The Insurance Cascade Framework to Diagnose Bottlenecks and Improve the Effectiveness of Health Insurance Programs: An Application to India

Sebastian Bauhoff and Nikkil Sudharsanan

Abstract

Many low- and middle-income countries are looking to achieve universal health coverage by implementing large social health insurance schemes. India has been a frontrunner in this effort, introducing state and national health insurance schemes, especially for tertiary care. Despite these efforts, Indian households remain at risk of high out-of-pocket spending due to inpatient hospitalizations. We examine bottlenecks to the effectiveness of health insurance schemes in India by using the "insurance cascade," a framework that traces the steps from enrolling eligible households to ultimately delivering their benefits at no charge. For each cascade step, we characterize potential constraints, discuss findings from existing literature, and describe what data could inform interventions to alleviate the bottlenecks. The existing evidence suggests substantial bottlenecks across all cascade steps, with especially large gaps in beneficiaries' awareness of how to enroll in schemes, what the schemes cover, and how to access scheme benefits. However, there is limited evidence for other cascade steps and existing data sources lack information to determine where exactly on the cascade individuals are lost and what steps contribute most to the poor functioning of these schemes. More systematic and comprehensive data are required to fully characterize the cascade and to identify potential solutions.

Keywords: health insurance; universal health coverage; out-of-pocket spending; use of benefits

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Contents

Introduction

Catastrophic health spending in India has remained high over the past 15 years despite the introduction of large and comprehensive social health insurance schemes.[1,2] Understanding why these schemes have not improved financial risk protection is a pressing concern as India advances towards universal health coverage. India recently introduced the *PM-JAY*, a large national social health insurance scheme that supersedes earlier state and national schemes, and aims to insure nearly 40% of the Indian population with an annual coverage of 500,000 INR (around 6,700 USD).[3] However, the *PM-JAY*'s predecessors appear to have had mixed impacts on average and catastrophic health expenditures, despite substantial investments of state and national resources.[4–7] Understanding why these insurance schemes fall short of their goals - and what remedies could be deployed - is especially urgent given the rapid scale-up of *PM-JAY*.

In this paper, we introduce the "insurance cascade", a framework to systematically evaluate why social health insurance schemes fail to protect beneficiary households against high out-of-pocket spending on covered services. The framework casts the process from enrolling eligible populations to receiving high-quality care at the hospital as a sequence of analytically distinct steps. In this way, the framework provides a tractable way for governments, donor agencies, and health policy researchers to identify bottlenecks in the insurance process and target efforts where they will be most effective. After introducing the cascade, we describe the data and outcome measures that would be required apply the cascade to each step from enrollment to the delivery of services. We then bring together and synthesize existing analyses on health insurance in India, describing potential reasons and evidence for bottlenecks at each step. We conclude with a discussion of current knowledge gaps and potential approaches to collecting the data needed to better map the insurance cascade and design interventions to improve financial risk protection of insurance schemes in India and elsewhere.

The insurance cascade

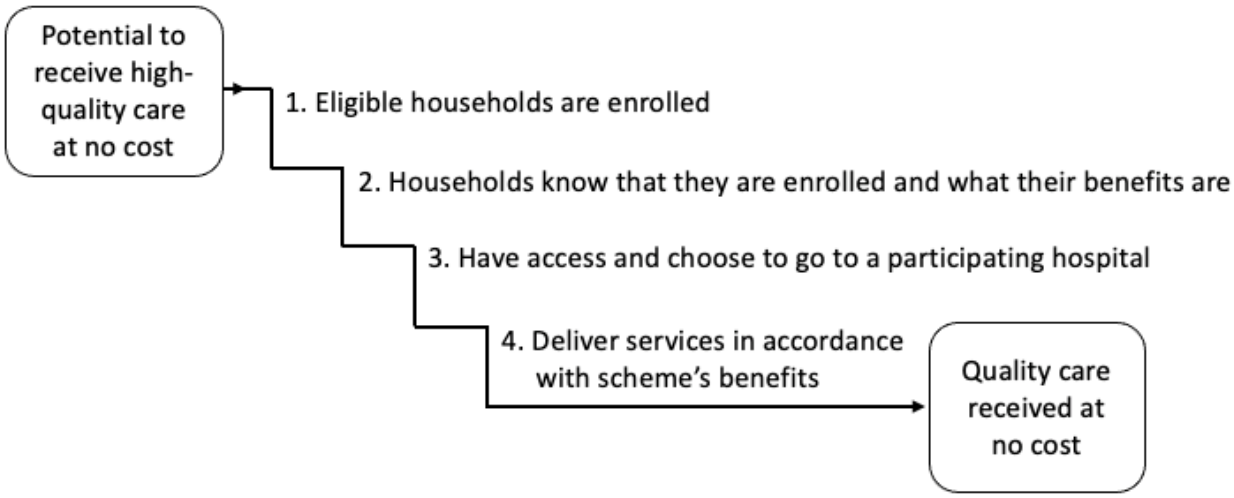
Getting from being eligible for high-quality care to actually receiving it is neither automatic nor assured. Instead, it involves a sequence of steps that begins with the identification and enrollment of eligible populations and ends with the delivery of appropriate care at the hospital. In this "insurance cascade," each step is conditional on successfully meeting the previous step, and even small failures accumulate and contribute to a lack of overall effectiveness.

