

Impact of India's publicly financed health insurance scheme on public sector district hospitals: a health financing perspective



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Summary

Background Districts hospitals in India play a pivotal role in delivering health care services in the public sector and are empanelled under India's national health insurance scheme i.e. *Ayushman Bharat Pradhan Mantri Jan Aarogya Yojana* (PMJAY). In this paper, we evaluate the extent to which the PMJAY impacts the district hospitals from a financing perspective.

Methods We used cost data from India's nationally representative costing study—'Costing of Health Services in India' (CHSI) to determine the incremental cost of treating PMJAY patients, after adjusting for resources that are paid through supply-side government financing route. Second, we used data on number and claim value paid to public district and sub-district hospitals during 2019, to determine the additional revenue generated through PMJAY. The annual net financial gain per district hospital was estimated as the difference between payments under PMJAY, and the incremental cost of delivering the services.

Findings At current levels of utilisation, the district hospitals in India gain a net annual financial benefit of \$ 26.1 (₹ 1839.3) million, which can potentially increase up to \$ 41.8 (₹ 2942.9) million with an increase in the share of patient volume. For an average district hospital, we estimate net annual financial gain of \$ 169,607 (₹ 11.9 million), increasing up to \$ 271,372 (₹ 19.1 million) per hospital with increased utilisation.

Interpretation Demand-side financing mechanisms can be used to strengthen the public sector. Increasing utilisation of district hospitals, by either gatekeeping or improving availability of services will enhance financial gains for district hospitals and strengthen public sector.

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Introduction

Districts hospitals (DHs) in India play a pivotal role in delivering health care services in the public sector. While the community health centres (CHCs) are also designed to provide secondary care, the lack of enough specialist doctors and physical infrastructure at the CHC level implies that district hospitals are the first functional point of specialist secondary care.^{1,2} The public facilities cater to 32.5% and 26.20% outpatient services in rural and urban areas respectively.

Similarly, for hospitalisation 45.7% of rural and 35.3% of urban patients are served by the public sector.³ Further, due to inequities in access to care, those belonging to low socioeconomic status are more reliant on the public hospitals in India.^{4,5} A total functional network of 756 district hospitals and 1234 sub-district hospitals with a strength of 24,676 and 13,750 doctors, and 85,194 and 36,909 paramedical health workers respectively, cater to the healthcare needs of the Indian population.¹ Annually, district hospitals

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Research in context**Evidence before this study**

In low-income and middle-income countries (LMICs), expansion of social or other publicly financed health insurance (PFHIs) is a key strategic policy to provide financial risk protection and achieve universal health coverage (UHC). Several studies have evaluated the impact of PFHIs in Indian context. Two systematic reviews have synthesised evidence on the impact of PFHIs in India. All the studies included in reviews have assessed PFHIs in terms of its impact on access and affordability to health care services, out-of-pocket expenditure, and financial risk protection, as well as its distributional impact. While a few studies assessed how the PFHIs influenced utilisation in public sector hospitals, none of the study reported the impact of the insurance schemes on financing of public hospitals of India.

Added value of this study

In India, *Ayushman Bharat Pradhan Mantri Jan Aarogya Yojana* (PMJAY), a cashless publicly financed health insurance scheme, was launched in 2018, to provide secondary and tertiary hospitalisation care for surgical and medical care to 40% of India's population. Under the PMJAY, the empanelled public and private hospitals are reimbursed, who

are paid a uniform case-based bundled payment. Since the public sector district hospitals continue to be financed as usual through the supply-side route, the PMJAY payments serve as an additional revenue source. Besides, since there is no additional capital cost incurred by district hospitals for PMJAY patients, these demand-side payments could be used to generate additional revenue to improve the quantity and quality of services which can broadly be used on infrastructure, human resources, drugs & consumables for PMJAY patients. We evaluated the extent to which the PMJAY has benefitted the district hospitals from a financing perspective. We estimate the net financial gain in a real-world scenario, as well as in alternate future scenarios of increased utilisation at the district hospitals.

Implications of all the available evidence

As per the authors' knowledge, this is the first of its kind study undertaken to assess the impact of PFHIs on the public hospitals from a financial perspective. It will guide other LMICs in designing and implementation of PFHIs with the long-term objective of providing financial risk protection, as well as to strengthen the existing public hospitals.

cater to 209 million outpatients, 41 million inpatients, 0.7 million major surgeries and 3 million institutional deliveries.⁶ However, the inter-state variation in the district hospitals is reasonable, in terms of number of beds, number of doctors and paramedics, availability of essential and desirable services as per the Indian Public Health Services (IPHS) norms. In terms of number of beds per hundred thousand population, inter-state variation ranges from 1 to 408 beds.⁶ The ratio of doctors in position to IPHS norms is highest in the state of Haryana (1.42) and lowest in Uttarakhand (0.48). The availability of core health care services (14 specialities) fulfilled by 16.8% DHs in Tamil Nadu and only 1% in states Assam, Goa, Punjab, Madhya Pradesh, Mizoram and Uttar Pradesh.⁶

In terms of financing, the district hospitals are financed through the classic supply-side financing route.⁷ This implies that the infrastructure is built and owned by the state, doctors are employed and paid salaries, while the drugs and consumables are centrally procured and supplied at the hospitals. Patients accessing district hospitals are provided subsidized healthcare services and a user fee is charged which varies for different services across different states of India.^{8–10} However, due to lack of availability of drugs, consumables, implants or diagnostic services, patients end up purchasing these services from private pharmacies or diagnostic laboratories. This leads to higher

out-of-pocket (OOP) expenditure even in the public hospitals. The recent National Sample Survey reports an average OOP expenditure of INR 331 and INR 4452 per outpatient visit and hospitalization at public hospitals.¹¹ Several other studies have shown significant OOP expenditures in district hospitals, of which a major share is constituted by the drugs and diagnostic services, with travel cost being the other major entity.^{12,13}

In 2018, the Government of India launched a tax-financed health insurance scheme—*Ayushman Bharat Pradhan Mantri Jan Aarogya Yojana* (PMJAY) to provide cashless hospitalisation care for secondary and tertiary health services of up to INR 500,000 per year to 50 million of India's poor population.¹⁴ The scheme is financed by the centre and state governments in the ratio of 60:40 except for north-eastern and three himalayan states where the ratio is 90:10 respectively.¹⁴ Currently, the states of West Bengal, Odisha and the union territory of Delhi have opted out of the scheme. The PMJAY creates a purchaser-provider split, with the government purchasing health care from empanelled public and private hospitals. A total of 8571 public hospitals and 9665 private hospitals were empanelled under the PMJAY as of September 2019.¹⁵ In 2019, a total of 42 public district hospitals and 112 public sub-district hospitals were empanelled under the PMJAY.¹⁶

