Why Do Patients Enrolled under Ayushman Bharat Incur Medical Expenses?

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Patients incurred significant medical expenses when admitted to private hospitals under the Pradhan Mantri Jan Arogya Yojana. Private hospitals charged patients and also claimed reimbursement under the insurance scheme. This practice of dual billing is a key cause of high medical expenses persisting under the PMJAY.

Publicly funded health insurance (PFHI) schemes are considered an important mechanism for financial protection from out-of-pocket expenditure (OOPE) on healthcare in low- and middle-income countries (LMICs), including India (Lagomarsino et al 2012; Prinja et al 2017). India now has nearly two decades of experience in implementing PFHI schemes (Garg et al 2020). In 2018, the union government launched a national PFHI scheme known as the Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (PMJAY) (NHA 2023). The PMJAY covers 100 million poor households with an annual sum of ₹5,00,000 per family. The PMJAY, like its predecessor schemes, mainly covers inpatient care. Its benefit package covers hospitalisations for a wide range of secondary and tertiary care needs. The insurance benefit is comprehensive as it covers costs of treatment, procedures, medicines, diagnostics, pre- and post-operative care, food and accommodation (NHA 2022, 2023; Government of India 2023). It provides services by empanelling private and public hospitals. The services under the PMJAY are designed to be cashless and completely free for the households enrolled under the scheme.

Studies on PMJAY and earlier PFHI schemes have shown that enrolment under these schemes was ineffective in ensuring financial protection (Ranjan et al 2018; Prinja et al 2017; Garg et al 2020, 2022; Ghosh and Gupta 2017; Nandi et al 2017; Reshmi et al 2021). The incidence of OOPE and catastrophic health expenditure was high in private hospitals irrespective of the patient's enrolment under PFHI schemes (Ranjan et al 2018; Garg et al 2020, 2022; Nandi et al 2017).

Under the PMJAY, hospitals enter into a contract with the government that prohibits them from charging any copayments from patients. Then, why do patients enrolled under PFHI incur OOPE? Some patients may need services that cost more than the ₹5,00,000 annual coverage and therefore end up paying from their pockets. It could be the case that hospitals prefer cash-paying patients and discourage admissions under the PFHI schemes (Nandi and Schneider 2020a). In rural and remote areas, there could be supply-side issues, that is, poor availability of services (Nandi et al 2018). There could be several reasons for the inability of some of the patients to access the benefits of PMJAY (Nandi and Schneider 2020a). This article aims to answer whether hospitalisations covered under the scheme involve significant OOPE for patients.

PMJAY in Chhattisgarh

Chhattisgarh has been a leading state in implementing PMJAY (Garg et al 2020) after being rolled out in September 2018. The PMJAY scheme was highly utilised as reflected in the large number of claims under it. In 2022, its benefits package included 2,338 healthcare services (Government of Chhattisgarh 2023). The state nodal agency (SNA), a purchasing organisation set up by the state government, had empanelled 1,006 public and 546 private hospitals to provide services under the PMJAY.

Design and sampling: In 2022, a primary quantitative survey was conducted on patients who had utilised hospitalisation services under the PMJAY in Chhattisgarh. The minimum required sample size was calculated as 384 for a 5% detectable difference at 95% confidence. Assuming a response rate of 50%, double the number, that is, 768 individuals were selected for the sample. The list of patients for whom claims had taken place in the preceding month was collected from the state government. Systematic random sampling was used to select the required sample of 768 individual episodes. The survey was able to get complete responses from 656 individuals.

Data collection: A structured questionnaire was prepared to cover household characteristics such as social group (caste),

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family size, place of residence (rural/urban), occupation, and monthly household consumption expenditure on food and non-food purposes; individual characteristics such as sex, age, education and marital status; and hospitalisation characteristics such as disease, medical OOPE, duration of hospitalisation, and perceived severity of illness. The data was collected in September 2022. The list of variables included in the study is given in Table 1.

We focused on only the medical OOPE as PMJAY does not aim to cover the transportation costs or other non-medical forms of OOPE. The medical OOPE was defined as the amount of money directly paid by a patient to the hospital, drugstore, and diagnostic centre during hospitalisation.