The idea of diagnosing gaps in health and health care delivery by breaking them into a set of sequential steps has been widely used in the form of "care cascades" for HIV,[8] tuberculosis,[9] and hypertension.[10] The approach has also been previously applied in different forms to study the US healthcare system and the Indian RSBY insurance scheme in Maharashtra.[11,12] Breaking down the larger process into distinct steps makes it easier to characterize the specific causes of failures at each step, clarify what evidence is needed to study the specific failure, and design targeted interventions.

Applying the cascade framework to social health insurance schemes first requires defining the beginning and end-points: who is eligible and for what services (and at what facilities). The middle steps of the cascade are enrollment, awareness and understanding, access and

deciding to seek care, and the correct administration of benefits by the health care provider. Figure 1 shows the insurance cascade applied to the specific context of India's health insurance schemes (adapted from Eisenberg and Power[12]).

Figure 1. Steps of the insurance cascade for India's health insurance schemes



Background on social health insurance in India

India has had several state and national health insurance schemes over the past 15 years, such as the *Aarogyasri* in Andhra Pradesh and Telangana, the Chief Minister's Comprehensive Health Protection Scheme (CHCMIS) in Tamil Nadu, and the national *Rashtriya Swasthya Bima Yojana* (RSBY).[13] These schemes all share several common features, including poverty- or income-based eligibility, participation from both public and private facilities (where over 65% of hospitalizations occur),[14] and cashless coverage of a large number of inpatient hospital procedures. Covered benefits are generally for treatment "packages" with a focus on surgical procedures but some schemes also cover transportation, diagnostics, and follow-up costs associated with the package.[13] The schemes tend to have annual spending caps for enrolled families; for RSBY this cap was INR 30,000 in 2016 (about 405 USD in 2020 dollars). The new *PM-JAY* program substantially expands this amount to cover INR 500,000 or approximately 6,750 in 2020 USD.[3] Like RSBY, the PM-JAY scheme focuses on hospital care.

Eligibility and coverage is at the household level, and households can enroll during regular drives; in some states, eligible individuals can also enroll at participating hospitals. Some schemes are operated by private insurance companies that receive a fixed premium from the government, while others collect premium payments in government-held trusts that directly reimburse hospitals for covered procedures.

Applying the insurance cascade to India

In the following sections we apply the insurance cascade to India's social health insurance schemes to better understand why they have not been fully successful at protecting households against high inpatient health expenditures. Because there is incomplete evidence for specific schemes and each step in the cascade, we summarize broad insights across schemes and suggest ways to specifically quantify each step.

Step 1: Enrollment

There are many possible barriers that prevent individuals who are eligible for the scheme from enrolling. Eligible individuals may not be enrolled if they are not aware that they are eligible or do not know where to enroll. Enrollment drives may miss certain geographic areas or occur during times when some eligible individuals cannot attend them.[15] Insurers obligated to enroll beneficiaries have incentives to avoid high-cost patients and may avoid subpopulations with high expected utilization. Hospitals may also avoid enrolling individuals at the time of the hospitalization to avoid administrative burden and risk associated with the claims process.

The primary metric for evaluating bottlenecks at this step is the share of eligible households that are enrolled. This ratio can be estimated with administrative data (registries of eligible and enrolled households) or surveys that identify eligible households and link these households to administrative enrollment information. Survey data may be more reliable, as administrative eligibility records may include households who are not eligible but nonetheless enrolled -- a common issue in these schemes.[16] Importantly, simply asking eligible households if they are enrolled may not provide accurate estimates since many households may be enrolled but unaware of their enrollment. This is an issue for schemes in India that often automatically enroll individuals without informing them and where the large number of government programs makes it challenging for individuals to keep track of all the schemes they are enrolled in.[17]