The provider payment rates under the PMJAY are set based on the cost of delivering health care, as determined through a nationally representative study being undertaken in public and private hospitals.^{17,18} The issue of cost-price differential for various procedures under the PMJAY Health Benefit Packages (HBPs) has been addressed from time to time. It has been reported that the proportion of procedures with high cost-price differential was halved during the revision from HBP 1.0 to 2.0.¹⁸ The cost represents the economic value of both the capital and recurrent resources utilised in delivering care. A uniform provider payment rate is used to pay public and private hospitals. The National Health Authority (NHA) has published detailed guidelines on utilisation of PMJAY claims revenue by the public hospitals for improving hospital infrastructure and quality of services for the patients.¹⁹ The 100% of the claims amount is transferred to the public hospitals or the state health agencies (SHAs) can deduct a maximum of 20% to set state-level corpus. The revenue can be used for staff incentives, recruitment of human resources, local purchase of medicines, consumables & diagnostic tests, hospital upgradation & quality improvement and administration of the scheme.¹⁹

The publicly financed health insurance schemes (PFHIs) in India at national and state level have been evaluated extensively.^{5,20–27} The focus of these evaluations has been the processes, enrolment, design, or impact on utilisation, out-of-pocket expenditure (OOPE), financial risk protection, equity, and overall health consequences. However, there is no study which evaluated the extent to which public hospitals in India can possibly gain financially from the additional demand-side financing mechanism which serves as a supplemental financing route over and above the usual supply-side tax-funded treasury route of the fund flow.

Since the public sector district hospitals continue to be financed as usual through the supply-side route, the PMJAY payments serve as an additional revenue source. These could be used to ensure that there is no OOP expenditure to patients, by guaranteeing adequate availability of all drugs, consumables, and diagnostics. Besides, since there is no additional capital cost incurred by district hospitals for PMJAY patients, these demand-side payments could be used to generate additional revenue to improve the quantity and quality of services. Further, there has been strong push to strengthen the quantity and quality of healthcare services at the level of public district hospitals which requires additional resources. The PMJAY revenue can provide a supplementary financing route and a synergistic effect. In the current study, we evaluate the extent to which the district hospitals in India have benefitted from a financing perspective. We estimate the net financial gain in a real-world scenario, as well as in alternate future scenarios of increased utilisation at the district hospital level.

Methods

Overview

We used the secondary data on cost derived from India's nationally representative costing study—'Costing of Health Services in India' (CHSI), as well as the data on the number and value of claims paid during the year 2019 at the public sector district and sub-district hospitals.^{16–18} The CHSI study is a four-phased study covering both public and private hospitals. The CHSI phase I and III covers 11 and 14 public tertiary hospitals selected from 11 to 14 states of India respectively. The CHSI phase III covers 38 private hospitals from ten states of India. The phase II of the CHSI study covers 27 district hospitals from nine states of India. A multistage stratified sampling method was used for the selection of states. The states were selected to represent the heterogeneity based on geography, health indicators, net state domestic product (NSDP) and health workforce density.¹⁷ The district hospitals within a given state were selected using stratified sampling. One district hospital was randomly selected from each of the three tertiles, stratified based on a composite index drawn from socioeconomic, demographic and healthcare utilisation indicators.¹⁷ The sampled district hospitals provide outpatient, inpatient and operative care services. Out of the 27 DHs, neonatal intensive care units (NICUs) and intensive care units (ICUs) were present in 25 and 18 hospitals respectively. The average bed-size per hospital was 248 beds with annual footfall of 29,244 inpatient admissions, 297,290 outpatient services and 6898 operative care services. The period of data collection was for the reference year of 2017–2018 i.e. 1st April 2017 to 31st March 2018.

The unit cost for 240 surgical (general surgery, obstetrics & gynaecology, orthopaedics, ophthalmology, urology) and 160 medical (general medicine and paediatrics) HBPs based on HBP 2.2 were derived from the CHSI study. Since the inception of the PMJAY scheme the revision of HBPs is a continuous process which is undertaken at different intervals of time to make the scheme more comprehensive and increase the number of HBPs provided by the PMJAY. The revision of HBPs predominantly relate to the inclusion/deletion/change in nomenclature of the procedures as well as revision in the provider payment rates. While the first revision of HBPs introduced in the 2019 was called HBP 1.0, there have been four subsequent revisions. The next three versions of HBP revision were HBP 2.0, HBP 2.1 and HBP 2.2 respectively. More recently in April 2022, the latest version HBP 2022 was announced. The claims data was from the year 2019 was corresponding to the HBP 1.0. So, recoding and matching of HBPs were undertaken. A total of 23 HBPs (7 surgical and 16 medical) were excluded, as these were added to HBP master in the year 2020. A given HBP under the PMJAY is designed to ensure cashless hospitalization care for secondary and tertiary care services. An HBP price

covers the cost of pre-admission visits, inpatient stay, surgery cost (if applicable), drugs, consumables, diet, implants (if required) and 15-day post-hospitalisation expenses on drugs and diagnostics. Due to the lack of electronic health records, data on the average length of stay (ALOS) for each HBP at the district hospital level was not available. To calculate the cost of surgical and medical HBPs, the average length of stay (ALOS) was derived based on the expert opinion sought from a panel of surgical and medical experts respectively. For each PMJAY HBP, the expert opinion was obtained for the ALOS for inpatient (IP) stay and intensive care unit (ICU) stay if applicable. Each surgical and medical speciality had a list of HBPs classified under it. For each HBP, within a speciality, the data on ALOS was obtained based on the interviews with the clinicians of the respective speciality. Mean ALOS as reported by the sample of clinicians was used.

Data sources and analysis

Multiple data sources were used to determine the extent of financial gains at the district hospitals through PMJAY payments (Table 1). First, data on number of claims was obtained for year 2019 for each state from the NHA (implementing agency for PMJAY). The dataset was comprised of the number and the amount of claims paid for each health benefit package (HBP), by level and type of facility.¹⁶ This dataset comprised a total of 995,778 claims for the selected 400 secondary care PMJAY health benefit packages (HBPs) for a period from 1st January 2019 to 31st December 2019. The dataset provides information for all the empanelled hospitals (both public and private) under the PMJAY from all the states of India which implemented the scheme by December 2019. The data provided summary information disaggregated by the type of facility—i.e. public or private. Second, the public sector facilities were disaggregated whether it was a community health centre (CHC), sub-district hospital, district hospital, maternity hospital, referral hospital, medical college, or teaching hospital. It was used to compute the extent of overall public sector utilisation, and the proportional utilisation of district hospitals, and below. The estimates of financial gains are based on 154 hospitals (42 district

