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The Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB-PMJAY) after four years of implementation – is it making an impact on quality of inpatient care and financial protection in India?

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Abstract

Background India launched a national health insurance scheme named Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB-PMJAY) in 2018 as a key policy for universal health coverage. The ambitious scheme covers 100 million poor households. None of the studies have examined its impact on the quality of care. The existing studies on the impact of AB-PMJAY on financial protection have been limited to early experiences of its implementation. Since then, the government has improved the scheme's design. The current study was aimed at evaluating the impact of AB-PMJAY on improving utilisation, quality, and financial protection for inpatient care after four years of its implementation.

Methods Two annual waves of household surveys were conducted for years 2021 and 2022 in Chhattisgarh state. The surveys had a sample representative of the state's population, covering around 15,000 individuals. Quality was measured in terms of patient satisfaction and length of stay. Financial protection was measured through indicators of catastrophic health expenditure at different thresholds. Multivariate adjusted models and propensity score matching were applied to examine the impacts of AB-PMJAY. In addition, the instrumental variable method was used to address the selection problem.

Results Enrollment under AB-PMJAY was not associated with increased utilisation of inpatient care. Among individuals enrolled under AB-PMJAY who utilised private hospitals, the proportion incurring catastrophic health expenditure at the threshold of 10% of annual consumption expenditure was 78.1% and 70.9% in 2021 and 2022, respectively. The utilisation of private hospitals was associated with greater catastrophic expenditure irrespective of AB-PMJAY coverage. Enrollment under AB-PMJAY was not associated with reduced out-of-pocket expenditure or catastrophic health expenditure.

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Conclusions AB-PMJAY has achieved a large coverage of the population but after four years of implementation and an evidence-based increase in reimbursement prices for hospitals, it has not made an impact on improving utilisation, quality, or financial protection. The private hospitals contracted under the scheme continued to overcharge patients, and purchasing was ineffective in regulating provider behaviour. Further research is recommended to assess the impact of publicly funded health insurance schemes on financial protection in other low- and middle-income countries.

Keywords AB-PMJAY, Ayushman Bharat, Pradhan Mantri Jan Arogya Yojana, Out-of-pocket expenditure, Catastrophic expenditure, India, Universal health coverage, Health insurance, Publicly funded health insurance, Financial protection, Access, Utilisation

Background

There is a global consensus to aim for universal health coverage (UHC) [1]. The main objectives of UHC agenda are to improve the access to quality healthcare while ensuring financial protection [2]. Publicly funded health insurance (PFHI) has been promoted as a model to achieve UHC in many low- and middle-income countries (LMICs), including India [3, 4]. In 2018, the central government of India launched a national PFHI scheme known as the Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB-PMJAY) [5, 6]. It replaced the earlier national PFHI scheme known as the Rashtriya Swasthya Bima Yojana (RSBY), which was in operation for a decade [7].

The AB-PMJAY covers 100 million poor households with an assured annual sum of half a million Indian rupees (around 6,000 US dollars) for hospitalisation care [8]. It provides seventeen times larger financial cover than RSBY did [7]. AB-PMJAY covers a wide range of services for secondary and tertiary inpatient care [7]. AB-PMJAY covers around 1400 services, comprehensively covering treatment, surgeries and other procedures, medicines and diagnostics, pre-operative and post-operative care, food, and accommodation [5, 7–9]. Like RSBY, the services under AB-PMJAY are expected to be completely free for the enrolled persons and cashless at the point of care [5, 7–9]. Under AB-PMJAY, state governments empanel a mix of private and public hospitals to provide a package of inpatient services at pre-defined prices. The contracting of private hospitals is a key measure to expand access for the poor households to a wide-range of inpatient care services, as the scheme aims to remove the financial barrier by making the services free. The coverage under AB-PMJAY is funded completely by the government.

Ensuring access to quality services is an important objective under the UHC agenda. The AB-PMJAY also includes it as a key objective [7]. However, there is no information available on the effects of AB-PMJAY on the quality dimension of services. The existing evidence on PFHI in India has shown its limited success in financial protection, though the evidence has been mixed on its role in increasing utilisation [10–17]. A few quantitative

studies are available on AB-PMJAY, but all of those have covered its early days [7, 16, 17]. A cross-sectional study covering 200 beneficiaries of AB-PMJAY in two states in April 2019 showed that patients incurred out-of-pocket expenditure (OOPE) in private hospitals [16]. Another cross-sectional study involving data collection from six states in 2019–2020, almost a year after the launch of AB-PMJAY, found that the patients able to utilise the scheme were 21% less likely to incur catastrophic expenditure (CHE) than others [17]. The above mentioned study reported that AB-PMJAY did not result in increased utilisation of inpatient care [17]. An evaluation of AB-PMJAY was conducted in Chhattisgarh state in 2019, after the scheme had completed its first year of implementation [7]. That study was based on repeated cross-sections of household surveys before and after the launch of AB-PMJAY. It showed that AB-PMJAY was not able to improve access or financial protection for hospitalisations [7].

Since then, the policymakers at the national level have made changes in an important aspect of design of the benefit package under AB-PMJAY. The prices at which hospitals get reimbursed for services were revised upwards using evidence from a large costing study conducted by national level government research institutions [18–20]. The increased prices became applicable in January, 2020 [21, 22]. The current study was aimed at examining the effectiveness of AB-PMJAY in improving access, quality, and financial protection after the above measures. The timing of this evaluation was significant, as it happened after a substantive period of full-fledged implementation of the scheme. The study was expected to add to the evidence base for improving the policy and practice of AB-PMJAY and such publicly funded health insurance schemes aimed at universal health coverage.

