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Trends in Healthcare Financing Patterns Among Inpatients in Tertiary Care Trust Hospital: A Six-Year Retrospective Study (2020–2025)

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ABSTRACT

Background: Though, Health insurance is important for financing inpatient healthcare. Out-of-pocket expenditure continues to dominate healthcare financing in India. This study examined temporal trends in Cash:(out of pocket expenditure) versus Credit:(insurance/funded) payment for hospitalization characteristics associated with payment mode, using six years of hospital admission records.

Methods: This retrospective study analysed routinely collected inpatients admission records data from a trust hospital in India, covering January 2020– December 2025 and analysed by year, age, gender, department, and length of stay. Using Pearson chi-square test, Cochran-Armitage trend, and Mann-Whitney U tests.

Results: Of all admissions, 15,659 (36.1%) were Credit and 27,704 (63.9%) were Cash. Credit patients were significantly younger (median 37.0 vs. 44.0 years, $p < 0.001$). Credit utilization rose from 31.0% (2020) to a peak of 41.4% (2024) before falling to 32.1% (2025), with no significant linear trend overall (Cochran-Armitage $p = 0.392$), despite a significant year wise association $\chi^2(5) = 247.7$, $p < 0.001$). State schemes' share fell from 59.8% to 49.1%, while private insurance share nearly doubled to 40.6% ($p < 0.001$). Funded patients stayed significantly longer than Cash patients.

Conclusion: Nearly two in three admissions (63.5%) were paid entirely out of pocket, with funded financing covering just over a third. Credit patients were significantly younger and stayed significantly longer in hospital than cash patients in every department, a gap that may partly reflect cash paying patients curtailing their stay for cost reasons. These findings highlight a substantial, unevenly distributed gap in financial protection relevant to Universal health coverage goals.

Keywords: *health insurance; hospital claims data; India; length of stay; out-of-pocket expenditure; payment mode; universal health coverage*

INTRODUCTION

Financial risk protection is one dimension of UHC and providing financial risk protection is a specific target of the Sustainable Development Goals (SDGs) of the United Nations. [1] In 2019, 193 countries, including India, unanimously affirmed their strong political commitment to universal health coverage (UHC) in a high-level meeting conducted by the United Nations. UHC means that all individuals receive quality health services without suffering financial hardship. [2] But still healthcare financing remains one of the most formidable challenges facing India's health system. Despite decades of policy attention, public spending on health has historically been low, leaving households to shoulder a disproportionately large share of the financial burden of illness through out-of-pocket payments.

Evidence from the National Health Accounts for 2022-2023 published in 2026 indicates that OOP expenditure on healthcare alone accounted for around 49.90% of total OOP health expenditure, despite the presence of multiple health insurance programmes. [3] Health insurance has been promoted as the principal instrument for correcting this imbalance. According to the NSS 80th round data, a substantial proportion of households remain without health insurance coverage or expenditure support. The proportion of uncovered households was 52.6% in rural areas and 55.7% in urban areas, indicating that more than half of households in both sectors lacked coverage under any health insurance scheme. [4] Compounding these disparities, more than 400 million Indians — over 30% of the population remain without any form of insurance, a “missing middle” that falls between government schemes and the organised sector. [5]

Much of the evidence base on health insurance utilization in India rests on periodic, nationally or state-representative household surveys, principally the National Sample Survey rounds on Social Consumption: Health. [4,6] These surveys are indispensable for estimating population level coverage and catastrophic expenditure, but by design they capture self-reported utilization at a point in time rather than continuous, facility-level utilization as it evolves from year to year. Hospital based claims and admission datasets offer a complementary, more operationally grounded view; because they are generated as a byproduct of routine care delivery, they can be used to track trends in payer mix, patient characteristics, and length of stay continuously over time at the institutions where care is actually delivered. This approach has been demonstrated in prior evaluations of specific publicly funded schemes in India, including analyses of enrolment and claims data from Meghalaya’s state health insurance scheme. [7]

Charitable trust hospitals occupy a distinctive position in this landscape. Unlike public sector government hospitals, where treatment is free, and purely private corporate hospitals, where Cash paying patients are comparatively rare due to high Out of Pocket Expenditure (OOPE), hence a tertiary-care trust hospital serving a mixed patient population is more likely to generate a substantial volume of both Cash:(out-of-pocket expenditure) and Credit:(insurance/funded) admissions within a single institutional setting. This makes such hospitals methodologically useful.