Evidence from RSBY indicates that enrollment is an important bottleneck in the overall cascade. Only between 28% and 46% of all eligible households across India were enrolled in the scheme's early years and this ratio did not improve much over time.[18–20] In addition, there was substantial variation in enrollment at the state, district, and even village levels.[15,18,19,21,22] For example, Delhi only enrolled 14% of all eligible households in the first two years[22] while Karnataka had an enrollment ratio of 68%.[15] Within the Amaravati district of Maharashtra, enrollment ratios ranged from 55% in some blocks to just 11% in others.[23] A recent evaluation of the *PM-JAY* in three states found tremendous variation in enrollment ratios, ranging from 84% in Tamil Nadu to 8% in Haryana, and under 2% in Bihar.[17]

Existing evidence points toward a range of underlying issues. For RSBY, the eligibility determination through below-poverty-line (BPL) listings did not locate all eligible households and misclassified many as ineligible.[15,19,22,24] There was also insufficient staff and services to identify and enroll the large amount of households on the BPL list.[22] Meanwhile, eligible individuals reported not attending enrollment drives because they were not provided prior information about the location of the registration, or would have had to travel long distances or during work hours to attend the registration.[15] For *PM-JAY*, only 10% and 12% of eligible individuals in Bihar and Haryana were even aware of the scheme, and many of

them were not aware that they needed to verify their entitlement and that they had to apply for an e-card following verification.[17]

Step 2: Awareness and understanding

Conditional on being enrolled, individuals need to know that they are enrolled in the scheme, have the credentials needed to access benefits (such as a beneficiary card), understand the benefits, and know which health facilities participate in the scheme. Alternatively, households need to know how to retrieve this information before seeking care, e.g., by asking neighbors or health workers, or calling a helpline. There are several potential reasons why some individuals may not know that they are enrolled. Individuals may have been enrolled but never received their beneficiary cards or were not told what exactly they were being enrolled for. Individuals may also have been automatically enrolled without their knowledge based on their enrollment in other government schemes, as in Tamil Nadu.[17] Those who know that they are enrolled may not adequately understand their benefits, which may be exacerbated by the low literacy of the schemes' target populations. Covered procedures are often specified in highly clinical language (e.g., "fulminant hepatic failure" or "acute MI with cardiogenic shock", where the acronym MI is not explained) rather than by symptom or in plain language. In addition, households may be deterred by the uncertainty of whether specific symptoms map to a covered service: is their stomach pain due to a condition that is covered by the scheme or would the household be legitimately responsible for the diagnostic and treatment costs? Lastly, beneficiaries may not know where to seek care as, e.g., only about one-third of hospitals are empanelled in the *PM-JAY* and not all departments of empanelled hospitals may be participating in the scheme. A schemes' network may also change over time.

Evaluating this stage of the cascade requires measuring awareness and understanding of the scheme's benefits and network among enrollees, or whether enrollees can easily retrieve this information from other sources. This could be done with surveys of households sampled from the enrollment files. Importantly, this step should be measured among enrolled, and not just eligible, individuals. This is because low awareness among eligible individuals could either be because they were not enrolled or because they were enrolled but still do not understand their benefits. A lack of awareness due to non-enrollment is captured in the previous step of the cascade and has a different set of policy implications.

Existing research indicates that a large share of individuals in the official enrollment files were unaware of their enrollment and had limited understanding of the covered benefits and the scheme's network. For the PM-JAY in Bihar and Haryana, even among those who received their beneficiary cards, less than 40% received any information on what the scheme covers and where benefits can be accessed, and more than half were not aware that the scheme is cashless.[17] A 2018 survey in Rajasthan found that only about half of patients who received dialysis treatments under the state scheme (BSBY) knew that the scheme covered all costs and knew a nearby empanelled hospital.[25] Similarly, evidence from small-scale studies on RSBY in a number of states reveal consistently low awareness of what is covered and which facilities participate in the schemes:[26–29] for example, one study in Gujarat found that only roughly 25% of households knew which hospitals were empanelled and none were aware that the scheme covered transportation, post-procedure, and food costs.[26] Low awareness and understanding may be a result of limited outreach efforts.[17] Households may

also be overwhelmed by the number of government schemes running at any point in time and confused about specific rules for each scheme.[29]

Step 3: Access to and choice of participating hospitals

After correctly understanding the benefits and processes of the scheme, beneficiaries who have an eligible health event need to be able to access empanelled hospitals and choose to use them. Barriers to access can include physical distance, as well as other constraints such as hospital opening hours, long wait times, or having a family member available to accompany them. Barriers to choice could include preferences, perceptions of poor quality of care or hassle with using the benefits at empanelled hospitals relative to non-empanelled facilities.