Financial protection was assessed in terms of catastrophic health expenditure (CHE) as proposed by Wagstaff and Doorslaer (2003). CHE was measured in two ways: (i) as a proportion of annual consumption expenditure (a threshold of 10% of the concerned household's annual consumption expenditure was taken as catastrophic and named CHE10) (Ranjan et al 2018; Garg et al 2020); and (ii) as a proportion of annual non-food consumption expenditure (a threshold of 40% of the concerned household's annual non-food consumption expenditure was taken as catastrophic and named CHE40). This is a commonly used measure of CHE (Wagstaff and Doorslaer 2003).

A descriptive analysis was done using cross-tabulations. Confidence intervals at 95% were reported for key indicators. Multivariate linear regression models for OOPE and logarithmic transformation of OOPE were applied to find the determinants of OOPE. Multivariate logistic regression was applied to find determinants of CHE10 and CHE40. To confirm the results of the regression models, a propensity score matching (PSM) model was used. Significance was taken at 95% ($p < 0.05$). The data was analysed using Stata-15.

Results

Table 2 (p 18) provides the socio-demographic characteristics of individuals covered in the survey. It shows that men used the scheme more often than women. The vulnerable group of Scheduled Tribes (STs) constituted a 15.9% share of the claims under the PMJAY whereas their proportion in the state's overall population was around 30%. Overall, public hospitals had a slightly larger share of claims as compared to private hospitals. Around a quarter of the patients had perceived their illnesses as serious.

PMJAY Utilisation

Table 3 (p 18) provides the share of private hospitals by individual characteristics. It shows that individuals belonging to STs and women were largely relying on public hospitals.

The table shows that among the disease categories, utilisation for maternal care and communicable diseases was concentrated in public hospitals. For non-communicable diseases (NCDs) and injuries, public and private hospitals had a nearly equal share. Among those

Table 1: List of Variables

Variable	Variable Description	Categories
Facility type	Type of facility by ownership	Public
		Private
Duration of hospitalisation	Number of days of hospitalisation for the episode	1 to 3 days
		Above 3 days
Tertiles of districts by the density of empanelled private hospitals	Tertiles of districts according to the number of private hospitals empanelled by PMJAY in the district per 1,00,000 population	High-density
		Medium-density
		Low-density
Disease category	Type of disease	Non-communicable diseases
		Communicable diseases
		Maternal care
		Injuries
		Others
Perceived severity of illness at the time of admission	Severity of illness as perceived by the patient at the time of admission	Seriously ill
		Medium
		Not seriously ill
Per capita household consumption expenditure quintiles	Quintiles based on per capita household consumption expenditure	Poorest
		Poor
		Middle
		Rich
		Richest
Sex	Sex of the patient admitted	Male
		Female
Family size	Size of the household of the patient	Continuous
Age category	Age category of the patient	< 5 Years
		5–14 Years
		15–48 Years
		49–59 Years
		> 60 Years
Education category	Category based on educational attainment of patient	Not literate
		Primary
		High school
		Graduation and above
Place of residence	Place of residence of patient	Rural
		Urban
Caste (social group)	Social group (caste) category that the patient belonged to	Scheduled Tribes
		Scheduled Castes
		Other Backward Classes
		Others
Medical OOPE	Amount of money directly paid by the patient/family to the hospital where the patient was admitted under the PMJAY (₹)	Continuous
Log of medical OOPE	Logarithmic transformation of OOPE	Continuous
CHE10	Whether in the hospitalisation episode, the patient/family incurred medical OOPE above the 10% threshold of the household's annual non-medical consumption expenditure	Binary
CHE40	Whether in the hospitalisation episode, the patient/family incurred medical OOPE above the 40% threshold of the household's annual non-food consumption expenditure	Binary

Source: Authors' estimates.

perceiving their illness as serious, a bigger share was utilised by private hospitals. Of the longer-duration hospitalisations, a bigger proportion took place in private hospitals.

Medical OOPE under PMJAY

Table 4 provides the mean medical OOPE per episode by individual and hospitalisation characteristics.