Materials and methods

Study setting

Chhattisgarh is one of the leading states in implementing AB-PMJAY in terms of population-enrollment and the number of patients utilising the scheme [8, 22]. The statewide implementation of AB-PMJAY started in September 2018 [8]. In Chhattisgarh, the funding available

for AB-PMJAY has been supplemented by the state government to allow universal population coverage under the scheme [23]. The state and central governments co-own the scheme. The number of hospitals empaneled in the state under AB-PMJAY was 1499 in 2021 [24].

Chhattisgarh had a population of around 30 million in 2021, and around three-fourths of it was rural [25]. The per capita income of Chhattisgarh was Indian rupees (INR) 83,511 which was lower than the national average of INR 98,374 in 2022-23 (at 2010-11 constant prices) [26]. The per capita total health expenditure was estimated to be INR 3416, compared to the national average of INR 4864 in 2019-20 [27]. The per capita government health expenditure in Chhattisgarh was INR 1790, close to the national average of INR 1014 in 2019-20 [28]. The density of medical doctors in Chhattisgarh was 2.9 per 10,000 population in 2018, which was lower than the national average of 7.6 per 10,000 [29].

Study design and key concepts

Sampling

For evaluating PFHI schemes, using observations of more than one time is considered appropriate [30, 31]. This study used panel data from two waves of household surveys. The two waves of the survey were carried out at annual intervals in November 2021 and November 2022, with a design to cover the same set of 3000 sample households in each wave. From the sampled households, data was collected on each individual. We expected to cover around 15,000 individuals in each annual wave. This sample size was decided based on earlier surveys conducted in the state to evaluate government insurance schemes [7]. The National Sample Survey on healthcare expenditure that is conducted by India's Ministry of Statistics also uses a similar sample size for Chhattisgarh [32]. The 2021 and 2022 rounds covered 14,827 and 15,283 individuals, respectively. The surveys had a representative sample of Chhattisgarh, covering each of the five geographical divisions of the state.

An adequate number of hospitalisation episodes was required in the sample. This was necessary to measure the financial protection for those who had utilised inpatient care. To detect a 10% reduction in CHE incidence with enrollment as compared to the non-insured patients, we calculated the sample size required at 5% type-1 error and 10% type-2 error. We assumed around 90% of the patients would be enrolled under the scheme. According to this calculation, the total sample size required was 840 patients. The actual survey covered 1627 patients, which was sufficient for the required analysis.

Data collection

The surveys were conducted by the State Health Resource Centre, a technical agency providing support to

the state department of health. The survey collected data on the socio-economic and demographic characteristics of individuals, including the consumption expenditure of their households on food and non-food purposes and the enrollment status of individuals under AB-PMJAY. The tool developed for the household survey is given in Additional File S0. Data was collected on any hospitalisation episodes within one year preceding the survey, type of hospital utilised (public/private ownership), the disease and its perceived severity, length of stay in the hospital, out-of-pocket expenditure incurred, and the perceived level of satisfaction with the quality of care received. Written informed consent was obtained from all respondents and legal representatives. The dataset was fully anonymized before starting the analysis. The ethics approval was obtained from the Institutional Ethics Committee of SHRC.

Quality

The concept of quality in healthcare is multi-dimensional and has been defined and measured in multiple ways [33–36]. We used two relatively simple indicators of quality that could be measured through a survey of patients: (a) patient satisfaction with the quality of the medical treatment; and (b) length of stay in the hospital. The patients were asked to express whether they were satisfied with the medical treatment they received (yes or no). While the relevance of measuring patient satisfaction is obvious, length of stay has also been recognized as a key measure of quality for hospital care, and longer stay is associated with lower quality and poorer outcomes [34–36].

Out-of-pocket expenditure (OOPE)

OOPE was calculated for each episode by adding the medical and transportation expenses and deducting any cash-reimbursements received by the patient. The OOPE amounts for 2022 were adjusted at 2021 prices for a valid comparison [7, 11].

Catastrophic health expenditure

Financial protection was measured in terms of catastrophic health expenditure (CHE) [37, 38]. Any hospitalisation episode in which OOPE crossed a defined threshold was counted as a CHE occurrence. This study used two types of definitions for the thresholds of CHE:

- a) CHE threshold as a proportion of annual consumption expenditure: This is called the budgetary method [31]. Thresholds of 10%, 25%, and 40% of a household's total annual consumption expenditure were taken for CHE and termed CHE10, CHE25, and CHE40.

- b) CHE threshold as a proportion of annual non-food consumption expenditure: This is called the non-essential expenditure method [37, 38]. A threshold of 40% of a household's annual non-food consumption expenditure was taken for CHE and termed CHE40-Non-Food.

Data analysis

The indicators of utilisation, OOPE, and CHE were compared for those enrolled under AB-PMJAY and the rest. Confidence intervals at 95% were reported for key indicators. Multivariate regression analysis was carried out to find the effect of AB-PMJAY on utilisation, OOPE, and CHE. The list of variables in the study is given in Additional File S1. The variables were selected based on existing studies on PFHI in the country [7, 15].

A logistic model was applied for determinants of utilisation. The independent variables included in the model were related to the socio-economic characteristics of the individuals (sex, age, place of residence (rural or urban), caste, income-quintile), insurance status (PFHI-enrolled or non-insured), perceived severity of illness, and year of the survey.