Quantifying this step of the cascade requires information on individuals who are in need of care for covered procedures and who also understand how and where to use their benefits. These individuals could be asked in a survey about their access to network facilities and where they chose to seek care. The survey could also help identify underlying reasons, i.e., why they did or did not choose to seek care at an empanelled facility for a specific episode. Importantly, the survey would need to establish that a health need is covered by a scheme which requires a clinical diagnosis. The utilization rate among eligible or enrolled individuals is not a good measure, as it represents a combination of underlying morbidity and access/choice of seeking care. Only the latter factor is informative for this step in the cascade. Using administrative claims data to measure this step is also challenging, as these data may miss out on individuals who had an eligible health event but did not seek care (or use their benefits) at an empanelled facility.

The very scant evidence on this step suggests a substantial dropoff. A study on PM-JAY found that households that are enrolled and aware of the scheme used it for only only about one-third of hospitalizations.[17] Similarly, a study on Maharashtra's RSBY scheme found that 7.6% of enrolled households who received their access card and reported at least one hospitalization in the prior year used RSBY services.[11] However, for both these studies it is unclear how many hospitalizations could have been covered by the scheme. Indeed, evidence from general surveys suggests that the bulk of hospitalizations are for infections and other conditions that would not fall under RSBY coverage.[14] Overall, individuals appear to primarily choose facilities based on their proximity, convenience (to them or their family members), and whether they have good perceptions of quality or positive previous experiences at that facility, even if these facilities were expensive.[29,30]

Step 4: Correct administration of the scheme

Conditional on all the prior steps, the final step of the cascade (from the perspective of the individual beneficiaries) is whether the empanelled facility correctly administered the schemes' benefits and did so free of charge to the patient. This includes, for example, providing appropriate services and also covering other costs associated with the hospitalization such as room rates, food, medicines, and transportation. Hospitals may attempt to save money by providing fewer than the services that are required by the scheme. Similarly, empanelled hospitals may still charge individuals for a covered benefit to extract higher total payments, offset any gap between the reimbursement and the actual cost of the procedure, compensate for the administrative effort to process a claim, or guard against the risk that a claim may be rejected.

Assessing the magnitude of losses at this step of the cascade requires at a minimum data on services that enrolled individuals received and expenditures they incurred during the care event, at which hospital they sought care, and for what procedure. One additional challenge is that many of the schemes contain ambiguity in what specific services should be covered, as packages are not defined in great detail.[13] Even with data on hospitalizations for enrolled individuals, identifying which parts of the hospitalization should have been covered may not be possible. For this reason, commonly available claims or hospital administrative data are likely insufficient for evaluating this step because claims may record procedures that the patient did not need or even procedures different from the one the patient actually received but that allow for billing outside of the scheme. These issues may be less severe for specific procedures that are easy for patients to identify and are known to be covered in all forms, such as childbirth or dialysis.

Available evidence suggests that over-charging and under-provision for covered services by empanelled facilities is quantitatively important. For instance, recent evidence on Rajasthan's scheme indicates that, across a range of procedures, more than one-third of patients have out-of-pocket expenditures for hospitalizations, including for services that are covered; and that wealthier, more educated and better informed patients tend to pay less.[31] Similarly, more than 40% of dialysis patients reported paying for medicines and diagnostics that should have been provided by the hospital.

Current data gaps and potential approaches to informing the cascade

While the cascade provides an empirically tractable framework to understanding the mixed effectiveness of social health insurance schemes, there is currently only limited evidence on the various steps.

An important practical question is whether existing data sources can be used to fill in these gaps and estimate the different steps of the insurance cascade. In India, the two primary national data sources with information on health insurance and expenditures are the National Sample Survey and program-specific claims data.[14] While these data sources can provide some insights into the insurance cascade, they have important limitations. Claims data contain details on what the hospital billed to the insurer, and hence information on the broad services (packages) provided. However, claims data miss the first several steps of the cascade and, even for the final step, do not reveal whether a patient should have paid for a procedure or whether they actually received the procedure in the claim. Meanwhile, data from general household surveys, such as the Indian Sample Survey (NSSO) do not contain information on eligibility for health insurance schemes and generally cannot be linked to administrative data to confirm enrollment. They also do not contain questions on knowledge of network hospitals and scheme benefits nor on potential causes of health care choices. Lastly, while the NSSO contains information on hospitalizations, the reason for each hospitalization is grouped into broad categories without information on specific procedures, which makes it difficult to determine which hospitalizations should have been covered under the different health insurance schemes.