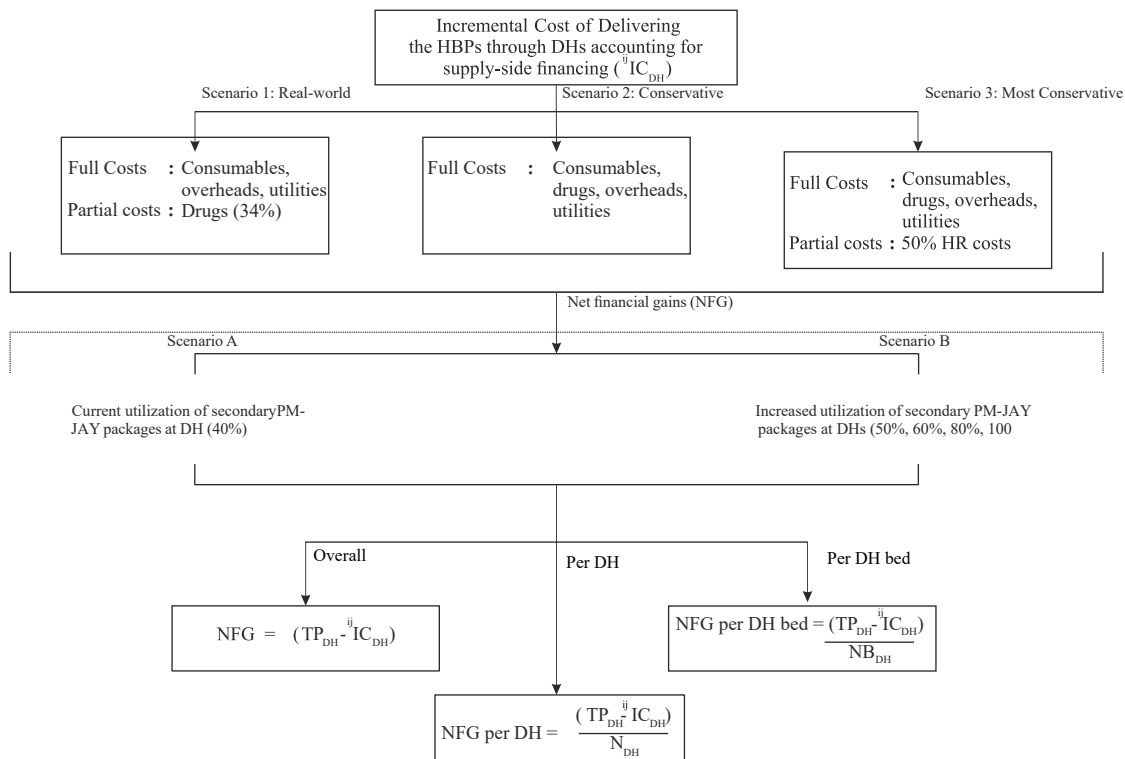
hospitals and 112 subdistrict hospitals) which were empanelled under the PMJAY by December 2019. These hospitals were situated in both urban and rural areas of all the states of India which implemented the PMJAY scheme by December 2019.

Second, the cost of each of the secondary care packages to be utilized at the level of district hospitals was derived from the CHSI study data based on a sample of 27 district hospitals selected from 9 Indian states. Detailed sampling strategy for selection of these district hospitals is published elsewhere.¹⁷ A mixed micro-costing methodology comprising of both bottom-up and top-down methods were employed to collect data on resources used. Data were collected in each of these hospitals for all resources—capital and recurrent, which were utilized in delivering the services. Subsequently, the data were analysed to determine the unit cost of each individual service, i.e. outpatient consultation, per bed-day hospitalization, per bed-day intensive care hospitalization, operative procedures, follow-up post-discharge cost. The cost of capital resources such as equipment were estimated by annualizing the cost over the useful life of the equipment, discounting at 3% for future years.²⁸ Recurrent resources were estimated by multiplying the price and quantity consumed. The cost of individual HBPs was estimated by combining the unit cost and volume of individual services which were stated to be part of an individual HBP.

Using the CHSI data, we derived the partial cost of delivering an individual HBP at the district hospital in three cost scenarios (Fig. 1, Table 2, and Supplementary Box S1). This partial cost was computed to represent the full recurrent cost that the hospital would need to pay, over and above the supply-side financing resources, in order to ensure the cashless supply to service to a patient without any OOP expenditure. In other words, this partial cost would represent the incremental cost of providing treatment for PMJAY patients, in addition to the supply-side revenue. The recurrent cost comprised of the cost of drugs, consumables, overheads, and any other utilities such as dietetics and laundry. In the first incremental cost scenario (real-world), we computed the partial cost considering that 66% of the drugs are also financed through the supply-side route,²⁹ and hence the hospital will not have to additionally spend on the same

Dataset/Parameters	Value/Detail	Source
Empanelled public hospitals included in analysis (as of December 2019)	154 (42 District & 112 Sub-district Hospitals)	16
Number of claims served in the year 2019	995,778	16
Number of health benefit packages (HBPs)	400	17
Cost of health benefit packages (HBPs)	Costing of health services in India (CHSI) study	17
Average length of stay (ALOS) data	Expert opinion from CHSI study	17
Availability of drugs in the public district hospitals	66%	29

Table 1: Data sources and assumptions for calculating financial gains for public district hospitals.



Note: HBPs= Health Benefit Packages; DH=District Hospital; HR= Human Resource; NFG= Net Financial Gain; PM-JAY= Pradhan Mantri Jan Arogya Yojana; TPDH =Total Price/Reimbursement of HBPs delivered through DHs; ijCDH= Total cost of delivering HBP through DHs; NDH= Number of DHs in India; NBDH= Number of beds in DHs in India; i= Scenario 1,2,3 and j= Scenario A,B

Fig. 1: Methodological Framework to compute net financial gains under PMJAY in district hospitals of India.

Input costs	Incremental cost per HBP for PMJAY patient care		
	Cost scenario 1 (real-world)	Conservative estimates	
		Cost scenario 2 (conservative)	Cost scenario 3 (most conservative)
Human resources	Nil	Nil	Partial (50%)
Capital/Infrastructure	Nil	Nil	Nil
Equipment	Nil	Nil	Nil
Furniture	Nil	Nil	Nil
Drugs	Partial (34%)	Full	Full
Consumables	Full	Full	Full
Utilities (dietetics & laundry)	Full	Full	Full
Overheads	Full	Full	Full

HBP: Health Benefit Package; PMJAY: Pradhan Mantri Jan Aarogya Yojana.

Table 2: Share of input costs for PMJAY care in different cost scenarios.

for PMJAY patients in order to provide cashless service (Fig. 1). There are many studies which highlights the issue of non-availability of drugs in the public health facilities. However, these studies were based on limited number of states (1–2 states) and focused on specific drugs only such as anti-hypertensives, antibiotics to name a few.³⁰ Therefore, the proportion of drugs financed through the supply-side route was obtained from a recently conducted cross-sectional survey

undertaken in nine district hospitals in three states.²⁹ In this study, the states were sampled based on the share of drugs in the overall OOP expenditure (high, medium, and low) and to represent the heterogeneity in terms of geography and state human development index (HDI) based on a multi-stage stratified sampling. The patients visiting public sector hospitals were interviewed to obtain information on the extent of total prescribed medicines provided free of cost.²⁹ The inverse of this

proportion of drugs supplied free of cost from the survey, was used to apportion the cost of the drugs per HBP (as derived from CHSI data) which would have to be procured by the facility at a local level to ensure cashless services.