An 'ordinary least squares' (OLS) regression model was applied for OOPE. The OLS for logarithmic (log) transformation of OOPE has been reported for comparison. A logistic regression model was applied for the binary outcome variables, i.e., the indicators of CHE. The independent variables included in the above mentioned models on OOPE and CHE were related to: (a) socio-economic characteristics of the individuals (sex, age, place of residence (rural or urban), caste, household-size, income-quintile); (b) insurance status of the patient (PFHI-enrolled or non-insured); (c) provider characteristics (public or private); (d) characteristics of hospitalisation episode (type of disease, perceived severity of illness, length of stay); and (e) year of the survey.

Of the individuals covered in the survey, 1.2% had insurance other than AB-PMJAY, and they were excluded from the analysis since the purpose was to compare those enrolled under AB-PMJAY against patients without any insurance. In years 2021 and 2022, 32 and 3 hospitalisations, respectively were reported for the COVID-19 infection, and those were excluded from all analyses conducted in this study. The pattern of hospitalisations in Chhattisgarh in 2021 was affected by the COVID-19 pandemic, but the impact was minimal in 2022. The year of the survey (2021 and 2022) was also used as an independent variable in the regression model to control for the effect of the pandemic.

For robustness, the results were compared with the average treatment effect on the treated (ATET) under a propensity score matching (PSM) model with

AB-PMJAY-enrollment as the treatment variable [7, 14]. PSM is considered a suitable method for evaluating the effect of an intervention as it creates a matching sample of the intervention (PFHI-enrolled) and the comparison (non-insured) groups [30, 31]. It is a useful method when the sampling is not based on an experimental design, and the size and characteristics of the intervention and comparison groups in the survey data may not match. The independent variables included in the PSM models were the same as those used in the regression models mentioned earlier.

The multivariate models for OOPE and CHE were repeated using the instrumental variable (IV) method. This was meant to address the potential endogeneity and selection problem in insurance enrollment [7, 11, 30, 31, 39–42]. When selection into the insurance scheme is non-random, it can lead to biased estimates of its impact on OOPE. While PSM helps in matching the two groups, it is not sufficient to address the unobserved variables. The IV method has been recognised as an effective solution to the problem of endogeneity [39–42].

A two-stage least squares (2sls) IV model was applied for OOPE, and a two-step IV-probit model was applied for CHE indicators [7, 11, 39–42]. The Wu-Hausman test for 2sls and the Wald test for IV-probit were conducted to test for endogeneity [7, 11, 39–44]. The 'household size category' was used as an instrumental variable because it satisfied both the criteria for a suitable instrumental variable – it was associated with scheme enrollment and was not expected to have a direct impact on the outcomes of interest, i.e., OOPE or patient satisfaction [43]. Over-identification restriction tests were applied to check the validity of the IV model [43, 44]. Significance was taken at 95% ($p < 0.05$). The survey data was analysed using STATA-15.

Results

The sample profile is given in Additional File S2. Out of the total surveyed population, the proportion of individuals enrolled under AB-PMJAY in 2021 and 2022 was 92.4% and 87.9%, respectively.

Utilisation

In 2021, 5.25% of the surveyed individuals had utilised inpatient care, and the proportion increased to 5.56% in 2022. The above pattern was similar for the AB-PMJAY enrolled individuals and the rest. The logistic regression model showed that utilisation of inpatient care and AB-PMJAY enrollment was not associated (Additional File S3). The PSM model also confirmed that AB-PMJAY-enrollment had no effect on utilisation (coefficient=0.002, $p=0.652$).

Table 1 Proportion of patients who were satisfied with the quality of care received for hospitalisation in public and private hospitals according to PFHI-enrollment status in Chhattisgarh – 2021 and 2022

	Proportion of patients satisfied with quality (with 95% CI) (n = 1627)		
	AB-PMJAY-enrolled	Not insured	All
Public Hospital	82.0 (79.2–84.5)	82.0 (73.2–88.4)	82.1 (84.5–89.5)
Private Hospital	81.8 (78.5–84.7)	83.3 (72.2–90.6)	82.2 (79.1–84.9)
All	81.9 (79.8–83.8)	82.6 (76.6–87.7)	82.1 (80.2–84.0)

Table 2 Mean length of stay for hospitalisation in public and private hospitals according to PFHI-enrollment status in Chhattisgarh – 2021 and 2022

	Mean length of stay in days (with 95% CI) (n = 1627)		
	AB-PMJAY-enrolled	Not insured	All
Public Hospital	4.8 (4.3–5.2)	5.3 (3.7–6.9)	4.8 (4.4–5.3)
Private Hospital	6.0 (5.5–6.6)	6.9 (5.7–8.2)	6.1 (5.6–6.6)
All	5.3 (4.9–5.7)	5.9 (4.9–7.0)	5.4 (5.0–5.7)

Hospitalisation characteristics

In 2021, 55.3% of the hospitalisation episodes were in public hospitals, and the share increased marginally to 57.6% in 2022. The types of diseases/conditions for which the hospitalisation took place and their perceived severity are reported in Additional File S2. Overall, 43.5% of the patients perceived the condition of their illness to be severe in 2021, and the proportion was 41.6% in 2022.

Quality of inpatient care

Patient satisfaction

The proportion of patients expressing satisfaction with the quality of care they received is reported in Table 1.

Length of stay

Table 2 reports the mean length of stay. The length of stay did not vary significantly for the AB-PMJAY-enrolled and the non-insured patients ($p=0.24$). The average length of stay was longer in private hospitals ($p=0.01$).