Therefore, the present study uses six years (January 2020–December 2025) of routinely collected inpatient admission records from a Tertiary care Charitable trust hospital to examine temporal trends in Cash payment versus Credit for hospitalization, department-wise distribution, and length of stay, spanning the Pandemic phase (2020–2022) and the post-Pandemic phase (2023–

2025), and compares utilization between the two phases.

By examining these patterns, the study seeks to generate empirical evidence that can contribute to a better understanding of healthcare utilization and the operational implications of health insurance claims in the Indian healthcare setting.

MATERIALS & METHODS

Study Design and Setting:

This was a hospital-based retrospective study of payment mode utilization among inpatients admitted to a tertiary care charitable trust hospital located in Hyderabad, Telangana state India. This trust hospital setting was chosen purposively, as government hospitals in the region generate minimal or no insurance claims volume, while purely private hospitals see few cash paying patients due to high out of pocket expenditure (OOP); whereas a charitable trust hospital, which admits both categories of patients in substantial numbers and accepts both payment modes either Cash (out-of-pocket expenditure) or Credit:(insurance/funded), was therefore considered best suited to characterize the full spectrum of payment mode utilization within a single institutional setting.

Study Period and Population

From the hospital data base, all the patient's identifiable information was removed by the IT department administrators before giving us the access and transferred to us for Data analysis to prevent individual level re identification. The received data included age, gender, department, Payment mode (cash or credit), and Length of stay.

The study covered all inpatient admissions recorded at the hospital over a six-year period from January 2020 to December 2025.

Six files with annual admissions were included in the files. The IT department staff provided full support whenever necessary to resolve any queries during the data cleaning process in case of duplicate admission entries.

Variables

The primary exposure variable was payment mode at admission: Cash (out-of-pocket) or Credit: (insurance/funded). For credit funded admissions, the payer category classified each admission as State government, Central government/Public Sector Undertaking, or private insurance. The primary temporal variable was admission year (2020-2025). Patient age, gender, treating department, and length of stay (duration of hospital stay in days) were used to analyze in relation to payment mode.

A total of 43,363 inpatient admission records were available for analysis. All admissions recorded in the hospital's administrative database during this period were included.

Statistical Methods

Categorical variables were summarized as frequencies and percentages; continuous variables (age, length of stay) were summarized as median with interquartile range (IQR), or mean with standard deviation (SD), according to their distribution.

Associations between categorical variables - payment mode versus age group, gender, department, admission year, and payer category were tested using the Pearson chi-square (χ^2) test of independence.

From the data, year on year linear trend in the proportion of credit: (insurance/funded) admissions was tested using the Cochran-Armitage trend test, the appropriate test for a linear trend in a binary proportion across an ordered categorical variable (admission year). Age was compared between the cash and credit groups using the Mann-Whitney U test, as age was not normally distributed. Length of stay was compared between the cash and credit groups - overall and separately within each department - using the Mann-Whitney U test.

For the purposes of this study, the study period was divided into two phases: the pandemic period was defined as 2020–2022, while the post pandemic period was defined

as 2023–2025, following the temporal classification used by Qi et al. (2026) [8]. The overall study was performed using the chi-square test of independence. A two-sided p-value <0.05 was considered statistically significant for all tests. All analyses were performed in Python (SciPy, pandas).

Ethical Considerations

After the approval of the Institutional Ethics Committee clearance with the (Registration number: ECR/477/Inst/AP/2013/RR-25). The patient identifier field was excluded from the analytic dataset, and all results are reported in aggregate and de identified form.

RESULT

Characteristics of the Study Population

Table 1. Characteristics of Inpatient Admissions by Payment Mode (2020–2025)