In the second cost scenario (conservative scenario), we computed the incremental cost incorporating the full cost of recurrent resources such as all drugs, consumables, overheads, and utilities, assuming that the entire set of recurrent resources will have to be paid additionally to ensure the cashless treatment to PMJAY patient (Fig. 1). In the third cost scenario (most conservative), we included 50% of the total cost of human resources in the incremental cost. This was done assuming that the PMJAY claim amount would be used to bridge some shortfall in specialists/doctors if the same are not adequately available in the hospital. We excluded the capital cost, i.e. building and space, equipment that are directly paid by the government financing route, in all these incremental costing scenarios since these are fixed cost incurred irrespective of the volume of services being delivered at the hospital. The mean cost of the HBPs is used to estimate the financial gains. Further, we calculated the quartile 1 and quartile 3 of the HBP cost to report the best- and worst-case in each of the scenarios mentioned above.

Scale-up scenarios

The net financial gain per HBP to the district hospital was estimated as the difference between the HBP provider payment rate under the PMJAY, and the incremental cost of delivering the same at a district hospital. This was estimated for 338 HBPs from 7 specialities for which unit cost data were available from the CHSI study. This gain was estimated using 3 alternate scenarios for scale-up of PMJAY services at the level of district hospitals (Fig. 1). Overall annual net financial gain to public sector district hospitals in India was estimated by using the net financial gain per HBP and the total number of claims per corresponding HBP, utilised at district hospitals. Next, the net financial gain was computed per district hospital, as well as per district hospital bed, by dividing the net annual financial gain in India by the number of district hospitals empanelled, and the total number of beds in empanelled district hospitals respectively. The information on district hospitals was obtained from the empanelled list of PMJAY, while the number of hospital beds was obtained from using the average bed-size of a district hospital in a nationally representative sample from a report by the NITI Aayog of India.^{6,16}

Each of the 3 indicators of annual financial gain—overall national, per district hospital, and per district hospital bed, were estimated in alternate scenarios of care-seeking. The base case used the actual claims data

and the number of hospitalizations availed in district hospitals. In the alternate hypothetical scenarios, we assumed an increase in the utilisation of the district hospitals, which could happen in future years either with an increase in quantity and quality of services with additional resources and more district hospitals being empanelled under the PMJAY or as a result of some potential gatekeeping for HBPs at district hospitals. To model this increased utilisation scenario, we first calculated that for the secondary care HBPs alone, 40% of the total public sector claims are presently served by the DH and SDHs. We assumed that with a progressive increase in the share of secondary care PMJAY HBPs delivered at the district hospitals, the overall share of the district hospitals in the PMJAY claims will also expand. Therefore, we gradually increased this share from 40% to 50%, 60%, 80% and 100%. We have presented all the scenarios of increase in the utilisation at district hospital level, which can be possible in the future. This is also expected considering that the Government of India and state governments are making use of alternative datasets to identify eligible beneficiary so as to expand the identified beneficiary case. Second, convergence of other social security schemes with PMJAY is likely to increase the utilisation numbers at the empanelled PMJAY hospitals, including the district hospitals. Third, these different scenarios will be helpful for the policy makers to understand the financial impact of gatekeeping at the level of public district hospitals. We reported the results in Indian rupee (₹) and United States dollar (\$) and used a conversion rate of 1 \$ = ₹ 70.42.³¹

We performed sensitivity analyses (SA) using Monte-Carlo simulation method, to account for uncertainties associated with key assumptions used for creating scenario 1 and 2. We varied the two important parameter assumptions i.e. percent share of drug cost and recurrent cost included for estimating the cost of each HBP. In scenario 1, the deterministic analysis assumed no additional fixed cost, 34% drugs cost and 100% of other recurrent costs to be financed through the PMJAY revenue. In the probabilistic analysis, we randomly varied the share of drugs cost from 20 to 50% and recurrent costs from 50 to 100% for estimating the cost of each HBP. In the base case, full recurrent cost was considered for cost estimation, therefore, there was no further scope of varying recurrent cost on upper side. Scenario 2 assumes full cost of drugs in base case, rest ceteris paribus as in scenario 1. In the SA for scenario 2, the share of drug cost is varied from 20 to 100% and recurrent cost from 50 to 100%. The cost model was simulated 999 times for both scenario 1 and 2, to generate the estimates of cost incurred for each HBP and as a result the annual incremental gains for DH under PM-JAY. A percentile method was used to generate the 95% confidence interval (CI) around the base estimate of annual incremental gain for DHs delivering PM-JAY services in India.

Role of the funding source

The study was funded by the Department of Health Research, Government of India. The funding agency had no role in study design, data collection, data analysis, interpretation, or writing of the report.

Results

PMJAY utilisation at public hospitals

Overall, we found that the public sector accounts for 11% of the total number of claims, and 35% of the total volume of claim payments under the PMJAY. The proportional utilisation (number of claims) in the public sector is the highest and lowest in the state of Tripura (97.8%) and Tamil Nadu (3.1%) respectively. In terms of the amount of the claims pay-out, Arunachal Pradesh (95.9%) is the highest, while Jharkhand (10.9%) has the lowest rank. Similarly, the utilisation of the public sector was highest for general medicine (38%), while it was lowest in the medical care at primary health centre (PHC) or community health centre (CHC) level (0.005%).

PMJAY utilisation at district hospitals

The proportional utilisation (number of claims) of district hospitals followed a pattern similar to the overall public sector, with Kerala (22%) and Goa (0.003%) being the highest and lowest. Similarly, for claim value, the share was highest for Tamil Nadu (28.5%) and lowest for Goa (0.005%) (Fig. 2). At the speciality level, utilisation (number of claims) of district hospitals was highest for general medicine (46.5%), and lowest in the speciality of interventional neuroradiology (0.002%) (Fig. 3). Even for general medicine, the utilisation (number of claims) at district hospitals under PMJAY varied from 46.5% in Kerala to 0.005% in Goa.

For the selected 400 secondary care HBPs, district hospitals accounted for 40% of the total number of claims in the public sector. At the state level, the utilisation of secondary care HBPs (number of claims) the highest share is in Chhattisgarh (17.8%) (Fig. 4). At the level of specialities, 71.4% of the secondary care HBPs for general medicine are catered by the district hospitals followed by 15.4% by obstetrics & gynaecology (OBG) (Fig. 5).

The inter-state and inter-speciality variation in number and value of claims highlights the scope for scale-up of PMJAY scheme among the states and specialities which currently have low utilisation in the public district hospitals. This is also expected considering that the Government of India and state governments are making use of alternative datasets to identify eligible beneficiary so as to expand the identified beneficiary case. Second, convergence of other social security schemes with PMJAY is likely to increase the utilisation numbers at the empanelled PMJAY hospitals, including the district hospitals. Third, these different scenarios

will be helpful for the policy makers to understand the financial impact of gatekeeping at the level of public district hospitals. This will further increase the revenue generated at the level of public district hospitals which will strengthen the availability and quality of services in the public hospitals.