Table 3 Effect of enrollment under AB-PMJAY on patient satisfaction and length of stay in Chhattisgarh – Summary of results of OLS, Logistic, PSM, and IV models

Indicator	OLS model		Logistic model		PSM model (ATET)		IV Model	
	Coeff.	P	Adj. odds ratio	p	Coeff.	P	Coeff.	p
Patient satisfaction			0.95	0.82	-0.02	0.64	1.49	0.31
Length of stay	0.76	0.21			0.27	0.72	2.46	0.71

Note: The independent variables included in the adjusted models were: place, household-size, education, sex, age, caste, income-quintile, type of hospital, disease category, severity of illness and year of survey

Table 4 Mean OOPE for hospitalisation in public and private hospitals according to PFHI-enrollment status in Chhattisgarh – 2021 and 2022

	Mean OOPE for Hospitalisation Episodes (in INR) with 95% CI (n = 1627)		
	AB-PMJAY-enrolled	Not insured	All
Public Hospital	4049 (3090–5007)	4270 (2017–6523)	4052 (3163–4941)
Private Hospital	47,052 (36369–57736)	33,683 (24953–42412)	45,617 (36133–55100)
All	23,691 (18674–28708)	18,051 (13165–22937)	23,246 (18733–27760)

The logistic model for determinants of patient satisfaction is given in Additional File S4. It shows that the perceived quality was not associated with AB-PMJAY enrollment. Patient satisfaction declined with increase in the length of stay. The PSM and IV models for patient satisfaction do not show any effect of AB-PMJAY enrollment on patient satisfaction (Table 3 and Additional File S5).

The OLS model for determinants of the length of stay is given in Additional File S6. It shows that the length of stay was not associated with AB-PMJAY enrollment. The main determinant of a longer length of stay was the utilisation of private hospitals. The PSM and IV models do not show any effect of AB-PMJAY enrollment on the length of stay (Table 3 and Additional File S7).

Financial protection

OOPE

Hospitalisation of individuals enrolled under AB-PMJAY involved significant OOPE when the private hospitals were utilised. The overall mean OOPE in private hospitals in 2021 or 2022 was around ten times larger than that in public hospitals (Table 4).

The findings on the median OOPE showed that there was little difference in OOPE for the patients enrolled in the scheme and the non-insured (Table 5). The private hospitals were more expensive, irrespective of the scheme.

Table 5 Median OPE for hospitalisation in public and private hospitals according to PFHI-enrollment status in Chhattisgarh – 2021 and 2022

	Median OPE for Hospitalisation Episodes (in INR) with 95% CI (n = 1627)		
	AB-PMJAY-enrolled	Not insured	All
Public Hospital	1000 (1000–1000)	2000 (1000–2700)	1000 (1000–1000)
Private Hospital	20,000 (20000–22000)	20,000 (15000–30000)	20,000 (20000–22000)
All	5000 (3310–5000)	5000 (3000–8000)	5000 (4000–5000)

Table 6 CHE10 for hospitalisation in public and private hospitals according to PFHI-enrollment status in Chhattisgarh – 2021 and 2022

	Proportion of patients who incurred CHE10 for Hospitalisation (%), with 95% CI (n = 1627)		
	AB-PMJAY-enrolled	Not insured	All
Public Hospital	11.5 (9.3–14.1)	8.7 (3.9–18.1)	11.2 (9.21–13.6)
Private Hospital	74.5 (70.8–77.8)	70.1 (58.5–80.6)	74.2 (70.8–74.4)
All	41.0 (38.3–43.7)	38.5 (30.7–47)	41.0 (38.5–43.6)

Table 7 Effect of enrollment under AB-PMJAY on OPE and CHE for Hospital Care – Summary of results of OLS, Logistic, PSM, and IV models

Indicator	OLS model		Logistic model		PSM model (ATET)		IV Model	
	Coeff.	P	Adj. odds ratio	p	Coeff.	P	Coeff.	P
OPE	10,690	0.21			-12,763	0.36	109,278	0.17
Log of OPE	0.24	0.15			0.17	0.56	0.38	0.80
CHE10			1.11	0.70	-0.48	0.51	0.21	0.87
CHE25			0.88	0.69	-0.08	0.16	0.36	0.81
CHE40			1.07	0.85	-0.02	0.74	3.28	0.08
CHE40-Non-Food			0.99	0.99	-0.09	0.18	-0.17	0.89

Note: The independent variables included in the adjusted models were – place, household-size, education, sex, age, caste, income-quintile, type of hospital, disease category, severity of illness, length of stay and year of survey

The incidence of CHE10 was similar among the AB-PMJAY-enrolled and the non-insured individuals (Table 6). Around three-fourths of the patients utilising private hospitals incurred CHE10, even when they were enrolled under AB-PMJAY.

The incidence of other indicators of CHE, i.e., CHE25, CHE40, and CHE40-Non-Food are reported in Additional File S8 and they show a similar pattern. The Additional File S8 also reports the year-wise estimates of the indicators on patient satisfaction, length of stay, mean OPE, median OPE, CHE10, CHE25, CHE40 and CHE40-Non-food.

Adjusted models for OPE

The results of OLS model applied for OPE and the log of OPE are available in Additional File S9 and they show that AB-PMJAY enrollment had no significant association with the size of OPE. The above mentioned models showed that the main determinant of the amount of OPE was utilisation of the private hospitals. Longer hospitalisations and perceived severity of illness were also associated with greater OPE.

The PSM models for OPE as well as the log of OPE do not show any effect of AB-PMJAY enrollment on the size of OPE (Table 7).

The IV model for OPE and the log of OPE are given in Additional File S10, and they show no relationship between OPE and AB-PMJAY.