Table 5 (p 19) shows that the mean medical OOPE per episode in private hospitals was 43 times larger than in public hospitals. This is also reflected in the indicators of catastrophic expenditure.

Table 6 (p 20) shows the results of the ordinary least square (OLS) models applied to identify the determinants of medical OOPE under the PMJAY. It shows that medical OOPE under the PMJAY is likely to be significantly greater for episodes in private hospitals than public hospitals. The longer-duration hospitalisations involved greater medical OOPE. The hospitalisations for illnesses perceived as serious involved greater medical OOPE. Episodes for NCDs resulted in greater medical OOPE than maternal care.

Nearly one-third of the hospitalisations in private hospitals resulted in CHE10 (Table 5). Utilising private hospitals was found to be the main determinant of catastrophic expenditure under the PMJAY. The poorer patients were more likely to incur CHE10 or CHE40 (Table 6). Table 7 (p 20) presents the results of the PSM models and confirms that utilising services from the private sector under the PMJAY involved significantly greater medical OOPE and catastrophic expenditure than the public sector.

Discussion

The article shows that utilisation of services under the PMJAY in Chhattisgarh involved significant medical OOPE and the incidence of catastrophic expenditure. The medical OOPE is seen to be quite large in the case of for-profit private hospitals. Why did the medical OOPE occur when the patients used the

Table 2: Socio-demographic Profile and Hospitalisation Characteristics of the Sample

Variable	Category	Proportion (%) (95% CI)
Age	Below 4 years	2.1 (1.2–3.4)
	5–14 years	4.9 (3.6–6.8)
	15–29 years	39.2 (35.7–42.8)
	30–44 years	25.9 (22.9–29.3)
	45–59 years	15.7 (13.2–18.6)
	60 and above	12.1 (9.8–14.6)
Sex	Male	56.9 (53.3–60.5)
	Female	43.1 (39.5–46.7)
Tertile of districts according to the density of empanelled private hospitals per 1,00,000 population	Low-density	37.9 (34.4–41.5)
	Medium-density	25.6 (22.6–28.9)
	High-density	36.4 (33.0–40.0)
Marital status	Never married	22.1 (19.2–25.3)
	Married	75.4 (72.1–78.4)
	Widow	2.3 (1.4–3.7)
	Separated	0.1 (0.1–0.9)
Place of residence	Rural	72 (68.6–75.2)
	Urban	28 (24.8–31.4)
Education	Not literate	22.4 (19.5–25.6)
	Primary	30.7 (27.4–34.2)
	High	31.1 (27.8–34.5)
	Graduation or above	15.7 (13.3–18.6)
Family size		5.5 (5.3–5.6)
Caste	Scheduled Tribes	15.9 (13.4–18.7)
	Scheduled Castes	14.0 (11.7–16.8)
	Other Backward Classes	55.7 (52.1–59.3)
	Others	14.3 (11.9–17.1)
Type of hospital utilised	Public hospital	55.2 (51.5–58.8)
	Private hospital	44.8 (41.2–48.4)
Disease category	Communicable diseases	16.6 (14.1–19.4)
	Non-communicable diseases	21.2 (18.3–24.2)
	Maternal care	18.8 (16.1–21.2)
	Injuries	23.3 (20.3–26.5)
	Others	20.3 (17.5–23.3)
Perceived severity at admission	Seriously ill	23.3 (20.3–26.5)
	Average condition	51.0 (47.4–54.7)
	Not seriously ill	25.7 (22.6–22.9)
Duration of hospitalisation	1 to 3 days	55.2 (51.5–58.7)
	Above 3 days	44.8 (41.2–48.4)

Source: Authors' estimates.