Net annual financial gains at district hospital

In the year 2019, the district and sub-district hospitals were reimbursed a total amount of \$ 88.7 (₹ 6254) million. The average price per HBP is estimated to be 3 times the incremental cost in a real-world scenario, after accounting for the supply-side financed revenue. In the 2 conservative scenarios, the price ranges from 2.8 to 1.8 times the cost per HBP. The mean financial gain along with quartile 1 (Q1) and quartile 3 (Q3) in the USD (\$) and INR (₹) is reported in Table 3 and Supplementary Table S1 respectively. For an average district hospital, in the real-world scenario, the PMJAY payments resulted in a net financial gain of \$ 169,607 (\$ 217,615–\$ 149,600) [₹ 11.9 million (₹ 15.3 million–₹ 10.5 million)] per hospital. Even in the conservative scenarios, the per district hospital gained ranged from \$ 104,413 (\$ 173,142–\$ 64,721) [₹ 7.4 million (₹ 12.2 million–₹ 4.6 million) to \$ 139,417 (\$ 196,293–\$ 103,013) [₹ 9.8 million (₹ 13.8 million–₹ 7.3 million)] (Table 3 and Supplementary Table S1). If all the secondary care HBPs currently being utilized in public sector facilities are utilized at district hospitals, the estimated net financial gain per district hospital would be the \$ 271,372 (\$ 348,184–\$ 239,360) [₹ 19.1 million (₹ 24.5 million–₹ 16.9 million)] (Table 3 and Supplementary Table S1).

Based on the sensitivity analysis, the mean annual incremental financial gain for district and sub-district hospitals for the year 2019 was \$ 26.1 million (95% confidence interval (CI), \$ 19.2–\$ 37.2 million) and \$ 21.5 million (95% CI, \$ 9.4–\$ 36.3 million) for scenario 1 and 2 respectively. This translates to \$ 169,607 (95% CI, \$ 124,950–\$ 241,876) and \$ 139,417 (95% CI, \$ 60,973–\$ 235,762) mean incremental financial gain per district hospital per year for scenario 1 and 2 respectively. Indian rupee (₹) it was ₹ 1839.3 million (95% CI, ₹ 1355.0–₹ 2623.1 million) and ₹ 1511.9 (95% CI, ₹ 661.2–₹ 2556.8 million) mean incremental financial gain per district hospital per year for scenario 1 and 2 respectively. The mean per-bed annual financial gain in scenario 1 and 2 was estimated to be \$ 764 (95% CI, \$ 562.8–\$ 1089.5) and \$ 628 (95% CI, \$ 274.7–\$ 1062.0) respectively. In India rupee mean per-bed annual financial gain in scenario 1 and 2 was ₹ 53,801 (95% CI, ₹ 39,365–₹ 76,725) and ₹ 44,224 (95% CI, ₹ 19,341–₹ 74,786) respectively.

Discussion

The publicly financed health insurance schemes in India have been evaluated primarily from the point

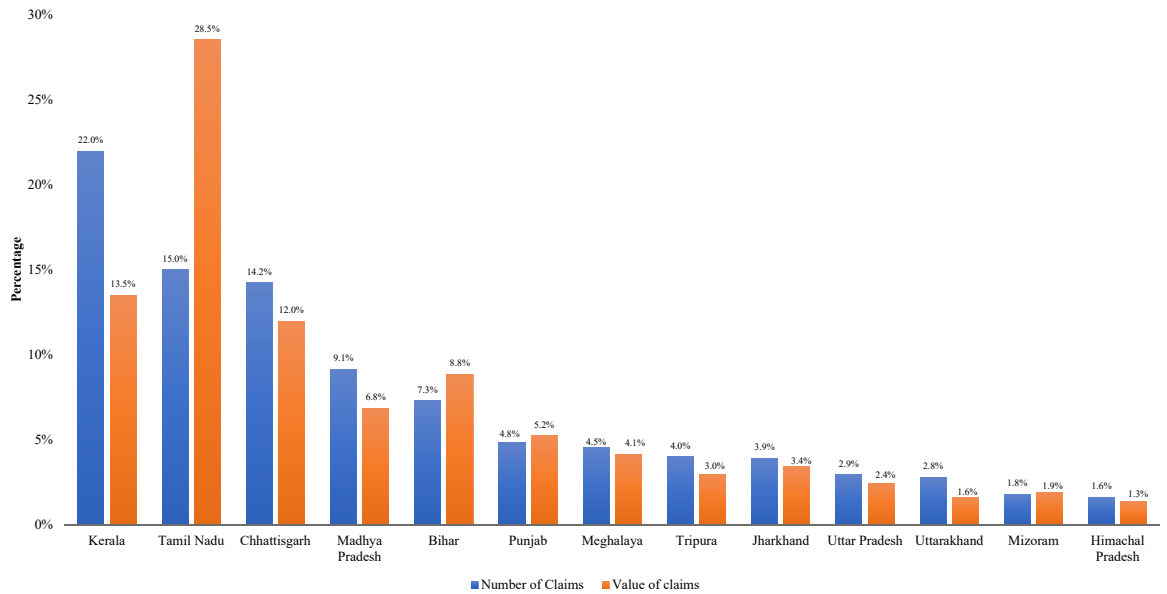


Fig. 2: State-wise percent share of PMJAY claims (number and value) at district hospitals.

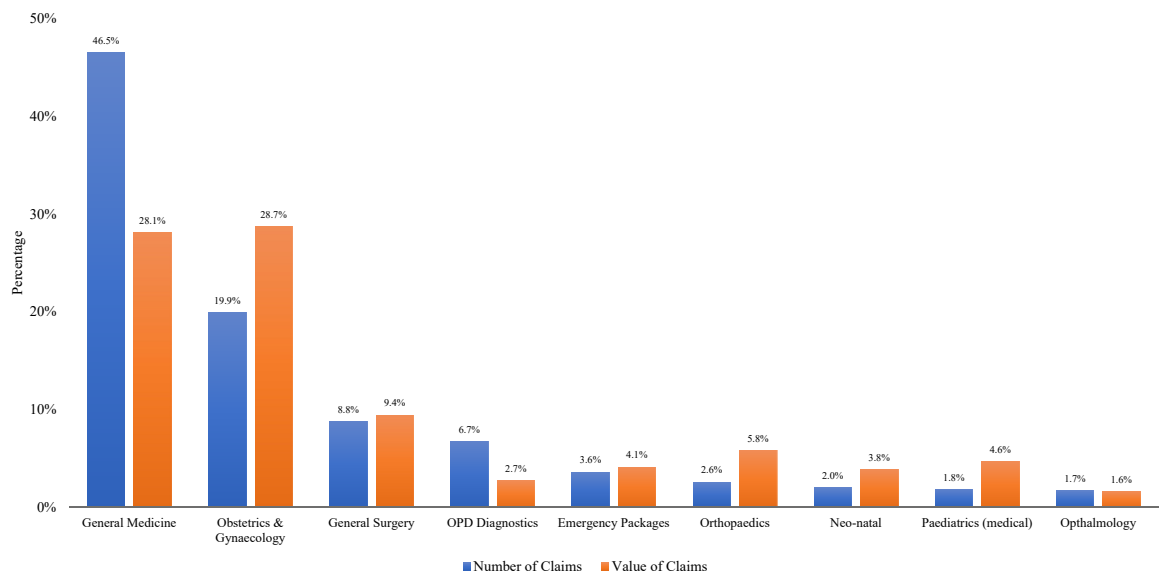


Fig. 3: Speciality-wise percent share of PMJAY claims (number and value) at district hospitals.