Adjusted models for indicators of CHE

The logistic, PSM, and IV models showed that AB-PMJAY-enrollment had no effect on CHE10 or the other three indicators of CHE (Table 5). The full results of the logistic and IV models for the CHE indicators are given in Additional Files S11 and S12 respectively. The logistic models showed that the type of hospital utilised was the main predictor of CHE occurrence. Longer hospitalisations and severe illnesses were also associated with greater chances of incurring CHE. Hospitalisations in 2022 involved a lower likelihood of CHE than in 2021.

Discussion

The current study is the first to evaluate the performance of AB-PMJAY in improving the quality of inpatient care. Patient satisfaction was found to be unrelated to whether the patient was enrolled under AB-PMJAY or not. An earlier survey that covered the care of older adults reported that 23.6% of those utilising inpatient care in Chhattisgarh were dissatisfied with the quality, and the proportion remained similar in the current study [45]. The length of stay was not associated with AB-PMJAY

but mainly with the type of hospital utilised. An earlier study had also shown that hospitalisations in private hospitals in India tend to be longer [46]. It seems that private hospitals have the incentive to prolong hospitalisations so as to charge more from the patients. The AB-PMJAY has not been able to effect a change in this pattern.

The current study found that enrollment under AB-PMJAY had reached around 90% of the population in the state. This represents an improvement from the days preceding the scheme, when the enrollment under PFHI was around 60% [47]. However, the study found that enrollment under AB-PMJAY did not result in increased utilisation of inpatient care. An earlier study done in the same state after one year of AB-PMJAY's implementation had reported the same conclusion [7]. A study covering six states also reported a similar finding regarding the effect of AB-PMJAY on utilisation [17].

A fundamental purpose of AB-PMJAY was to provide financial protection for inpatient care. The current study found that enrollment under AB-PMJAY did not reduce OOPE or protect the patients from catastrophic expenditure for hospitalisation. In our study, the mean OOPE incurred by patients enrolled under this scheme was INR 23,691, which was quite high when compared to the mean annual non-health consumption expenditure of households (INR 97365). Among those using private hospitals, 45.4% incurred CHE25 (at the 25% threshold) in 2022, and an earlier study in the same state reported that the proportion was 39.4% in 2019 after one year of AB-PMJAY implementation [7]. The proportion of inpatients in the private sector incurring CHE25 was 32.1% in 2014 when the RSBY scheme was in operation and 27.6% in 2004 when no PFHI scheme was in operation [7]. This shows that despite the introduction of PFHI schemes and the expansion of their coverage through AB-PMJAY, there has been a rising trend in catastrophic health expenditure in private hospitals. The current study shows that AB-PMJAY could not make the private hospitals affordable for the patients enrolled under its cover. Utilising public hospitals offered better protection from OOPE, irrespective of enrollment under health insurance. A study in 2019 showed that enrollment under AB-PMJAY was not able to make an impact on financial protection [7]. At that time, the empaneled private hospitals had contended that the prices at which they got reimbursed under AB-PMJAY were inadequate [18]. A large costing study was carried out nationally in 2019 to decide the reimbursement rates according to rigorous evidence [18–20]. It resulted in an upward revision of reimbursement rates for 61% of the services covered in the AB-PMJAY benefit-package [19]. In addition, AB-PMJAY had several advantages over its predecessor national PFHI scheme, called RSBY. The annual sum assured per family enrolled under AB-PMJAY was seventeen times larger than the

RSBY [7]. The population coverage, i.e., the enrollment was also larger in AB-PMJAY than earlier schemes [7]. The number of empaneled hospitals had also increased, at least in urban areas [24]. The above changes were not successful in making AB-PMJAY effective in financial protection. The inability of PFHI in ensuring financial protection for hospital-care is consistent with other studies in India [7, 10–15]. A study of AB-PMJAY in the first year of its implementation had reported a minor effect of AB-PMJAY in reducing OOPE with 21% lower chance of CHE for those who were able to utilise the scheme [17]. Looking at the findings of the above study alongside the current evaluation, it seems that many of those enrolled under AB-PMJAY may be unable to receive the benefit of AB-PMJAY when they get hospitalised. And those who are able to access the benefit of AB-PMJAY may be getting a minor discount in payment.

Why does PFHI remain ineffective in providing financial protection in the Indian context? The current study found that the mean OOPE for utilising private hospitals remained around ten times larger than that of public hospitals. As found by other studies, utilising private hospitals was the main determinant for incurring high OOPE or catastrophic expenditure [7, 11–15]. The current study showed that the same pattern persisted four years after the full roll-out of AB-PMJAY. This failure seems to be related to the existing problem of 'double-billing' and overcharging by private providers under PFHI schemes in India [7, 11–16, 48, 49]. 'Double billing' refers to a fraudulent practice whereby a hospital takes cash payments from a patient while also claiming reimbursement for the same service from the government's PFHI scheme [11]. The private hospitals were taking copayments from the patients even though their empanelment contracts specifically prohibited such a practice. The present study showed that even after implementing the increased prices, contracting was ineffective in ensuring that the private hospitals adhered to the agreed prices. The persistent failure of AB-PMJAY and other PFHI schemes in the Indian context suggests that further research is needed to develop alternative policies for UHC.

The study was conducted during a period affected by the COVID-19 pandemic. The hospital services in 2021 were badly affected. The severity of COVID-19 infections and mortality in Chhattisgarh had reduced significantly in 2022. This situation is reflected in the descriptive comparison of OOPE figures for the two years. In private hospitals, the average OOPE was greater in 2021 than in 2022.