Table 3: Share of Public and Private Hospitals in PMJAY Utilisation in 2022 by Individual Characteristics (%)

Characteristic		Public Hospital	Private Hospital
Caste	Scheduled Tribes	72.5 (63.6–80)	27.4 (19.9–36.4)
	Scheduled Castes	52.1 (42.1–61.8)	47.9 (38.2–57.8)
	Other Backward Classes	51.8 (46.8–56.7)	48.2 (43.3–53.2)
	Others	58.4 (48.5–67.7)	41.6 (32.3–51.4)
Tertile of district according to the number of empanelled private hospitals per 1,00,000 population	Lower	62.3 (56.4–67.8)	37.7 (32.1–43.5)
	Medium	47.8 (40.7–55.1)	52.1 (44.9–59.3)
	High	52.8 (46.8–58.8)	47.1 (41.1–53.2)
Per capita household expenditure quintile	Poorest	48.3 (40.2–56.4)	51.7 (43.6–59.8)
	Poor	47.1 (39.3–55)	52.9 (44.9–60.7)
	Middle	35.8 (28.1–44.3)	64.2 (55.7–71.9)
	Rich	36.8 (29.5–44.8)	63.1 (55.2–70.5)
	Richest	40.8 (32.2–50.1)	59.1 (49.9–67.8)
Age	Below 4 years	40.0 (13.1–18.6)	60.0 (33.9–81.4)
	5 to 14 years	58.3 (41.6–73.3)	41.6 (26.7–58.3)
	15–29 years	64.6 (58.9–70.0)	35.3 (29.9–41.1)
	30–44 years	55.6 (48.4–62.6)	44.3 (37.4–51.6)
	45–59 years	47.3 (38.2–56.6)	52.7 (43.4–61.8)
	60 and above	33.7 (24.5–44.4)	66.3 (55.6–75.5)
Sex	Male	50.7 (45.9–55.5)	49.3 (44.4–54.1)
	Female	61.2 (55.7–66.5)	38.8 (33.5–44.3)
Place	Rural	55.1 (50.8–59.4)	44.8 (40.5–49.2)
	Urban	54 (47.1–60.8)	46 (39.2–52.9)
Education	Not literate	46.3 (38.7–54)	53.7 (45.9–61.3)
	Primary	55.7 (49–62.2)	44.3 (37.8–50.9)
	Higher secondary	65.3 (58.8–71.3)	34.7 (28.7–41.1)
	Grad and above	46.1 (37.1–55.3)	53.9 (44.7–62.9)
Disease category	Communicable diseases	78.5 (70.2–84.9)	21.5 (15.1–29.7)
	Non-communicable diseases	52.9 (45–60.7)	47.1 (39.2–55.1)
	Maternal care	74.6 (66.2–80.9)	25.4 (19.1–33.8)
	Injuries	53.3 (45.7–60.7)	46.7 (39.3–54.3)
	Others	22.6 (16.5–30.1)	77.4 (69.9–83.4)
Perceived severity at admission	Seriously ill	35.9 (28.9–43.5)	64.1 (56.5–71)
	Average condition	48.2 (43.1–53.3)	51.8 (46.6–56.8)
	Not serious	85.3 (79.4–89.7)	14.7 (10.2–20.6)
Duration of hospital stay	1 to 3 days	81.7 (77.6–85.2)	18.3 (14.8–22.4)
	Above 3 days	21.8 (17.6–26.7)	78.2 (73.3–82.4)

Source: Authors' estimates.

flagship government scheme promising free services?

Each private hospital empanelled under the PMJAY had entered into a contract with the government that prohibited the hospital from charging any copayments from patients for episodes covered under the scheme. However, we find that private hospitals took significant charges from patients and also claimed reimbursements under the PMJAY from the government for the same episodes. This practice can be called dual billing or double billing whereby the hospital charges two sources for the same service episode. This is a fraudulent practice.

Earlier studies had speculated that dual billing might be a cause of the ineffectiveness of Indian PFHI schemes in controlling OOPE (Garg et al 2020; Rent and Ghosh 2015). This article establishes the prevalence of this phenomenon under the PMJAY. While existing evaluations of PMJAY had covered its early implementation, this article shows that PMJAY was unable to protect patients from catastrophic expenditure for healthcare episodes even after four years of full rollout.

Why did the private hospitals take copayments from patients? A potential argument is that the prices at which PMJAY reimbursed hospitals were not remunerative. However, there is a substantial body of credible evidence that shows that the prices in PMJAY were based on scientific costing studies of diverse private and public hospitals (Prinja et al 2020, 2021; Singh et al 2022; Chauhan et al 2022). From 2020 onwards, PMJAY implemented increased prices for the services in its benefits package (Prinja et al 2021; Government of Chattisgarh 2023).