of view of their impact on utilisation of health care, out-of-pocket expenditure, equity, and in a few instances on overall population health or efficiency.^{20,22,24,25,27,32} A few assessments have determined its effect on net financial gain for households.²¹ While a few assessments have also evaluated the impact of the insurance schemes on utilisation in the public sector in particular,²³ there is no assessment of the impact of such a publicly financed insurance scheme on the public sector from health financing or financial perspective. Moreover, the

majority of previous assessments have focused on schemes before the PMJAY. These schemes differed significantly from the PMJAY in terms of the benefit packages and the extent of population coverage. In this sense, our study fills a major gap in the current evidence on the impact of the publicly financed insurance scheme PMJAY on the financing of district hospitals.

Overall, we found that the PMJAY results in an annual financial gain of \$ 26.1 (₹ 1839.3) million per year at the level of district hospitals in India. This

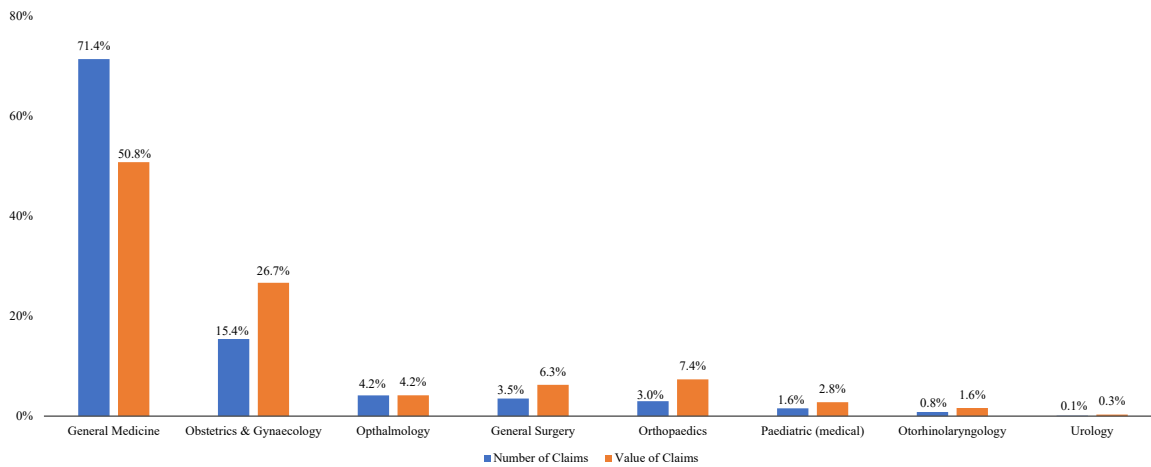


Fig. 4: State-wise percent share of secondary care PMJAY claims (number and value) at district hospitals.

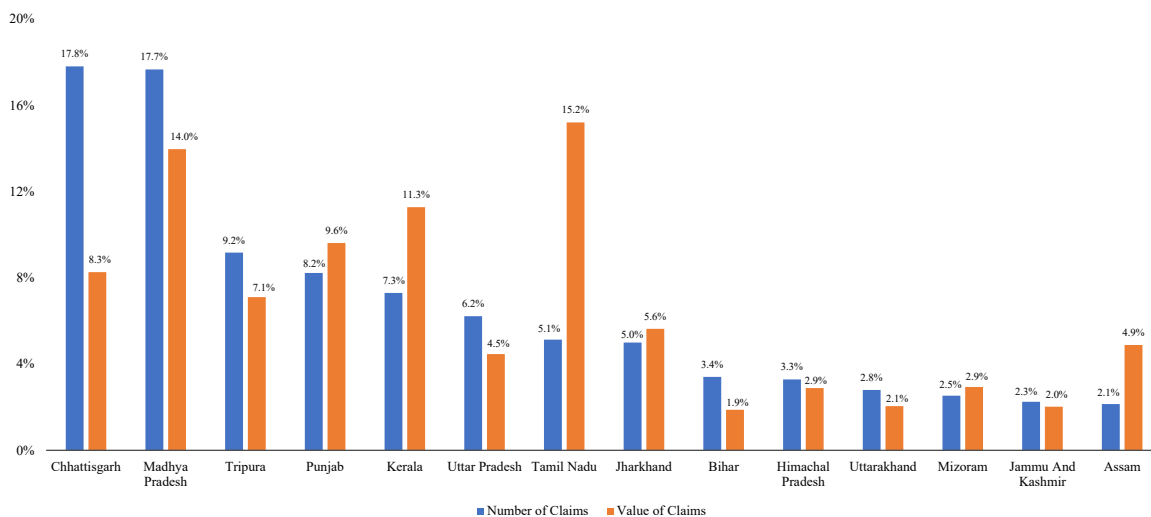


Fig. 5: State-wise percent share of secondary care PMJAY claims (number and value) at district hospitals.

implied an annual financial gain of \$ 169,607 (₹ 11.9 million) per district hospital in India. This excess revenue could be used to either increase the quantity of health services or improve their quality. If all the states increase the share of the utilisation of secondary care HBPs at district hospitals to as much as 100% of the public sector claims for secondary care HBPs, it has the potential to increase the net financial benefit of PMJAY to the \$ 271,372 (₹ 19.1 million) per district hospital. The latter is possible through a regulatory intervention such as gatekeeping of all secondary care HBPs, which can be provided at district hospitals. To ensure gatekeeping, the state health agencies (SHAs) of different states have already reserved a few packages to the public hospitals only considering the state specific needs. Further, with the expansion of PMJAY, as more district

hospitals will be empanelled it will increase the availability of HBPs as well as claims served at the DH level. By January 2022, the number of empanelled district and sub-district hospitals under the PMJAY increased to 473 and 304 respectively.¹⁶ These are the initial years of the PMJAY scheme, and the current analysis is based on the coverage where 40% claims catered by the public district hospitals. This is only for the selected 400 secondary care HBPs out of more than 1600 total HBPs covered under the PMJAY. Therefore, with gradual increase in the coverage and service uptake under the PMJAY, the financial gains for the public district hospitals will also increase.