Our study has several strengths, and it covers a lot more ground in comparison to the existing evaluations of AB-PMJAY. The study is not based on a single cross-section but involves two annual waves of data collection. It has a large sample of around 15,000 individuals

in each wave, representative of a state with a population of 30 million. The state chosen has been a leading implementor of AB-PMJAY and has around 90% of its population enrolled under the PFHI scheme. The study was conducted after four years of implementation of the AB-PMJAY and thereby provides the first evaluation beyond its early days. The study is the first to evaluate AB-PMJAY on the quality of inpatient care and used two different measures for that. The methodology is robust as it confirms the results using multiple analytical methods, including those addressing potential endogeneity. Earlier studies on PFHI in India had another limitation: they could not take into account the severity of illness while analysing the variations in OOPE [7, 11]. The current study is able to overcome that limitation by including the perceived severity of the illness.

Another strength of the study is the robustness of the analytical methods used. The multi-variate regression analysis offered the advantage that its results were easy to interpret intuitively. It also shed light on the determinants contributing to OOPE, such as provider ownership. Repeating the regressions using the IV approach was useful in addressing any potential endogeneity. The PSM was useful in confirming the main findings on the effect of PFHI on matched groups of enrolled and non-insured individuals.

Several policy lessons emerge from our findings. Our study shows that coverage under a health insurance scheme may not guarantee financial protection. One set of policy measures can be focused on improving the design and implementation of AB-PMJAY. The share of private hospitals in service provision under the scheme needs to be reduced. The contracting of private providers can be limited to services that are difficult to provide through the public sector. The renewal of contracts with providers should be based on their track record of adhering to the contracts. Contracting a smaller number of private providers can perhaps make it easier for government regulators to monitor provider behaviour and enforce the contractual conditions. If the public sector starts providing the necessary range of services, it can reduce its dependence on private providers. Introducing gatekeeping through public sector hospitals may also help in reducing unnecessary medical procedures in the private sector. There is a need to learn from the experiences of other LMICs in implementing PFHI schemes. Another set of policy changes should be focused on measures beyond AB-PMJAY. It has to be realized that health insurance schemes cannot be sufficient to ensure financial protection, and additional strategies are needed for achieving the goals of universal health coverage. Improving affordable access to essential medicines and diagnostics and strengthening primary health care are examples of such measures.

Limitations

The study covers a single state of India, and similar studies in more states may be needed to capture the diversity in the large country. The study is not based on an experimental design. It does not include observations of a time before the scheme was launched and, therefore is unable to directly compare the situation before and after the scheme's implementation. The impact of the COVID-19 pandemic cannot be ruled out, though efforts have been made in the analyses to control for it. We believe that the overall conclusion of the study still holds, in terms of persistent CHE in private hospitals, irrespective of enrollment under AB-PMJAY. This was evidenced by the pattern of OOPE in 2022, when the severe effects of the pandemic had largely abated in India. Quality in health-care is a multi-dimensional and complex concept that is not easy to measure. Our study relied on two simple indicators of quality, and it did not attempt to capture quality in its complexity. Measurement of quality should ideally include examination of facilities and details of treatment given to patients [33]. The patient feedback collected in our study did not cover multiple aspects of experience during hospitalisation and was limited to their satisfaction with the medical treatment received.

Conclusion

Based on the analysis presented here, the study concludes that India's AB-PMJAY scheme was not associated with improved utilisation, financial protection, or quality for inpatient care. The current study adds to the literature on the effectiveness of PFHI-based policies in the LMICs for UHC. Further research is recommended to assess the impact of PFHI schemes on financial protection in other LMICs where a major share of service delivery is through for-profit private hospitals and to draw lessons from their successes or failures.

Abbreviations

CHE	Catastrophic health expenditure
CHE10	Catastrophic Health Expenditure computed using the threshold of 10% of annual consumption expenditure
CHE25	Catastrophic Health Expenditure computed using the threshold of 25% of annual consumption expenditure
CHE40	Catastrophic Health Expenditure computed using the threshold of 40% of annual consumption expenditure
CHE40-Non-food	Catastrophic Health Expenditure computed using the threshold of 40% of annual non-food consumption expenditure
CI	Confidence Interval
INR	Indian Rupee
IV	Instrumental Variable
LMIC	Low- and Middle-Income Country
OLS	Ordinary Least Squares
OOPE	Out-of-pocket expenditure
PFHI	Publicly Funded Health Insurance
AB-PMJAY	Ayushman Bharat Pradhan Mantri Jan Arogya Yojana
UHC	Universal Health Coverage
2sls	Two Stage Least Squares

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12913-024-11393-2>.

Supplementary Material 0
Supplementary Material 1
Supplementary Material 2
Supplementary Material 3
Supplementary Material 4
Supplementary Material 5
Supplementary Material 6
Supplementary Material 7
Supplementary Material 8
Supplementary Material 9
Supplementary Material 10
Supplementary Material 11
Supplementary Material 12

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Author contributions

SG contributed to the study design and writing of manuscript. SG, KB and NT analyzed the data; KB, NT and SG contributed to design of tools; and KB and NT contributed to the data-collection. All authors read and approved the final manuscript.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author and State Health Resource Centre, Chhattisgarh on reasonable request.

Declarations

Ethics approval and consent to participate

Informed written consent was obtained from each respondent and legal representative. Confidentiality was maintained strictly. The dataset was anonymised before starting analysis. The study was approved by the Institutional Ethics Committee of the State Health Resource Centre, Chhattisgarh. All methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication

Not Applicable.

Competing interests

The authors declare no competing interests.

