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Social health insurance for the poor: lessons from a health insurance programme in Karnataka, India

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ABSTRACT

Life-saving technology used to treat catastrophic illnesses such as heart disease and cancer is often out of reach for the poor. As life expectancy increases in poor countries and the burden from chronic illnesses continues to rise, so will the unmet need for expensive tertiary care. Understanding how best to increase access to and reduce the financial burden of expensive tertiary care is a crucial task for the global health community in the coming decades. In 2010, Karnataka, a state in India, rolled out the Vajpayee Arogyashree scheme (VAS), a social health insurance scheme focused on increasing access to tertiary care for households below the poverty line. VAS was rolled out in a way that allowed for robust evaluation of its causal effects and several studies have examined various impacts of the scheme on poor households. In this analysis article, we summarise the key findings and assess how these findings can be used to inform other social health insurance schemes. First, the evidence suggests that VAS led to a substantial reduction in mortality driven by increased tertiary care utilisation as well as use of better quality facilities and earlier diagnosis. Second, VAS significantly reduced the financial burden of receiving tertiary care. Third, these benefits of social health insurance were achieved at a reasonable cost to society and taxpayers. Several unique features of VAS led to its success at improving health and financial well-being including effective outreach via health camps, targeting expensive conditions with high disease burden, easy enrolment process, cashless treatment, bundled payment for hospital services, participation of both public and private hospitals and prior authorisation to improve appropriateness of care.

Key questions

What is already known about this topic?

- It is important to understand how best to increase access to tertiary care among the poor to reduce the disease and financial burden of chronic illness.
- Several studies highlight the success of the Vajpayee Arogyashree scheme (VAS) in Karnataka, India, in delivering tertiary care insurance for the poor; however, it is unclear how each of these studies relates to one another, and how such studies can be used to craft social health insurance schemes in other settings.

What are the new findings?

- The VAS in Karnataka, India, was successful at improving health and reducing the financial burden from covered conditions.
- Pathways to these improvements included increased utilisation, and also use of higher quality facilities and earlier diagnosis.
- Key features of VAS that led to these improvements include ease of use, community outreach, targeting conditions with a high disease burden, contracting with both public and private providers, prior authorisation and bundled payments.

Recommendations for policy

- Social insurance should be designed in a way that increases access to and use of high-quality health facilities, while incorporating mechanisms to keep costs in check.
- Features like patient outreach in rural areas and effortless enrolment can help increase use of covered services.
- Costs can be controlled through both bundled payments and prior authorisation as well through targeting only a select set of high-burden conditions.

INTRODUCTION

The last three decades have brought about substantial improvements in life expectancy in low/middle-income countries (LMIC) as a result of medical innovation, improved health behaviours and better access to care.[1] Although these achievements should be celebrated, they have also led to an increase in the burden of chronic illness.[2 3] Illnesses such as heart disease and cancers, which were thought of as predominantly developed country illnesses, are on the rise throughout the developing world. For example, over two-thirds of deaths from cardiovascular disease now occur in LMICs.[4] Efforts by LMICs and global health practitioners have largely focused on *preventing* chronic illness. Primary care and prevention are certainly important for controlling the spread of chronic illness, but not all illnesses can be prevented.

The good news is that we have very effective interventions for treating the most prevalent and lethal chronic conditions (eg, coronary artery bypass graft (CABG) for heart disease). The bad news is that many of these interventions are very costly and out of reach for the poor. As the burden of chronic illness continues to increase in poor countries, so will the unmet need for expensive tertiary care. Moreover, those that are able to access needed tertiary care are left with devastating hospital bills. Understanding how best to reduce the unmet need and the financial burden of expensive tertiary care is a crucial task for the global health community in the coming decades.

One way of increasing access to and reducing the financial burden of tertiary care is for the government to provide such care free of cost at public tertiary care hospitals. Another relatively new approach is to provide social health insurance that covers tertiary care. Several LMIC governments have experimented with such social health insurance schemes, some of which include tertiary care coverage.[5 6] However, although several countries now provide social health insurance, evidence on the impact of social health insurance for tertiary care is scarce.[7]

In 2010, the state of Karnataka in India rolled out the Vajpayee Arogyashree scheme (VAS), a social health insurance scheme focused on increasing access to tertiary care for households below the poverty line (BPL). However, VAS was rolled out to only half of the state using an arbitrary cut-off boundary (ie, a staggered roll-out), which allowed for robust evaluation of the causal effect of the scheme on an array of outcomes. (See table 1 for a list of all published studies and key findings.) In this paper, we first summarise the key findings on VAS's impact on health and financial well-being. Next, we review the evidence on the potential pathways through which improvements were achieved and whether investment in tertiary care insurance appears to be good value for money. Finally, we discuss the lessons learnt from VAS and how these can be used to craft social health insurance schemes in other settings.