Given the significant importance of the district hospitals in the provision of health services in India, it is important to consider the findings in light of how the

Level of utilisation at district hospital ^a		Cost scenario 1 real-world		Cost scenario 2 conservative		Cost scenario 3 most conservative	
		Mean (\$)	Quartile 1–quartile 3 (\$)	Mean (\$)	Quartile 1–quartile 3 (\$)	Mean (\$)	Quartile 1–quartile 3 (\$)
Net annual financial gain (million)	Current utilisation (40%)	26.1	33.5–23.0	21.5	30.2–15.9	16.1	26.7–10.0
	10% increased utilisation	28.7	36.9–25.3	23.6	33.3–17.5	17.7	29.3–11.0
	20% increased utilisation	31.3	40.2–27.6	25.8	36.3–19.0	19.3	32.0–12.0
	40% increased utilisation	36.6	46.9–32.3	30.1	42.3–22.2	22.5	37.3–14.0
	60% increased utilisation	41.8	53.6–36.9	34.4	48.4–25.4	25.7	42.7–15.9
Net annual financial gain per district hospital	Current utilisation (40%)	169,607	217,615–149,600	139,417	196,293–103,013	104,413	173,142–64,721
	10% increased utilisation	186,568	239,376–164,560	153,359	215,923–113,314	114,855	190,456–71,193
	20% increased utilisation	203,529	261,138–179,520	167,300	235,552–123,615	125,296	207,771–77,666
	40% increased utilisation	237,450	304,661–209,440	195,184	274,811–144,218	146,179	242,399–90,610
	60% increased utilisation	271,372	348,184–239,360	223,067	314,069–164,820	167,061	277,028–103,554
Net annual financial gain per district hospital bed	Current utilisation (40%)	764.0	980–674	628.0	884–464	470.3	780–292
	10% increased utilisation	840.4	1078–741	690.8	973–510	517.4	858–321
	20% increased utilisation	916.8	1176–809	753.6	1061–557	564.4	936–350
	40% increased utilisation	1069.6	1372–943	879.2	1238–650	658.5	1092–408
	60% increased utilisation	1222.4	1568–1078	1004.8	1415–742	752.5	1248–466

^aCurrent utilisation implies that 40% of the total patients treated for secondary care packages were booked at district and sub-district hospitals. Each of the scale-up scenarios is based on a relative increase.

Table 3: Net annual financial gain at district hospitals in cost different scenarios in USD (\$).

district hospitals can be further incentivised to strengthen the public sector and realize the broader goal of reducing financial hardship for patients. First, the findings of our study point to the significant differential between the PMJAY prices and the cost of providing care at the district hospital. Considering that the PMJAY prices are uniform, it is quite tempting to consider gatekeeping the provision of certain services which require secondary care at district hospitals, or even similar secondary level private hospitals. This will not only result in greater efficiency as the utilisation of care will move from tertiary care teaching hospitals, which incur a higher cost for the same service, to district hospitals, but will also help in lowering the already stretched teaching hospitals for providing the tertiary care which these are meant to cater to. Second, since the district hospitals are located in all tier-2 and tier-3 cities, they have the potential to bridge the geographic barriers to accessing care and hence result in more equitable utilisation.

However, such gatekeeping is likely to have trade-offs in terms of provider choice. Moreover, this is linked with strong political commitment, as any such gatekeeping is likely to be met with resistance from the private hospitals. Even if the secondary private hospitals are considered to be kept at par with district hospitals, the current nomenclature of hospitals in the private sector preclude such a classification. Hence, we do acknowledge that such gatekeeping is likely to be a difficult policy proposition. However, consistent efforts towards increasing the utilisation by strengthening public sector district hospitals is a plausible and imperative policy direction.

The study has few limitations. First, the current analysis is based on the 154 public district and sub-district hospitals. There may be regional differences in terms of empanelment of public district and sub-district hospitals, availability of alternative choice to the patients i.e. private hospitals, national and state-level expansion of inclusion criteria for population coverage to name a few. This may influence the financial gains in the future. Second, there is proposal for public private partnership (PPP) at the level of public district hospitals. The term and conditions of the agreement can influence the service delivery in the district hospitals working on PPP mode. There is no publicly available data to document how did this will translate in increasing quantity and quality of care. Third, the analysis represents the overall financial gains for the public district hospitals. The assessment of improvement in the service delivery by the public district hospitals and utilisation of PMJAY revenue by states remains an area of future research. Fourth, the financial gains are calculated for the additional revenue generated by the PMJAY funds. The trend analysis for district hospitals in terms of year-on year budgetary allocation is beyond the scope of present analysis and is recommended for future area of research. Fifth, a comprehensive analysis on the impact of PMJAY on both public and private hospitals remains an important area of future research. Finally, due to lack of electronic health records the disaggregated data on disease or HBP specific data on average length of stay (ALOS) was not available. Therefore, we had collected data on HBP specific ALOS based on the expert opinion.

The National Health Authority is making attempts towards a differential payment system, which can eventually be transformed towards a diagnosis-related group (DRG) payment system. In case such as transition takes place, the district hospitals may get a relatively lower price per HBP as compared to tertiary care teaching hospitals. Even then, however, an increase in utilisation at the district hospitals would result in an efficient outcome from the payer's perspective, as the National Health Authority stands to gain monetarily in that case. Hence, the increase in district hospital utilisation, irrespective of gatekeeping or a differential payment system, has significant potential to monetarily benefit the public sector or the payer.

Contributors

Conception of study design: SP, MPS. Acquisition of data: SP, MPS, KR, PG, VA. Data analysis: MPS, PB, AG. Interpretation of results: SP, MPS, PB. Visualisation: MPS, PB, AG. Writing first draft of manuscript: SP, MPS. Critical inputs for revision of the manuscript: SP, MPS, VP, PB.

Data sharing statement

The data on the cost of healthcare services in public district hospitals of India is available from the corresponding author on reasonable request.

Declaration of interests

Dr Shankar Prinja is the Executive Director (HP&QA) of National Health Authority, Ayushman Bharat PMJAY, Government of India. Dr Vipul Aggarwal is the Deputy Chief executive officer (CEO) of National Health Authority, Ayushman Bharat PMJAY, Government of India. Dr Kavitha Rajsekar is the Scientist-E of Department of Health Research, Government of India. Dr Praveen Gedam is the Additional Chief Executive Officer of the National Health Authority, Ayushman Bharat PMJAY & Managing Director of the Ayushman Bharat Digital Mission, Government of India. All authors declare no other conflict of interests.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.lansea.2022.100123>.