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References

1. United Nations (UN). Resolution A/RES/70/1. Transforming our world: the 2030 agenda for sustainable development. Seventieth United Nations General Assembly, New York, 25 September 2015. New York: United Nations; 2015.
2. World Health Organization. Health systems financing: the path to universal coverage. World Health Report 2010. Geneva: WHO; 2010.
3. Lagomarsino G, Garabrant A, Adyas A et al. Moving towards universal health coverage: health insurance reforms in nine developing countries in Africa and Asia. *Lancet*. 2012;380:933–943. <http://www.sciencedirect.com/science/article/pii/S0140673612611477>
4. Marten R, McIntyre D, Travassos C, et al. An assessment of progress towards universal health coverage in Brazil, Russia, India, China, and South Africa (BRICS). *Lancet*. 2014;384:2164–71.
5. Chatterjee P. National health protection scheme revealed in India. *Lancet*. 2018;391(10120):523–4. [https://doi.org/10.1016/S0140-6736\(18\)30241-1](https://doi.org/10.1016/S0140-6736(18)30241-1)
6. Government of India. About Pradhan Mantri Jan Arogya Yojana (AB-PMJAY). <https://www.AB-PMJAY.gov.in/about-AB-PMJAY>. Accessed on 11th May, 2022.
7. Garg S, Bebartta KK, Tripathi N. Performance of India's national publicly funded health insurance scheme, Pradhan Mantri Jan Arogya Yojana (AB-PMJAY), in improving access and financial protection for hospital care: findings from household surveys in Chhattisgarh state. *BMC Public Health*. 2020;20:949. <https://doi.org/10.1186/s12889-020-09107-4>
8. National Health Authority. Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (AB-PMJAY). Annual report 2018–19 https://AB-PMJAY.gov.in/sites/default/Files/2019-09/Annual%20Report%20-%20AB-PMJAY%20small%20version_1.pdf. Accessed 13 May, 2022.
9. Government of India. Health benefit packages & empanelment criteria for AB-NHPM. <https://www.AB-PMJAY.gov.in/sites/default/Files/2018-07/HBP.pdf>. Accessed 6th May 2022.
10. Reshmi B, Unnikrishnan B, Rajwar E, et al. Impact of public-funded health insurances in India on health care utilisation and financial risk protection: a systematic review. *BMJ Open*. 2021;11:e050077. <https://doi.org/10.1136/bmjopen-2021-050077>
11. Garg S, Chowdhury S, Sundararaman T. Utilisation and financial protection for hospital care under publicly funded health insurance in three states in southern India. *BMC Health Serv Res*. 2019;19:1004.
12. 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>
13. Prinja S, Chauhan A, Karan A, Kaur G, Kumar R. Impact of publicly financed health insurance schemes on healthcare utilisation and financial risk protection in India: a systematic review. *PLoS ONE*. 2017;12(2):e0170996. <https://doi.org/10.1371/journal.pone.0170996> PMID: 28151946.
14. Ranjan A, Dixit P, Mukhopadhyay I, Sundararaman T. Effectiveness of government strategies for financial protection against costs of hospitalisation care in India. *BMC Public Health*. 2018;18(1):501. <https://doi.org/10.1186/s12889-018-5431-8>
15. Nandi S, Schneider H, Dixit P. Hospital utilisation 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:e0187904.
16. Trivedi M, Saxena A, Shroff Z, Sharma M. Experiences and challenges in accessing hospitalisation in a government-funded health insurance scheme: evidence from early implementation of Pradhan Mantri Jan Arogya Yojana (PM-JAY) in India. *PLoS ONE*. 2022;17(5):e0266798. <https://doi.org/10.1371/journal.pone.0266798>
17. Parmar D, Strupat C, Srivastava S, Brenner S, Parisi D, Ziegler S, et al. Effects of the Indian National Health Insurance Scheme (PM-JAY) on hospitalizations, out-of-pocket expenditures and Catastrophic expenditures. *Health Syst Reform*. 2023;9(1). <https://doi.org/10.1080/23288604.2023.2227430>
18. Prinja S, Singh MP, Guinness L, et al. 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:e035170. <https://doi.org/10.1136/bmjopen-2019-035170>
19. 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;19:353–70. <https://doi.org/10.1007/s40258-020-00631-3>
20. Chauhan AS, Guinness L, Bahuguna P, et al. Cost of hospital services in India: a multi-site study to inform provider payment rates and Health Technology Assessment. *BMC Health Serv Res*. 2022;22:1343. <https://doi.org/10.1186/s12913-022-08707-7>