Characteristic	Cash (n = 27704)	Credit: (n = 15659)	Total (N = 43363)
Age, years – median (IQR)[a]	44.0 (34.0–61.2)	37.0 (30.7–44.2)	40.7 (32.5–56.0)
Age group, n (%)[b]			
<18 years	1157 (4.2%)	247 (1.6%)	1404 (3.2%)
18–40 years	10194 (36.8%)	9612 (61.4%)	19806 (45.7%)
41–60 years	9034 (32.6%)	3967 (25.3%)	13001 (30.0%)
>60 years	7319 (26.4%)	1833 (11.7%)	9152 (21.1%)
Gender, n (%)[b]			
Female	13925 (50.3%)	7608 (48.6%)	21533 (49.7%)
Male	13779 (49.7%)	8051 (51.4%)	21830 (50.3%)
Department, n (%)[b]			
General Medicine	6423 (23.2%)	5353 (34.2%)	11776 (27.2%)
Cardiology	5547 (20.0%)	1896 (12.1%)	7443 (17.2%)
General Surgery	179 (0.6%)	4963 (31.7%)	5142 (11.9%)
Obstetrics	2470 (8.9%)	1150 (7.3%)	3620 (8.3%)
Gynecology	1818 (6.6%)	480 (3.1%)	2298 (5.3%)
Nephrology	1490 (5.4%)	349 (2.2%)	1839 (4.2%)
ENT	1776 (6.4%)	0 (0.0%)	1776 (4.1%)
Pediatrics	1287 (4.6%)	291 (1.9%)	1578 (3.6%)
Gastroenterology	1137 (4.1%)	427 (2.7%)	1564 (3.6%)
Orthopedics	1117 (4.0%)	280 (1.8%)	1397 (3.2%)
Psychiatry	1352 (4.9%)	0 (0.0%)	1352 (3.1%)
Plastic Surgery	987 (3.6%)	0 (0.0%)	987 (2.3%)
Neurology	758 (2.7%)	175 (1.1%)	933 (2.2%)
Emergency Medicine	689 (2.5%)	158 (1.0%)	847 (2.0%)
Oncology	674 (2.4%)	137 (0.9%)	811 (1.9%)

[a] Mann-Whitney U test (non-normal distribution): U = 273,960,943.5, p <0.001. [b] Pearson chi-square test of independence. Age group: $\chi^2(3) = 2735.5$, p <0.001. Gender: $\chi^2(1) = 11.2$, p <0.001. Department: $\chi^2(14) = 12550.2$, p <0.001. IQR = interquartile range (25th–75th percentile).

Of the 43,363 admissions analyzed, 27,704 (63.9%) were financed by direct cash payment and 15,659 (36.1%) were financed through Credit based payment and also this category was also significantly younger than cash paying patients (median 37.0 vs. 44.0 years, p <0.001). Credit category declined steadily with increasing age, consistent with the concentration of employment linked state and central government schemes in the working age population. The gender distribution differed modestly but significantly, with a slightly higher share of male patients among funded admissions (51.4%) than cash admissions (49.7%). The department wise distribution showed the strongest association with payment mode of all variables tested: General Surgery was overwhelmingly insurance financed (96.5% credit), while ENT, Psychiatry, and Plastic Surgery recorded zero Credit admissions

across the entire six-year period, a structural pattern explored further below.

Annual Trend in Cash vs. Credit Payment Mode

Table 2a. Annual Inpatient Admissions by Payment Mode (2020-2025)

Year	Cash, n (%)	Credit, n (%)	Total, N
2020	3890 (69.0%)	1747 (31.0%)	5637
2021	4373 (62.2%)	2652 (37.8%)	7025
2022	3954 (62.3%)	2396 (37.7%)	6350
2023	4037 (63.1%)	2363 (36.9%)	6400
2024	4694 (58.6%)	3312 (41.4%)	8006
2025	6756 (67.9%)	3189 (32.1%)	9945
Total	27704 (63.9%)	15659 (36.1%)	43363

Pearson chi-square test of independence (year × payment mode): $\chi^2(5) = 247.7$, $p < 0.001$. Cochran-Armitage trend test for linear trend in insured/funded proportion across ordered year categories: $Z = 0.86$, two-sided $p = 0.392$.

Table 2b. Credit: Insured/Funded Utilization by Pandemic Phase

Pandemic Phase	Cash, n (%)	Credit, n (%)	Total, N
Pandemic phase (2020–2022)	12217 (64.3%)	6795 (35.7%)	19012
Post pandemic phase (2023–2025)	15487 (63.6%)	8864 (36.4%)	24351

Pearson chi-square test of independence (phase × payment mode): $\chi^2(1) = 1.99$, $p=0.158$.