References

- 1 *Rural Health Statistics 2018-19*. New Delhi: Statistics Division, Ministry of Health and Family Welfare, Government of India; 2019.
- 2 Kasthuri A. Challenges to healthcare in India - the five A's. *Indian J Community Med*. 2018;43(3):141-143. https://doi.org/10.4103/ijcm.IJCM_194_18.
- 3 *Key indicators of social consumption in India: health NSS 75th round (July 2017-June 2018)*. New Delhi: Ministry of Statistics and Programme Implementation; 2019.
- 4 Balarajan Y, Selvaraj S, Subramanian SV. Health care and equity in India. *Lancet*. 2011;377(9764):505-515. [https://doi.org/10.1016/S0140-6736\(10\)61894-6](https://doi.org/10.1016/S0140-6736(10)61894-6).
- 5 Ranjan A, Dixit P, Mukhopadhyay I, Thiagarajan S. Effectiveness of government strategies for financial protection against costs of hospitalization care in India. *BMC Public Health*. 2018;18(1):501. <https://doi.org/10.1186/s12889-018-5431-8>.
- 6 Sarwal R, Kalal S, Iyer V. *Best practices in the performance of district hospitals*. New Delhi: NITI Aayog; 2021.
- 7 *National health accounts estimates for India (2017-18)*. New Delhi: National Health Systems Resource Centre, Ministry of Health and Family Welfare, Government of India; 2021.
- 8 Bajpai V, Saraya A. User charges as a feature of health policy in India: a perspective. *Natl Med J India*. 2010;23(3):163-170.
- 9 Constitution of rogi kalyan samities New Delhi: national health mission. Available from: <https://nhm.gov.in/index1.php?lang=1&level=2&sublinkid=1078&lid=145>.
- 10 Duggal R, Jadhav N. User charges onslaught on public health services. *Econ Polit Wkly*. 2018;4:23-25.
- 11 *Key indicators of social consumption in India: health NSS 75th round*. New Delhi: National Statistical Office, Ministry of Statistics and Programme Implementation, Government of India; 2019.
- 12 Rout SK, Sahu KS, Swain S, Pati S. Out of pocket expenditure on surgical and nonsurgical conditions in Odisha. *J Family Med Prim Care*. 2016;5(2):367-372. <https://doi.org/10.4103/2249-4863.192377>.
- 13 Issac A, Chatterjee S, Srivastava A, Bhattacharyya S. Out of pocket expenditure to deliver at public health facilities in India: a cross sectional analysis. *Reprod Health*. 2016;13(1):99. <https://doi.org/10.1186/s12978-016-0221-1>.
- 14 About Pradhan Mantri Jan Arogya Yojana (PM-JAY) New Delhi: National Health Authority. Available from: <https://pmjay.gov.in/about/pmjay>.
- 15 *Ayushman Bharat Pradhan Mantri Jan Aarogya Yojana annual report 2018-19*. New Delhi: National Health Authority; 2019.
- 16 Aggarwal R. *State wise public hospital data for the year 2019*. New Delhi: National Health Authority; 2021.
- 17 Prinja S, Singh MP, Guinness L, Rajsekar K, Bhargava B. Establishing reference costs for the health benefit packages under universal health coverage in India: cost of health services in India (CHSI) protocol. *BMJ Open*. 2020;10(7):e035170. <https://doi.org/10.1136/bmjopen-2019-035170>.
- 18 Prinja S, Singh MP, Rajsekar K, et al. Translating research to policy: setting provider payment rates for strategic purchasing under India's national publicly financed health insurance scheme. *Appl Health Econ Health Policy*. 2021;19(3):353-370. <https://doi.org/10.1007/s40258-020-00631-3>.
- 19 Guidelines on process of empanelment for hospital New Delhi: National Health Authority. Available from: https://pmjay.gov.in/sites/default/files/2019-04/NHA_Guidelines_on_Process_of_Empanelment_for_Hospital_Revised_0.pdf.
- 20 Garg S, Bebarta KK, Tripathi N. Performance of India's national publicly funded health insurance scheme, Pradhan Mantri Jan Arogya Yojana (PMJAY), in improving access and financial protection for hospital care: findings from household surveys in Chhattisgarh state. *BMC Public Health*. 2020;20(1):949. <https://doi.org/10.1186/s12889-020-09107-4>.
- 21 Karan A, Yip W, Mahal A. Extending health insurance to the poor in India: an impact evaluation of Rashtriya Swasthya Bima Yojana on out of pocket spending for healthcare. *Soc Sci Med*. 2017;181:83-92. <https://doi.org/10.1016/j.socscimed.2017.03.053>.
- 22 Nandi S, Schneider H. Using an equity-based framework for evaluating publicly funded health insurance programmes as an instrument of UHC in Chhattisgarh State, India. *Health Res Policy Syst*. 2020;18(1):50. <https://doi.org/10.1186/s12961-020-00555-3>.
- 23 Nandi S, Schneider H, Dixit P. Hospital utilization and out of pocket expenditure in public and private sectors under the universal government health insurance scheme in Chhattisgarh State, India: lessons for universal health coverage. *PLoS One*. 2017;12(11):e0187904. <https://doi.org/10.1371/journal.pone.0187904>.
- 24 Prinja S, Chauhan AS, Karan A, Kaur G, Kumar R. Impact of publicly financed health insurance schemes on healthcare utilization and financial risk protection in India: a systematic review. *PLoS One*. 2017;12(2):e0170996. <https://doi.org/10.1371/journal.pone.0170996>.
- 25 Reshmi B, Unnikrishnan B, Rajwar E, Parsekar SS, Vijayamma R, Venkatesh BT. Impact of public-funded health insurances in India on health care utilisation and financial risk protection: a systematic

- review. *BMJ Open*. 2021;11(12):e050077. <https://doi.org/10.1136/bmjopen-2021-050077>.
- 26 Prinja S, Sharma A, Gupta I, Chowdhury S, Trivedi M. Designing a framework for benefit packages achieving universal health coverage in India. *Econ Polit Wkly*. 2019;54(30):45–54.
- 27 Prinja S, Bahuguna P, Gupta I, Chowdhury S, Trivedi M. Role of insurance in determining utilization of healthcare and financial risk protection in India. *PLoS One*. 2019;14(2):e0211793. <https://doi.org/10.1371/journal.pone.0211793>.
- 28 Drummond MF. *Methods for the economic evaluation of health care programmes*. 2nd ed. Oxford: Oxford Medical Publications; 1997.
- 29 *Identification of factors contributing to out-of-pocket expenditure on medicines (2019-2020)*. Chandigarh: Department of Community Medicine & School of Public Health, Postgraduate Institute of Medical Education & Research; 2021.
- 30 Meena DK, Mathaiyan J. Essential medicines research in India: situation analysis. *J Young Pharm*. 2021;13(2):82–86. <https://doi.org/10.5530/jyp.2021.13.19>.
- 31 Table 136: exchange rate of the INDIAN rupee VIS-A-VIS SDR, US dollar, pound sterling. D. M./EURO AND JAPANESE YEN (Calendar Year—Annual Average) Mumbai: Reserve Bank of India; Available from: <https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/136T189C5BD53485482FAA3DA904EF607147.PDF>.
- 32 Sinha RK. Impact of publicly financed health insurance scheme (Rashtriya Swasthya Bima Yojana) from equity and efficiency perspectives. *Vikalpa*. 2018;43(4):191–206. <https://doi.org/10.1177/0256090918804390>.