BACKGROUND

The VAS programme

India is the world's third largest country with over 1.2 billion people. Karnataka, where VAS was rolled out,

Table 1 Summary of studies on VAS

	Outcome	Findings
Sood *et al*[8]	Mortality	Among households below the poverty line, the mortality rate from conditions potentially responsive to services covered by the scheme (mostly cardiac conditions and cancer) was 0.32% in households eligible for the scheme compared with 0.90% among ineligible households just south of the eligibility border (difference of 0.58 percentage points, 95% CI 0.40 to 0.75; P<0.001).
Sood *et al*[8]	Financial well-being	60% fewer OOP expenditures for hospitalisations covered by VAS.
Barnes *et al*[13]	Financial well-being	VAS reduced catastrophic expenditures. At the median, the reduction in OOP was 2879 rupees (US$43) whereas the reduction at the 75th and 95th percentiles was 4484 rupees (US$67) and 23 548 rupees (US$353), respectively.
Sood *et al*[8]	Utilisation	VAS eligible households were over 40% more likely to report a hospitalisation for a condition covered by VAS at a tertiary care facility. Moreover, eligible households were 35% less likely to report unmet need for medical care for a serious illness.
Sood and Wagner[10]	Quality of care	VAS eligible respondents reported greater improvements in well-being after hospitalisation. VAS respondents who were hospitalised reported 88% fewer posthospitalisation infections were 48% less likely to report needing to be rehospitalised after the initial hospitalisation than VAS ineligible respondents who were hospitalised.
Sood *et al*[13]	Appropriateness of care	86.7% of cases were deemed appropriate and only 3.7% of cases were deemed inappropriate.
Sood and Wagner[10]	Seeking care for symptoms	VAS eligible respondents were 7% more likely to seek care for symptoms than non-eligible respondents, particularly for cardiac and cancer symptoms.
Basu *et al*[9]	Cost-effectiveness	Adding tertiary treatment to primary prevention prevented 6.6 million DALYs at an incremental cost-effectiveness ratio of $2241 per DALY averted, when compared with that of primary prevention alone.

DALY, disability-adjusted life-year; OOP, out of pocket; VAS, Vajpayee Arogyashree scheme.

has a population of over 61 million people and is known for having state-of-the-art private tertiary care facilities. VAS is a unique social health insurance scheme, in that it covers only tertiary care. Most VAS beneficiaries were poor and lived in rural areas with little or no access to tertiary care. Residents in eligible areas who possessed a BPL card issued by the state government were automatically enrolled (about one-third of all residents). This enabled beneficiaries to receive free care at both private and public hospitals empaneled by VAS. Beneficiaries paid no premiums or copayments at the point of service. The scheme empaneled several hospitals capable of providing tertiary care, including all major medical centres in the state. Hospitals received a fixed bundled payment based on a reimbursement schedule for more than 400 tertiary care service packages in cardiology, oncology, neurology, nephrology, neonatology, burn care and trauma care. As most hospitals are in urban centres in southern Karnataka, while beneficiaries are located in villages, empaneled hospitals were required to organise health camps in rural areas to screen patients for tertiary care and transport eligible patients to hospitals. Hospitals signed an agreement with VAS to conduct these health camps during the empanelment process and received a fixed payment from VAS per health camp conducted.

VAS roll-out and experimental design

In February 2010, the state government offered the VAS insurance to BPL residents in the northern part of the state of Karnataka; in August 2012, insurance coverage was extended to the entire state. During this staggered implementation, researchers evaluated the programme's outcomes using a quasiexperimental design that took advantage of the arbitrary boundary in coverage. In particular, they conducted surveys in September 2012 and compared outcomes in neighbouring villages on either side of the boundary drawn between the communities chosen for early versus late implementation. Since the eligibility boundary is arbitrary, early and late implementation villages located just above or below the eligibility threshold are likely to be similar. Moreover, they used propensity score matching techniques to ensure similarity on geographic proximity, demographics and socioeconomic characteristics between early and late implementation villages enrolled in the study. This allowed them to assess the causal impact of VAS without introducing the selection bias that plagues most insurance impact studies.