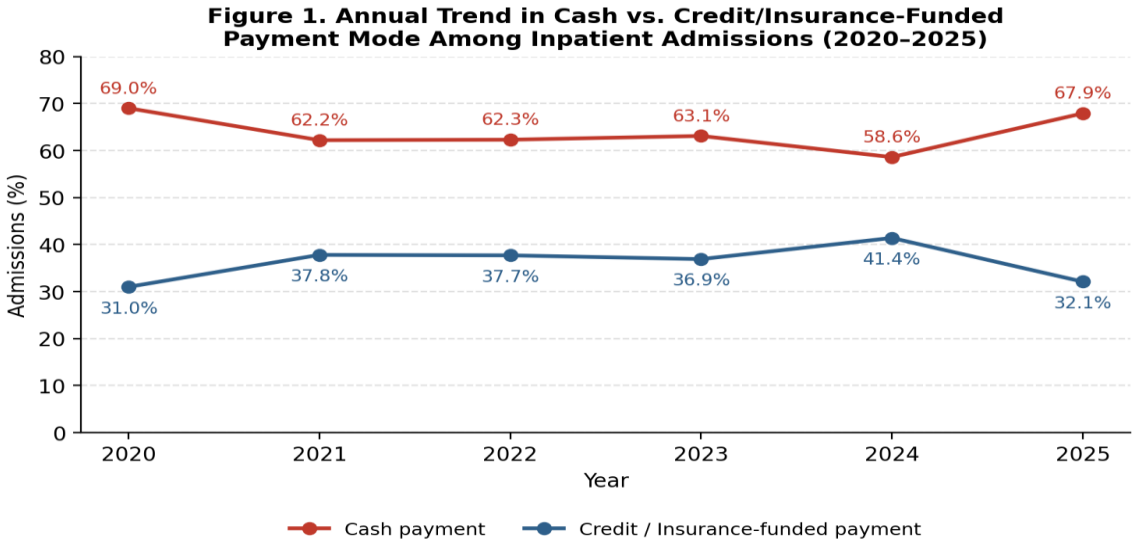


Figure 1. Annual Trend in Cash vs. Credit Payment Mode Among Inpatient Admissions (2020–2025)

Total inpatient volume grew from 5,637 admissions in 2020 to 9,945 in 2025, alongside a statistically significant association between year and payment mode ($p < 0.001$). The Credit category share rose from 31.0% (2020) to a peak of 41.4% (2024) before falling back to 32.1% in 2025, while the cash share correspondingly fell from 69.0% to a low of 58.6% in 2024 before rising sharply back to 67.9% in 2025, which is the highest cash share recorded since the start of the study period. The Cochran Armitage trend test did not detect a statistically significant linear trend over the full six-year period ($p = 0.392$), because the pattern rises through 2024 and then reverses in 2025 rather than following a consistent linear direction. The 2025 change was the largest year to year shift in payment mode in the study period; the reasons for it cannot be determined from this dataset.

Comparing the Pandemic phase (2020–2022) with the post pandemic phase (2023–2025), in the table the proportion Credit

utilization remained relatively stable between the Pandemic phase and post Pandemic phase with no statistically significant difference between the periods.

Distribution of Credit: (insurance/funded) category by Year

Table 3. Distribution of Credit Category Among Credit Admissions, by Year (2020–2025)

Year	State Govt. Scheme, n (%)	Central Govt./PSU, n (%)	Private Insurance, n (%)	Total Insured, N
2020	1045 (59.8%)	305 (17.5%)	397 (22.7%)	1747
2021	1546 (58.3%)	430 (16.2%)	676 (25.5%)	2652
2022	1277 (53.3%)	543 (22.7%)	576 (24.0%)	2396
2023	1246 (52.7%)	435 (18.4%)	682 (28.9%)	2363
2024	1969 (59.5%)	410 (12.4%)	933 (28.2%)	3312
2025	1565 (49.1%)	330 (10.3%)	1294 (40.6%)	3189
Total	8648 (55.2%)	2453 (15.7%)	4558 (29.1%)	15659

Pearson chi-square test of independence (year × scheme category), for Credit admissions: $\chi^2(10) = 421.4$, $p < 0.001$. State = state government scheme (e.g., Aarogyasri, EHS, APSRTC/TSRTC employee schemes, Arogya Bhadratha); Central = central government/public sector undertaking (PSU) scheme; Private = private health insurance.

