 1, Yes represents "presence", No represents "absence" and "doesn't matter" otherwise. For example, in Table 1, configuration 3 indicates that good patient condition (Y) in the absence of wait time (N) and the provision of medicine (Y) leads to patient satisfaction.

While arriving at the solution, we have made certain assumptions for first question. In fsQCA, assumptions are based on theoretical knowledge about the possible effect of a variable. The assumption is marked as "present/absent" if the variable's absence as well as presence may impact the outcome. It is marked to "present" if only the presence of that variable has an impact and absence is believed to have no effect (similarly for "absent") of the variable on the outcome.
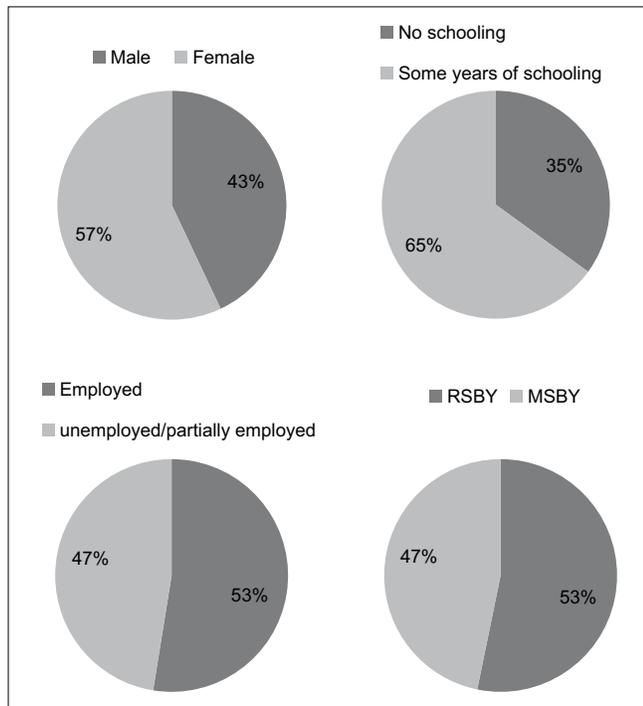

Figure 1: Descriptive statistics of claim data.

Table 1: Configuration for *Rashtriya Swasthya Bima Yojna*/Mukhyamantri Swasthya Bima Yojna beneficiary satisfaction

Dependent variable: Satisfaction level	Assumptions	Configurations					
		1	2	3	4	5	6
Patient condition	Present/absent	Yes	Yes	Yes	Yes	Yes	Yes
Gender	Present		Yes			Yes	
Waiting time	Present/absent	No	No	No	No		Yes
Advance money?	Present						
Medicines?	Present/absent	Yes	Yes	Yes	Yes	Yes	Yes
Yes education of head of family	Present/absent	Yes	Yes		Yes		No
Yes occupation	Present/absent		No	Yes	Yes	Yes	Yes
Charged for diagnosis?	Present						
Distance	Present/absent			Yes	Yes	Yes	No
Who sent you to the hospital?	Present						
RAW coverage		0.319	0.102	0.165	0.112	0.125	0.058
Unique coverage		0.176	0.056	0.021	0.016	0.027	0.015
Consistency		0.971	0.951	0.950	0.964	0.947	0.965
Overall solution coverage	0.529						
Overall solution consistency	0.959						

Source: fsQCA tool output. fsQCA: Fuzzy set qualitative comparative analysis

Table 2: Configurations for overclaiming under Rashtriya Swasthya Bima Yojna scheme

DV: Package rate variation	Assumption	Configuration	
		1	2
Education HOF	Present/absent	No	Yes
Occupation	Present/absent	No	Yes
Gender	Present/absent	No	No
RSBY?	Present/absent	No	No
Disability weight	Present/absent	No	No
Surgical/medical?	Present/absent	Yes	Yes
RAW coverage		0.065	0.092
Unique coverage		0.065	0.092
Consistency		0.820	0.750
Over all solution coverage		0.157	
Over all solution consistency	0.781		

Source: fsQCA tool output. fsQCA: Fuzzy set qualitative comparative analysis

Table 3: Configurations for higher disease severity

DV: Disability weight	Assumptions	Configuration	
		1	2
Distance	Present/absent	No	Yes
education of HOF	Present/absent	No	No
Family size	Present/absent	Yes	No
Gender	Present/absent	Yes	No
Occupation	Present/absent	No	Yes
RAW coverage		0.052	0.089
Unique coverage		0.052	0.089
Consistency		0.758	0.764
Overall solution coverage		0.140	
Overall solution consistency	0.762		

Source: fsQCA tool output. fsQCA: Fuzzy set qualitative comparative analysis

For the first part we have made three assumptions (i) Only "presence" of male patient bears an effect on satisfaction level and "absence" has no effect; (ii) and (iii) Nonzero advance money and diagnosis charges, bears an impact on satisfaction level but absence does not matter. For assumption (i), there is indicative literature that suggests a preference of male over female family member in healthcare seeking.[15-17] Assumption (ii) and (iii) are baseline expectations from the scheme; therefore, we assume that deviation from the scheme design bears an impact on satisfaction.