EFFECT OF VAS ON HEALTH AND FINANCIAL WELL-BEING

Impact on health

Mortality is arguably the most important health outcome that could potentially be affected by VAS. However, it is also a rare outcome, which makes it difficult to measure with precision and requires an extremely large sample. In order to precisely estimate the mortality impact of VAS, Sood *et al* used surveys from over 80 000 households located in matched villages just above or just below the VAS eligibility border.[8] The surveys used verbal autopsy techniques to capture whether a death occurred in a household as well as the probable cause of death during the time between VAS implementation and the day of the survey. The authors then compared the probability of mortality among BPL households in VAS eligible villages with that of BPL households in ineligible villages and found that eligible households were 64% less likely to report a death from a condition covered by VAS. Most of this reduction was due to fewer deaths from cancer and cardiac conditions, which account for the bulk of VAS claims. Moreover, the authors found no effect on deaths from conditions not covered by VAS and no effect on VAS covered conditions among non-BPL households, which were not eligible for coverage. This supports the notion that VAS eligibility and not some other confounding factor caused the observed mortality reduction.

Impact on financial well-being

In addition to reduced mortality, VAS also provided financial protection. Sood *et al*[8] used detailed survey data to demonstrate that VAS eligible households reported about 60% fewer out-of-pocket (OOP) expenditures for hospitalisations covered by VAS. Barnes *et al*[13] analysed changes in the distribution of OOP and found that most of the reduction in OOP came from the right tail of the distribution (very high costs), suggesting a reduction in catastrophic expenditures. At the median, the reduction in OOP was 2879 rupees (US$43) whereas the reduction at the 75th and 95th percentiles was 4484 rupees (US$67) and 23 548 rupees (US$353), respectively. This is what would be expected from insurance, such as VAS, that mainly covers very costly interventions. Moreover, the authors found reductions in the frequency and quantity of health-related debt.

IS PAYING FOR TERTIARY CARE GOOD VALUE FOR MONEY?

The evidence from Sood *et al*[8] and Barnes *et al* (2017) suggests that the main objectives of VAS were met. However, one reason for excluding tertiary care from national health coverage is that it is unclear if it is cost-effective to cover tertiary care services.

Basu *et al*[9] used a microsimulation model and cost-effectiveness analysis to answer this question.[9] Specifically, the authors used the data described above combined with the best available clinical and epidemiological data as inputs to a validated microsimulation model of cardiovascular disease in India to evaluate the cost-effectiveness of alternate national health insurance coverage strategies. The authors found that primary prevention was by far the most cost-effective type of coverage and that such coverage should be included in any type of national health insurance package. However, not all illnesses can be prevented and the additional benefit from covering tertiary care along with primary prevention was also

well below standard cost-effectiveness thresholds. This suggests that VAS was indeed good value for money.

CONCEPTUAL FRAMEWORK: PATHWAYS TO IMPROVED OUTCOMES

There are four main ways through which VAS is likely to have reduced mortality from covered conditions: (1) increased utilisation of life-saving services by making them free; (2) improved quality of care by empaneling state-of-the-art hospitals to participate; (3) improving appropriateness of care so people do not receive care that could be detrimental to health; and (4) earlier diagnosis and treatment by increasing treatment-seeking behaviour.

Utilisation

The main channel through which insurance is generally thought to improve health is by increasing use of covered services. Sood *et al*[8] assessed whether VAS increased utilisation of covered tertiary care using the household surveys described above combined with VAS administrative data to identify hospitalisations that were most likely to have been eligible for VAS coverage (whether or not the household was eligible). The authors found that VAS eligible households were over 40% more likely to report such a hospitalisation. Moreover, eligible households were 35% less likely to report unmet need for medical care for a serious illness. This suggests that VAS did indeed lead to increased utilisation of covered services, which fulfilled a previously unmet need.

Quality of care

A key feature of VAS was that it empaneled both private and public hospitals capable of providing complex tertiary care (eg, heart surgery). These are generally expensive specialty facilities, which are thought to be high quality (some of these facilities are used by medical tourists to India). If quality is indeed better at participating VAS facilities than other facilities where tertiary care is accessed, the insurance could have improved quality of care. To assess how quality of care was affected by VAS, Sood and Wagner[10] examined how patient outcomes differed for VAS eligible hospitalisation compared with ineligible hospitalisations (for covered conditions).[10] First, the authors assessed posthospitalisation well-being using survey questions that asked patients to rate several aspects of well-being 'a few days' prior to the hospitalisation and to rate the same aspects on the day of the survey. VAS eligible respondents reported greater improvements in well-being across all categories.