While a greater share of the more severely ill were treated in private hospitals, the multivariate analysis controlling for this factor showed that the medical OOPE was very high in private hospitals irrespective of illness severity. A more likely explanation of high medical OOPE in the private sector seems to be high-profit expectations. Recent costing studies comparing the public and private providers in India indicated that the profit earned by for-profit private hospitals was huge in comparison to the costs incurred by them (Garg, Tripathi, Ranjan and Bebarta 2022). In India, the price and quality regulation of private healthcare providers is poor (Lacy-Nichols et al 2023; Hooda 2017; Mackintosh et al 2016). This, combined with the profit incentive encourages private hospitals to adopt the practice of dual billing. Another possibility is that the hospitals used unnecessary diagnostics and medical procedures that increased the costs (Lacy-Nichols et al 2023; Hooda 2017; Nandi and Schneider 2020a).

A significant share of the claim reimbursement amount under PMJAY went to private hospitals (NHA 2022). Did these contracts with the private sector help the objectives of PMJAY? Unfortunately, the contracts were ineffective in controlling the behaviour of for-profit private hospitals and did not stop them from charging extra from patients. The government or its purchaser organisation failed to enforce this all-important condition in the contract. Perhaps in this context, the private sector

Table 4: Mean Medical OOPE under PMJAY in 2022 by Individual and Hospitalisation Characteristics (₹)

Variable	Category	Overall Mean Medical OOPE (95% CI)	Mean Medical OOPE Public Hospitals (95% CI)	Mean Medical OOPE in Private Hospitals (95% CI)
Caste	Scheduled Tribes	6,078 (546–11,611)	750 (167–1,333)	20,174 (665–39,683)
	Scheduled Castes	4,858 (3,039–6,877)	249 (151–347)	9.712 (6.223–13,202)
	Other Backward Classes	8,581 (5,318–11,844)	376 (233–519)	16.350 (9.890–22,809)
	Others	4,976 (2,017–7,935)	305 (142–468)	11,346 (4,586–18,106)
Tertile of district according to density of empanelled private hospitals per 1,00,000 population	Low-density	4,951 (3,109–6,793)	395 (215–576)	12,354 (7,775–16,933)
	Medium-density	9,559 (4,927–14,191)	525 (33–1,018)	16,972 (8,484–25,459)
	High-density	12,159 (3,092–21,226)	399 (255–544)	24,493 (5,299–43,687)
Per capita household expenditure quintile	Poorest	10,217 (6,060–14,373)	407 (136–678)	20,727 (12,794–28,660)
	Poor	6,829 (481–13,177)	554 (38–1,069)	13,878 (521–27,234)
	Middle	3,866 (1,641–6,091)	297 (186–408)	9,800 (3952–15647)
	Rich	3,374 (1,945–4,802)	438 (151–724)	8,499 (4976–12021)
	Richest	22,309 (3,022–41,595)	488 (159–817)	35,230 (1,940–68,521)
Age	Below 4 years	3,626 (0–7,294)	16 (0–49)	6,033 (324–11,724)
	5 to 14 years	4,331 (0–9,163)	307 (0–692)	9,966 (0–21,161)
	15–29 years	5,419 (3,355–7,482)	335 (230–439)	14,517 (9,091–19,942)
	30–44 years	11,142 (0–23,004)	538 (93–983)	24,720 (0–51,625)
	45–59 years	14,907 (4,578–25,237)	573 (234–912)	26,467 (7,106–45,829)
	60 and above	9,802 (5,405–14,200)	536 (0–1,216)	12,443 (7,448–17,439)
Sex	Male	11,442 (5,393–17,490)	458 (222–693)	22,275 (10,082–34,468)
	Female	5,259 (2,904–7,614)	390 (237–544)	12,035 (6,315–17,755)
Place of residence	Rural	7,789 (5,131–10,448)	400 (219–581)	15,934 (10,277–21,590)
	Urban	11,770 (641–22,900)	489 (252–726)	25,146 (852–49,439)
Education	Not literate	16,229 (1,502–30,955)	378 (79–677)	29,894 (2,674–57,114)
	Primary	7,160 (4,110–10,210)	662 (263–1,060)	14,095 (7,868–20,323)
	Higher secondary	3,285 (1,861–4,708)	289 (197–381)	8,930 (5,111–12,750)
	Graduation and above	11,641 (5,257–18,025)	351 (77–626)	21,187 (9,663–32,711)
Disease category	Communicable diseases	6,971 (0–15,224)	433 (192–674)	30,861 (0–68,470)
	Non-communicable diseases	9,178 (5,754–12,601)	388 (109–666)	17,881 (11,575–24,188)
	Maternal care	2,015 (1,106–2,925)	415 (246–584)	5,948 (3,068–8,829)
	Injuries	13,492 (515–26,469)	181 (24–338)	28,663 (968–56,357)
	Others	10,622 (5,054–16,191)	1196 (0–2,450)	12,441 (5,493–19,389)
Perceived severity of illness	Serious	22,581 (7,810–37,351)	925 (161–1,688)	33,707 (10,678–56,736)
	Average	5,971 (4,280–7,661)	461 (297–625)	10,666 (7,674–13,658)
	Not serious	1,976 (509–3,442)	199 (96–302)	11,948 (2,607–21,288)
Duration of hospitalisation	1 to 3 days	1,468 (767–2,168)	264 (123–404)	6,931 (3,338–10,523)
	Above 3 days	17,813 (9,918–25,708)	1,193 (741–1,645)	21,690 (11,568–31,813)