As a consequence, informing the insurance cascade will require dedicated data collection - via a specialized household survey - possibly in combination with administrative data on eligibility, enrollment and claims. In Table 1, we summarize each of the cascade steps, what

their target populations are, and also the potential ways to measure shortfalls and losses at each step.

Table 1. Cascade steps, target populations, and measurements

Cascade step	Target population	How could this be measured?
Enrollment: Are eligible individuals enrolled?	Eligible individuals or households	Using administrative data Match administrative listing of eligible households with administrative records on enrollment Using survey data Conduct a population-based survey to identify eligible households by measuring eligibility criteria in the same way as the scheme. Next, link identified eligible households with scheme enrollment records.
Awareness and understanding: Are individuals aware that they are enrolled in the scheme, do they understand their benefits, and do they know where they need to go to access the scheme benefits?	Enrolled individuals or households	Using survey data Conduct a survey of households sampled from enrollment files with questions on whether they know they are enrolled in the scheme, their understanding of scheme benefits, and their knowledge of where to access care or get more information on care
Access and choice: Do individuals have access to empanelled facilities and do they choose to seek care there?	Enrolled individuals or households who know they are enrolled,are knowledgeable about scheme benefits and where to access them, and are in need of or received care for procedures that are covered by the insurance scheme	Using survey data First, identify the sub-sample of prior cascade step respondents that had or need care for a covered procedure through additional questions on past health care needs and if possible specific procedures that the individual previously sought care for. Next, conduct a survey among these individuals to measure access to facilities and drivers of health facility choice.
Correct administration of the scheme	Enrolled individuals, or those who are eligible and enrolled on site, who sought care at a scheme empanelled-facility for a procedure covered under the scheme	Using household survey data Conduct a household survey among scheme-enrolled individuals who sought care for a procedure(s) covered the scheme and collect information on costs and services provided. Using hospital survey data Conduct a survey at or outside empanelled facilities among scheme-enrolled individuals who sought care for a procedure(s) covered the scheme and collect information on costs and services provided. Using claims data Use claims or other hospital billing data to identify patients who received care that should be covered and conduct surveys to assess correct administration of the scheme benefits.

Looking to the future: Estimating, monitoring, and improving the insurance cascade

As India and other low and middle-income countries push further towards universal health coverage, improving the effectiveness of social health insurance schemes is important for providing eligible households with appropriate, high-quality care without excessive financial risk due to out-of-pocket medical spending. Rigorously applying the cascade framework requires thoughtful measurement and dedicated data collection through surveys that can be linked to existing administrative records.

In the case of India, the broad evidence discussed above points to several specific issues with existing health insurance schemes, as well as to several promising interventions to improve bottlenecks at each step of the cascade. For example, enrollment rates could be improved by automatically enrolling households that are known to be eligible, clarifying and simplifying eligibility conditions, improving the timing and penetration of enrollment drives, and by checking eligibility and enrolling individuals at the time of the hospitalization.[32] Awareness and understanding could be improved by ensuring that individuals are provided information at the time of enrollment and at regular intervals,[25] that information on the scheme is publicly posted at participating hospitals, and also through the creation of telephone helplines. Random audits could help ensure that hospitals correctly administer the scheme's benefits free of charge to enrolled individuals seeking care for a covered procedure. Schemes could also establish or expand compliance mechanisms and encourage beneficiaries to report encounters and issues with care and treatment. Random audits, for example, are commonly used in many health systems, such as the United Kingdom's National Health Service and the U.S. Medicare program. Given the very limited evidence on the determinants of hospital choice among enrolled individuals who are aware of their benefits and where to access them, more information is needed to identify promising interventions to improve individuals' choice of empanelled hospitals.

In addition to the distinct challenges at each step of the cascade, the general design of insurance schemes can also influence how effective they are. For instance, insurance schemes that do not cover those at highest risk of catastrophic expenditures and do not cover the most important sources of health spending may not be effective even if every step of the cascade is functioning correctly. Moreover, deficient overall design and coverage could influence the various steps of the cascade if, e.g., beneficiaries do not find it worthwhile to learn about a scheme that is not relevant to their needs. Identifying the most effective designs and their influence on individuals' decisions is important to consider in conjunction with the steps of the cascade.

The recent proliferation of social health insurance schemes in low and middle-income countries holds the important promise to provide vulnerable households with improved access to affordable health care. As a leader in this space, India has an opportunity to develop and test cost-effective ways to improve the insurance cascade, and to share its insights with other countries. The health insurance cascade we described here can help understand why insurance schemes have not been fully effective and what could be done to better meet their goal of protecting households against high health spending.

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