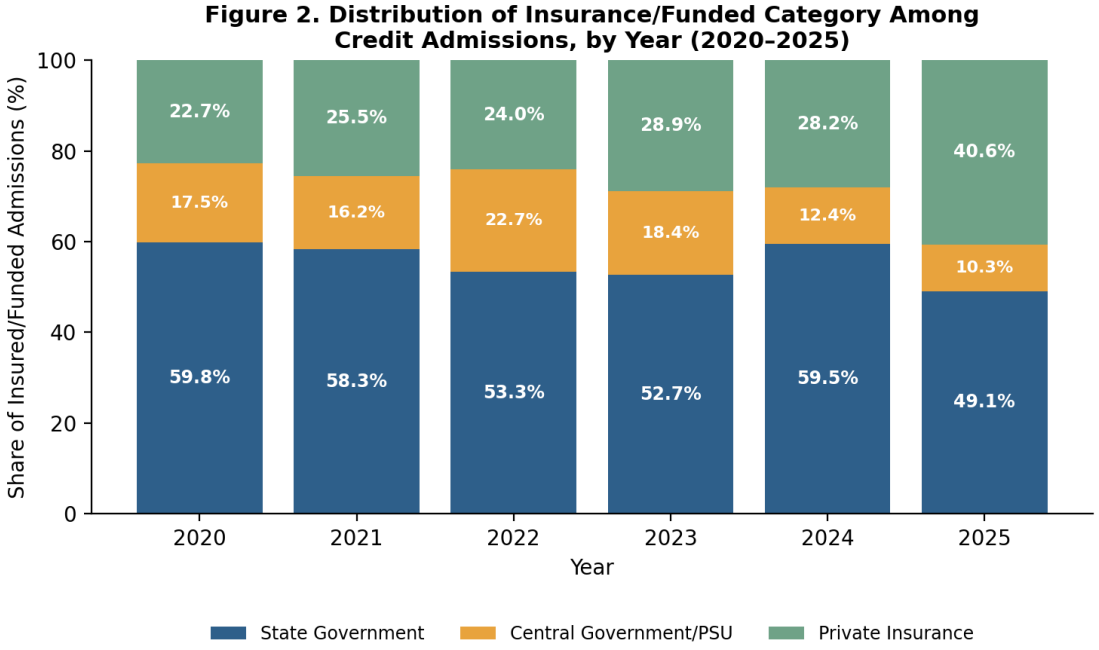


Figure 2. Distribution of Credit Category Among Credit Admissions, by Year (2020-2025)

Among Credit: insured/funded admissions, state government schemes remained the dominant payer category throughout the study period, though their share declined from 59.8% in 2020 to 49.1% in 2025. Over the same period, private insurance nearly doubled its share, rising from 22.7% in 2020 to 40.6% in 2025, which is the largest relative shift observed in this dataset. The central government/PSU category remained the smallest throughout, declining from 17.5% to 10.3% with no reversal.

Length of Stay by Department and Payment Mode

Table 4. Average Length of Hospital Stay by Department, Cash vs. Credit Payment Mode (2020–2025, Six Years Combined)

Department	Cash: mean LOS, days (SD)	Credit: mean LOS, days (SD)	Difference[a] (Credit − Cash)	p-value[b]
Nephrology	8.44 (1.53)	11.52 (0.50)	+3.08	<0.001
Oncology	6.54 (1.58)	9.56 (0.50)	+3.02	<0.001
Neurology	7.03 (1.22)	9.52 (0.50)	+2.49	<0.001
Cardiology	4.55 (1.65)	8.29 (0.64)	+3.74	<0.001
Orthopedics	5.63 (0.95)	7.49 (0.50)	+1.86	<0.001
General Surgery	4.00 (0.00)	5.55 (0.77)	+1.55	<0.001
Pediatrics	3.88 (0.33)	4.54 (0.50)	+0.66	<0.001
Gynecology	3.24 (0.66)	4.47 (0.50)	+1.23	<0.001
Gastroenterology	3.19 (0.65)	4.36 (0.48)	+1.17	<0.001
Obstetrics	3.12 (0.63)	4.31 (0.46)	+1.19	<0.001
General Medicine	2.89 (0.50)	4.22 (0.41)	+1.33	<0.001
Emergency Medicine	1.88 (0.32)	2.52 (0.50)	+0.64	<0.001
ENT	2.00 (0.44)	No credit admissions	-	-
Plastic Surgery	2.95 (1.15)	No credit admissions	-	-
Psychiatry	2.00 (0.44)	No credit admissions	-	-

[a] Difference in mean length of stay, Credit:(Insurance/funded) minus Cash, in days. [b] Mann-Whitney U test (cash vs. credit length of stay within department; non-normal distribution). ENT, Plastic Surgery, and Psychiatry had no credit:(insurance/funded) admissions. LOS = length of stay (days); SD = standard deviation.