Source: Authors' estimates.

Table 5: Mean Medical OOPE and Incidence of CHE on Hospitalisation under PMJAY in 2022 According to Hospital Type (95% CI)

Types of Hospitals	Mean Medical OOPE (₹)	CHE10 (%)	CHE40 (%)
Public hospitals	426 (283–568)	0.5 (0.1–1.9)	1.7 (0.8–3.6)
Private hospitals	18,382 (10,491–26,273)	29.6 (24.9–34.8)	16.6 (12.9–21.1)

Source: Authors' estimates

hospitals were too powerful to be regulated (Nandi and Schneider 2020b; Sanders et al 2019). Why did patients pay to the hospitals? Did they not know that the services were meant to be free under PMJAY? If we use the education level of patients as a proxy for awareness, it is seen to not affect the amount of medical OOPE.

Competition among providers is expected to improve the services and bring down prices (Siciliani et al 2017). However, episodes in the districts with a very high density of private hospitals and thus a good likelihood of competition did not show lower medical OOPE than those with lower hospital density.

We found that the vulnerable sections such as the STs and women were largely dependent upon the public sector, even though PMJAY offered the promise of affordable access to the private sector. Studies on PFHI schemes in the country have also reported a similar pattern (Nandi et al 2017). We found that utilising public hospitals saved people from incurring large medical OOPE. Earlier studies have also shown that public sector services were substantially cheaper for patients than using the private sector, irrespective of PFHI schemes (Ranjan et al 2018; Nandi et al 2017; Garg et al 2020).

This article examined the medical OOPE where it was known for certain that PFHI was utilised, that is, a claim was paid to the hospital. It factored in the perceived severity of illness while comparing OOPE between the public and private hospitals, which many earlier studies had listed as a limitation. A key reason for the ineffectiveness of PMJAY on financial protection was the widespread practice of dual billing by private hospitals empanelled under the scheme. Improvements in pricing failed to limit this practice. Neither competition nor contracts

Table 7: PSM Models for the Effect of Utilisation of Private Hospitals on Medical OOPE and CHE

Indicator	Average Treatment Effect on Treated (ATET) in PSM Model		
	Coefficient	95% CI of Coefficient	p-value
Medical OOPE (₹)	14,322	9,595–19,050	<0.01
Log of medical OOPE	1.97	1.29–2.61	<0.01
CHE10	3.33	2.86–4.01	<0.01
CHE40	11.11	5.88–50.02	0.01

Source: Authors' estimates.