Next, the authors compared the rate of posthospitalisation infection and readmissions for eligible versus ineligible hospitalisations. Among VAS ineligible patients, 7.7% reported a posthospitalisation infection and 32.6% reported needing to be rehospitalised after the initial hospitalisation. However, among VAS eligible patients only 0.9% reported infection and 16.8% reported rehospitalisation, 88% and 48% reductions, respectively. Overall, these findings suggest that VAS covered patients received better care than ineligible patients.

Appropriateness of care

Unnecessary tertiary care can lead to poor health outcomes and should only be employed when the benefits outweigh the risks. However, most tertiary care in India is provided on a fee-for-service basis, which creates the incentive for providers to do more procedures and use more resources, regardless of appropriateness. There have been several media reports in recent years describing the anecdotes of overuse of stenting for cardiac conditions.[11 12] Moreover, unnecessary care could be exacerbated by the moral hazard associated with health insurance, which could lead beneficiaries to overuse tertiary procedures since they are shielded from the price of care.

Policymakers and VAS administrators were concerned about this type of unnecessary and potentially harmful use of care. To address this, all procedures covered by VAS require prior authorisation from VAS administrators before they could be initiated. Such a policy could have helped reduce inappropriate care and the negative health consequences that go along with it.

Sood *et al*[13] assess the appropriateness of cardiac care (the most commonly covered service) among a subset of VAS empaneled hospitals.[13] The authors applied appropriate use criteria for coronary revascularisation, a validated method primarily used to assess appropriateness of CABG and cardiac stenting in the USA. Care deemed inappropriate implies that the potential health risks of the procedure outweigh the potential benefits.[14] Using medical records from a random sample of 600 VAS covered patients from 28 empaneled hospitals, the authors demonstrated that 86.7% of cases were deemed appropriate and only 3.7% of cases were deemed inappropriate (the rest were deemed uncertain). This level of appropriateness for cardiac procedures meets or exceeds that of the USA. However, the authors did not have access to administrative records for non-VAS empaneled hospitals, and therefore they were unable to assess how VAS might have impacted appropriateness of care. Moreover, data used to determine appropriateness were provided by hospitals, and the veracity of the data could not be tested. For example, angina symptoms were self-reported by the physician in the treating hospital and it was not possible to independently verify the data based on patient interviews.

Earlier detection and treatment

In addition to increasing use of services and improving quality of care received, VAS also could have improved health by causing patients to seek treatment for symptoms earlier, creating the opportunity for earlier diagnosis. VAS could have led to earlier diagnosis for two reasons. First, VAS could increase treatment seeking since increased access to otherwise costly tertiary care might increase the perceived value of seeking treatment for symptoms potentially requiring tertiary care.[15] For

example, poor patients with chest pain might be more motivated to visit a doctor if they know that they do not have to pay OOP for any follow-up surgeries. Second, a key feature of VAS was that they set up health camps specifically designed to identify illness covered by VAS.

Sood and Wagner[10] examined the impact of VAS on treatment-seeking behaviour. Surveys asked household heads whether they suffered from 16 different symptoms in the last year. If the respondents suffered from the referenced symptom, they were then asked if they sought care for that symptom. Sood and Wagner found that symptoms were reported at a similar rate among VAS eligible and ineligible respondents, but VAS eligible respondents were about 7% more likely to seek care for these symptoms. Moreover, this difference was more pronounced for cardiac symptoms, the condition most frequently covered by VAS. These results suggest that VAS led to more treatment seeking, which is likely to have led to earlier diagnosis.

LESSONS FOR DESIGNING EFFECTIVE PROGRAMMES

The body of work described above highlights that VAS was successful at effectively and efficiently improving health and that it likely achieved this objective by increasing utilisation of needed care, improving quality of care and increasing treatment seeking among beneficiaries. However, not all insurance programmes have led to the same positive effects as VAS. For example, Mexico's national health insurance scheme, Seguro Popular, did not increase utilisation or health (although it did provide financial protection).[16] National insurance schemes in Ghana, Costa Rica and China increased utilisation but did not exhibit any improvements in health outcomes.[17–19] This underlines the fact that there is substantial variation in insurance programme design and raises the question: what aspects of the design of VAS could have led to the observed success? Below we discuss specific aspects of the design of VAS that may have helped make the programme successful.