We obtained six possible configurations with solution consistency of 95.9% and coverage of 52.9%. Among six configurations, provision of medicine and patient condition are invariably present indicating a strong linkage to satisfaction. While linkage of patient condition with satisfaction is quite intuitive, "medicine provision" as a factor indicates high expenditure on medicines. As indicated by solution 1, for an educated household, absence of waiting time accompanied by medicine provision is leading to high satisfaction. In contrast, for a household with no occupation and education (solution 6), waiting time has no impact on satisfaction level. This is an important observation in the context of developing countries.

In solution 3, even with a higher distance, there is a positive outcome because of the absence of wait time. Solution 4 presents an inquisitive configuration where even with the higher distance, there is a satisfaction based on "medicine-provision" and individual-centric factors such as education and occupation.

In the second part of the study, we explored the social positioning of beneficiaries who are overclaimed then the prescribed rate. Result suggests only two possible configurations with overall low solution coverage of 15.7% with 78% solution consistency [Table 2]. In both the solutions, the nature of the medical procedure and low disability weight are found to be a necessary condition for overclaiming. Solution 2 suggests that there is no impact of beneficiary's education and occupation on overclaiming. The overall result indicates a lack of awareness about the scheme and package rate among educated and uneducated beneficiaries equally. Furthermore, beneficiaries are overcharged for procedures that are less severe in nature.

The last subset of the study determines characteristics of the beneficiary that bear higher severity of the disease which can be an indicator of delayed care-seeking behavior.[18,19] Only two possible causal paths emerge with the overall consistency of 76% and coverage of 14%. In solution 1, an illiterate and unemployed male beneficiary residing close to a health facility with large family size appears to bear high severity of the disease. While in solution 2, a female beneficiary of an employed but uneducated household residing at a higher distance is found to bear the higher severity. Lack of education emerges as a necessary condition among people bearing high disease severity. To summarize, for beneficiaries residing close to health services, larger family size is a hindrance in seeking care under the scheme, especially for males. For beneficiaries that have to travel substantially, as in the case of rural people, females belonging to the uneducated household are having a higher severity.

DISCUSSION

The results reveal an important combination of barriers that led to dissatisfaction/satisfaction under the scheme. Provision of medicine emerges as a necessary condition for patient satisfaction irrespective of educational background and occupation status. Here, a supply-side intervention (medicine availability) obscured demand-side barriers (education and occupation) to provide patient satisfaction. This finding is in line with the National Health Accounts 2014–2015 which indicates that 43% of OOPE is due to medicines. AB - National Health Protection Mission (AB-NHPM) and earlier RSBY do have provision for medication posthospitalization which should be monitored for (1) quality and (2) over-the-counter sale of drugs in case of stock out in hospital.

Waiting time, a standard measure of hospital service quality in developed countries, did not come out as a necessary parameter of satisfaction and had a varied effect on beneficiaries. The result indicates that uneducated patients under the scheme are customary to long waiting time and do not understand the associated opportunity cost. Since most of the beneficiaries belong to far-flung areas and are often daily wage workers, the wait time should be monitored and optimized out of benevolence.

Further, the misconducts by hospitals of overclaiming the cashless card for minor surgical procedures that call for increased monitoring as education, occupation, and income level of beneficiary make no difference to this practice. Though, this practice does not burden benefi ciary directly but results in a delay in claim settlement hence weaken the trust of hospitals on payment mechanism which can further deny/delay services to benefi ciaries.

Delayed care-seeking behavior is observed among females in far-flung rural areas. This result is disappointing because the scheme was unable to plug in the gaps of the healthcare system. It may not be lucrative for private providers to maintain a facility in the remote area. Therefore, the scheme is bound to lapse for these locations, and public health system strengthening is the only resolution. Here, AB-NHPM has proposed a major improvement over RSBY and shows intent to strengthen the primary health care system.

Similarly, unemployed and illiterate male beneficiaries with large family size who reside close to the health facility have been found to bear high disease severity. Unfortunately, no study could be found with similar result. One possible explanation can be the ceiling of five members per family which may leave a family member uncovered for large families resulting in delayed care. The new scheme has removed any cap on the family size and age which should appease the situation. The results require revalidation by future studies.

As with any other study, there are certain limitations in the present study. Posthospitalization survey is based on self-reported data and in some cases reported by a family member. Unstructured interviews could have been used to revalidate the results. The survey data was matched with actual claim data to ensure reliability. The study can be extended further to develop a health service quality scale for developing countries like India where the standards and service expectations are different from that of the developed countries.

Conclusion

AB-NHPM is an ambitious venture. Fortunately, the scheme is not on the roll-on entirely unknown grounds. Precursor scheme RSBY was launched a decade before whose learning can guide the path of policy design and implementation in a better manner. The study results provide insights into the interaction of different demand and supply-side barriers that lead to patient satisfaction, overclaiming, and disease burden severity.

Results reveal unawareness among beneficiaries (irrespective of education status) about claimed medical service and amount on their cashless card. Therefore, only efficient monitoring and technology intervention can curtail these problems. Provision of medicine at the healthcare facility emerged as an important factor of patient satisfaction where AB-NHPM scheme should focus. Lack of education was found out to be a common trait among beneficiaries with high disease severity. The previous scheme failed to cater to the healthcare needs of women in remote locations due to poor access to empanelled hospitals. Therefore, apart from working in a public–private partnership mode, the new scheme should diligently improve public hospitals quality as well. Although the new scheme has incorporated various corrective measures in the scheme design, it is to observe if it successfully overcomes these issues after implementation.

Conflicts of interest

There are no conflicts of interest.

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