21. Government of Chhattisgarh. Health Benefit Package 2 (HBP-2)- User Guidelines https://dkbssy.cg.nic.in/dkbssydoc/HBP_2.0_User_Guidelines.pdf. Accessed on: 12th May, 2022.
22. National Health Authority. Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (AB-PMJAY). Annual report 2020-21. <https://nha.gov.in/img/resources/Annual-Report-2020-21.pdf>. Accessed on: 12th May, 2022.
23. Government of Chhattisgarh - Department of Health and Family Welfare. Tender Document for Selection of Insurance Company for the implementation of Ayushman Bharat – National Health Protection Mission (AB-NHPM) & Mukhyamantri Swasthya BimaYojana (MSBY) In the State – Chhattisgarh. July 2018.
24. Government of Chhattisgarh. List of empaneled hospitals. <https://dkbssy.cg.nic.in/allhospital.aspx>. Accessed on: 12th May, 2022.
25. Census of India. Population Projections for India and States 2011–2036. Report of Technical Group on Population Projections. July, 2020. https://main.mohfw.gov.in/sites/default/Files/Population%20Projection%20Report%202011-2036%20-%20Upload_compressed_0.pdf. Accessed on 10 May, 2024.
26. Ministry of Statistics & Programme Implementation. State-wise data on per capita income. Posted On: 24 JUL 2023 by PIB Delhi. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1942055>. Accessed on 10 May, 2024.
27. Ministry of Statistics & Programme Implementation. PER CAPITA INCOME. Posted On: 2 August by PIB Delhi. <https://pib.gov.in/PressReleaseFramePage.aspx?PRID=1945144>. Accessed on 10 May, 2024.
28. National Health Systems Resource Centre. National Health Accounts Estimates for India 2019-20. Ministry of Health and Family, Welfare Government of India. 2023. <https://nhsrcindia.org/national-health-accounts-records>. Accessed on 10 May, 2024.
29. Garg S, Tripathi N, Mclsaac M, et al. Implementing a health labour market analysis to address health workforce gaps in a rural region of India. *Hum Resour Health*. 2022;20:50. <https://doi.org/10.1186/s12960-022-00749-6>
30. Acharya A, Vellakkal S, Taylor F, Masset E, Satija A, Burke M, et al. Impact of national health insurance for the poor and the informal sector in low-and middle-income countries: a systematic review. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London; 2012.
31. Giedion U, Alfonso AE, Diaz Y. The impact of Universal Coverage schemes in the developing world: a review of the existing evidence. UNICO Studies Series. Volume 25. Washington DC: The World Bank; 2013.
32. Ministry of Statistics and Programme Implementation. Social Consumption in India – Health. NSS 75th Round. July 2017–June 2018. National Sample Survey Office. 2019. https://www.mospi.gov.in/sites/default/Files/NSS75250H/KI_Health_75th_Final.pdf. Accessed 10th Nov, 2022.
33. Donabedian A. Evaluating the quality of medical care. 1966. *Millbank Q*. 2005;83(4):691–729. <https://doi.org/10.1111/j.1468-0009.2005.00397.x>
34. Thomas JW, Guire KE, Horvat GG. Is patient length of stay related to quality of care? *Hosp Health Serv Adm*. 1997 Winter;42(4):489–507. PMID: 10174462.
35. Bottle A, Middleton S, Kalkman CJ, Livingston EH, Aylin P. Global Comparators Project: International Comparison of Hospital outcomes using Administrative Data. *Health Serv Res*. 2013;48:2081–100. <https://doi.org/10.1111/1475-6773.12074>
36. Lingsma HF, Bottle A, Middleton S, et al. Evaluation of hospital outcomes: the relation between length-of-stay, readmission, and mortality in a large international administrative database. *BMC Health Serv Res*. 2018;18:116. <https://doi.org/10.1186/s12913-018-2916-1>
37. Wagstaff A, Doorslaer E. Catastrophe and impoverishment in paying for healthcare: with applications to Vietnam 1993–98. *Health Econ*. 2003;12:921–34.
38. Mohanty SK, Dwivedi LK. Addressing data and methodological limitations in estimating catastrophic health spending and impoverishment in India, 2004–18. *Int J Equity Health*. 2021;20:85. <https://doi.org/10.1186/s12939-021-01421-6>
39. Leewu F, Vaessen J. NONIE Guidance on Impact evaluation. Network of networks on impact evaluation. Washington DC: Independent Evaluation Group; 2009.
40. Rukundo EN. Does Community-Based Health Insurance reduce child stunting? Evidence from a cross-sectional survey in Rural Uganda. Bonn: ZEF Bonn Center for Development Research Bonn University; 2017.
41. Galarraga O, Sosa-Rubi SG, Salinas-Rodriguez A, Sesma-Vazquez S. Health insurance for the poor: impact on catastrophic and out-of-pocket health expenditures in Mexico. *Eur J Health Econ*. 2010;11:437–47. <https://doi.org/10.1007/s10198-009-0180-3>
42. Aryeetey GC, Westenberg J, Spaan E, Jehu-Appiah C, Agyepong IA, Baltussen R. Can health insurance protect against out-of-pocket and catastrophic expenditures and also support poverty reduction? Evidence from Ghana's National Health Insurance Scheme. *Int J Equity Health*. 2016;15:116. <https://doi.org/10.1186/s12939-016-0401-1>
43. Baum CF. An introduction to modern econometrics using Stata. Stata; 2006.
44. StataCorp. 'OVERID': module to calculate tests of overidentifying restrictions after ivreg2, ivreg29, ivregress, ivprobit, ivtobit, reg3. Last accessed 10 August 2023.
45. International Institute for Population Sciences (IIPS). National Programme for Healthcare of Elderly - Ministry of Health and Family Welfare, India; Harvard T. H. Chan School of Public Health (HSPH) and the University of Southern California (USC). Longitudinal Ageing Study in India (LASI) Wave 1, 2017-18, India Report, 2020. International Institute for Population Sciences, Mumbai. https://www.iipsindia.ac.in/sites/default/Files/LASI_India_Report_2020_compressed.pdf. Accessed 23 August 2023.
46. Kumar P, Dhillon P. Length of stay after childbirth in India: a comparative study of public and private health institutions. *BMC Pregnancy Childbirth*. 2020;20:181. <https://doi.org/10.1186/s12884-020-2839-9>
47. 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 Sys*. 2020;18:50. <https://doi.org/10.1186/s12961-020-00555-3>
48. Nandi S, Schneider H. When state-funded health insurance schemes fail to provide financial protection: an in-depth exploration of the experiences of patients from urban slums of Chhattisgarh, India. *Glob Public Health*. 2019. <https://doi.org/10.1080/17441692.2019.1651369>
49. Garg S, Bebartha KK, Tripathi N. Why do patients enrolled under Ayushman Bharat Incur Medical expenses? *Economic and Political Weekly*. 2024; 59 (17). Pp16–21.

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