Ease of use

First, VAS was made very simple to use for beneficiaries. VAS autoenrolled all households with a BPL card so no effort was required on the part of beneficiaries. VAS also required no cash payments from enrollees for premiums or treatment. In contrast, several other social health insurance programmes have an explicit enrolment process and often require OOP payment.[6] These features could have led to more use of the insurance benefits relative to other social insurance programmes. This could be more difficult to implement in countries that do not have identification cards to identify poor households.

Health camps

Second, a key feature of VAS was that it set up health camps in eligible villages, which were designed to help identify people with covered conditions. Health camps could have increased utilisation of needed care and thus improved health. In the absence of health camps, rural beneficiaries might have found it difficult to navigate the healthcare system.

Targeting conditions with a high disease burden

Although VAS covered over 400 health services and procedures, these services only applied to a small number conditions: mostly cancers, cardiac conditions, burns, trauma and neurologic conditions. VAS administrators deliberately chose to focus on conditions that (1) had a very high disease burden and (2) had interventions that were available but were underused. Focusing on this 'low hanging fruit' may have contributed the success of VAS. Identifying this 'low hanging fruit' is feasible in other settings, and covered conditions should be assessed carefully to maximise efficiency.

Contracting with private hospitals

Another feature of VAS that may have helped lead to the observed success is contracting with private hospitals. Private specialty hospitals in India are thought to provide good quality of care and have unused capacity. In contrast, public hospitals are often overcrowded and as a result quality of care can be poor. However, due to their high costs, the poor would not have had access to private hospitals without insurance. As outlined above, VAS appears to have improved the quality of care received by beneficiaries. This could be in part due to increased access to high-quality private hospitals. This might be feasible in other settings only to the extent to which private hospitals provide good quality care and can be monitored by the social health insurance programme.

Prior authorisation and bundled payments

As discussed above, a potential problem with insurance programmes is overutilisation of care. VAS mitigated these incentives to overuse care by instituting a preauthorisation process for checking the appropriateness of care. Physicians employed by VAS scrutinised medical records of VAS beneficiaries and only approved reimbursement for the surgery or procedure if it was deemed to be medically necessary. This additional oversight likely reduced overutilisation of care. VAS also paid hospitals prospectively for a bundle of services related to a hospitalisation thereby reducing financial incentives to overprovide care during a hospitalisation. In particular, hospitals received a bundled payment for a procedure (say CABG) and the amount of payment was independent of the length of stay in the hospital or the amount of services provided during the hospitalisation. Implementation of prior authorisation and bundled payments is not unique to the Indian setting, and is feasible to initiate in other countries.

CONCLUSIONS

The VAS experience provides many insights for policymakers who are considering how best to design insurance programmes for the poor. Insurance should be designed in a way that increases access to and improves

quality of care, while keeping costs in check. VAS facilitated access through patient outreach to rural areas via health camps, effortless enrolment and expansion of the provider network by contracting with private providers. VAS improved quality of care by empaneling high-quality facilities and requiring prior authorisation. Finally, VAS controlled costs through both bundled payments and prior authorisation as well through targeting only a select set of high-burden conditions.

Although VAS appears to be succeeding, it is not without its limitations and there is ample room for improvement. First, prior authorisation could be more effective. Currently, prior authorisation for cardiac procedures is based on a 'rule of thumb' rather than evidence-based guidelines. VAS can more effectively monitor the appropriateness of care if prior authorisation is based on evidence-based guidelines specific to the patient population covered by VAS. Second, although VAS covers treatment in urban hospitals, it does not ensure that patients receive adequate follow-up care when they return home to their villages. VAS could improve follow-up care for patients by using a telemedicine model where primary care physician in the village can get advice and training on follow-up from the treating specialist at the urban hospital. VAS could also improve access to medications which are critical for secondary prevention. Third, VAS could have unintended consequences, such as use of tertiary care, when it was not warranted. More needs to be done to monitor the potential overuse of care. Fourth, VAS uses BPL cards to identify eligible families; however, it is suspected that millions of BPL cards in Karnataka have been issued to non-poor families and sometimes poor families have difficulty in getting BPL cards. Hence, the current system for VAS might exclude some residents with severe health needs.[20] Finally, VAS could conduct routine beneficiary surveys to better monitor adverse events and patient health after surgery. This would help identify hospitals that are providing poor quality care and also identify other opportunities for improving care. Policymakers should consider the design of VAS and proposed enhancements as they develop and implement social health insurance programmes.

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