Table 6: Regression Models for Medical OOPE, Log of Medical OOPE, CHE10 and CHE40

Variables	Category	Log of Medical OOPE OLS (n=656) R Square=0.32		Medical OOPE OLS (n=656) R Square=0.12		CHE10 Logistic (n=656)		CHE40 Logistic (n=656)	
		Coeff	p-value	Coeff	p-value	Adj odds ratio	p-value	Adj odds ratio	p-value
Facility type	Public	Ref		Ref		Ref		Ref	
	Private	2.48	<0.01	10,264	<0.01	39.72	<0.01	6.91	<0.01
Duration of hospitalisation	1 to 3 days	Ref		Ref		Ref		Ref	
	Above 3 days	1.52	<0.01	3,182	0.25	2.28	0.03	2.59	0.04
Tertiles of districts by density of empanelled private hospitals	High-density	Ref		Ref		Ref		Ref	
	Medium-density	−0.39	0.20	1,444	0.60	1.11	0.78	1.25	0.60
	Low-density	0.05	0.85	2492	0.35	1.15	0.70	1.19	0.67
Disease category	Non-communicable diseases	Ref		Ref		Ref		Ref	
	Communicable diseases	0.01	0.98	−3,130	0.38	1.79	0.28	1.38	0.55
	Maternal care	−0.18	0.69	−10,995	0.01	0.12	0.02	0.21	0.07
	Injuries	−0.40	0.30	−5,692	0.11	1.13	0.82	0.50	0.23
	Others	−0.02	0.96	−6,314	0.10	1.12	0.83	0.52	0.26
Perceived severity of illness at the time of admission	Seriously ill	Ref		Ref		Ref		Ref	
	Medium	0.19	0.55	−10,772	<0.01	0.42	0.01	0.36	0.01
	Not seriously ill	0.45	0.25	−10,214	<0.01	0.17	0.01	0.51	0.26
Per capita household consumption expenditure quintiles	Poorest	Ref		Ref		Ref		Ref	
	Poor	−1.09	<0.01	−3,543	0.29	0.33	0.01	0.14	<0.01
	Middle	−1.29	<0.01	−4,245	0.23	0.37	0.04	0.18	<0.01
	Rich	−1.24	<0.01	−6,694	0.07	0.35	0.03	0.13	<0.01
	Richest	−0.80	0.07	−1,354	0.74	0.21	<0.01	0.13	<0.01
Sex	Male	Ref		Ref		Ref		Ref	
	Female	−0.27	0.32	−1,424	0.57	0.92	0.79	0.47	0.07
Family size		0.02	0.80	−540	0.33	0.89	0.08	0.82	0.01
Age category	< 5 years	Ref		Ref		Ref		Ref	
	5–14 years	0.95	0.08	5,599	0.26	3.30	0.09	3.87	0.10
	15–48 years	0.64	0.21	2,799	0.55	2.60	0.16	1.49	0.63
	49–59 years	1.16	0.03	8,290	0.09	2.82	0.13	2.61	0.23
	> 60 years	0.78	0.18	1,310	0.80	4.45	0.03	2.96	0.18
Education category	Not literate	Ref		Ref		Ref		Ref	
	Primary	0.71	0.05	−1,574	0.64	1.19	0.67	1.22	0.68
	High school	0.41	0.30	−4,393	0.22	1.47	0.41	1.28	0.66
	Graduation or above	0.68	0.13	3,093	0.45	1.84	0.22	2.76	0.08
Place of residence	Rural	Ref		Ref		Ref		Ref	
	Urban	0.41	0.14	−1,154	0.65	0.98	0.96	0.75	0.45
Caste (social group)	Scheduled Tribes	Ref		Ref		Ref		Ref	
	Scheduled Castes	−0.02	0.96	−5,540	0.17	1.30	0.64	0.40	0.21
	Other Backward Classes	−0.52	0.14	−1,657	0.61	0.57	0.26	0.79	0.68
	Others	−0.17	0.70	−3,759	0.36	1.00	0.99	1.72	0.38

Source: Authors' estimates.

were found to be effective in steering the for-profit private healthcare providers towards the desired goals of PMJAY. A key limitation was that we did not have a comparison group, that is, hospitalisation episodes in which PMJAY was not utilised. It needs to be explored if practices similar to dual billing are common in other LMICs. Further research is recommended to find ways to address dual billing.

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