Across every department with both payment groups represented, Credit patients stayed significantly longer than cash paying patients (p <0.001 in all 12 comparable departments). Nephrology recorded the longest average stay in both payment groups and the largest absolute cash versus credit with a gap of (11.52 days for credit vs. 8.44 days for cash, a difference of +3.08 days), followed by Oncology (9.56 vs. 6.54 days) and Neurology (9.52 vs. 7.03 days) departments managing chronic, complex, or late-presenting conditions. The shortest stays in both groups were in Emergency Medicine (1.88 days in cash category, 2.52 days in credit). The consistently longer stay among credit patients across departments may reflect more complete or more complex case profiles among scheme covered admissions, more conservative discharge practice once costs are covered by a third party, or administrative time required for insurance/scheme processing before discharge; the dataset cannot distinguish between these explanations.

Department-wise Payment Mode Distribution, by Year

Table 5. Department wise Payment Mode Distribution (%), by Year (2020–2025)

Department	Year	Total Admissions, N	Cash, %	Credit, %
Cardiology	2020	971	79.1%	20.9%
	2021	1223	77.0%	23.0%
	2022	1166	75.0%	25.0%
	2023	1183	74.0%	26.0%
	2024	1299	73.1%	26.9%
	2025	1601	71.0%	29.0%
General Medicine	2020	1737	65.7%	34.3%
	2021	2059	51.5%	48.5%
	2022	1768	51.4%	48.6%
	2023	1778	50.3%	49.7%
	2024	2087	50.3%	49.7%
	2025	2347	58.3%	41.7%
General Surgery	2020	864	10.0%	90.0%
	2021	887	0.0%	100.0%
	2022	863	0.0%	100.0%

	2023	791	0.0%	100.0%
	2024	801	0.0%	100.0%
	2025	936	9.9%	90.1%
Obstetrics	2020	398	90.2%	9.8%
	2021	527	55.2%	44.8%
	2022	578	70.4%	29.6%
	2023	562	76.0%	24.0%
	2024	709	49.5%	50.5%
	2025	846	75.1%	24.9%
Gynecology	2020	263	90.1%	9.9%
	2021	321	90.0%	10.0%
	2022	297	89.2%	10.8%
	2023	314	87.3%	12.7%
	2024	519	51.6%	48.4%
	2025	584	83.0%	17.0%
Orthopedics	2020	215	80.0%	20.0%
	2021	234	78.2%	21.8%
	2022	229	76.4%	23.6%
	2023	182	78.0%	22.0%
	2024	222	81.1%	18.9%
	2025	315	84.1%	15.9%
Neurology	2020	91	90.1%	9.9%
	2021	158	87.3%	12.7%
	2022	111	84.7%	15.3%
	2023	124	81.5%	18.5%
	2024	159	78.6%	21.4%
	2025	290	75.2%	24.8%
Nephrology	2020	182	90.1%	9.9%
	2021	315	87.3%	12.7%
	2022	214	84.1%	15.9%
	2023	219	81.3%	18.7%
	2024	357	78.2%	21.8%
	2025	552	75.0%	25.0%
Gastroenterology	2020	170	90.0%	10.0%
	2021	246	68.7%	31.3%
	2022	195	84.1%	15.9%
	2023	217	81.1%	18.9%
	2024	303	49.5%	50.5%
	2025	433	75.1%	24.9%
Oncology	2020	19	94.7%	5.3%
	2021	37	94.6%	5.4%
	2022	31	90.3%	9.7%
	2023	39	89.7%	10.3%
	2024	273	82.8%	17.2%
	2025	412	80.6%	19.4%
Pediatrics	2020	87	90.8%	9.2%
	2021	140	90.0%	10.0%
	2022	203	89.2%	10.8%
	2023	264	87.1%	12.9%
	2024	383	66.6%	33.4%
	2025	501	83.0%	17.0%
Emergency Medicine	2020	95	90.5%	9.5%
	2021	115	87.8%	12.2%
	2022	113	84.1%	15.9%
	2023	129	81.4%	18.6%
	2024	154	78.6%	21.4%
	2025	241	75.1%	24.9%
ENT	2020	245	100.0%	0.0%

	2021	322	100.0%	0.0%
	2022	256	100.0%	0.0%
	2023	247	100.0%	0.0%
	2024	327	100.0%	0.0%
	2025	379	100.0%	0.0%
Plastic Surgery	2020	123	100.0%	0.0%
	2021	188	100.0%	0.0%
	2022	133	100.0%	0.0%
	2023	137	100.0%	0.0%
	2024	161	100.0%	0.0%
	2025	245	100.0%	0.0%
Psychiatry	2020	177	100.0%	0.0%
	2021	253	100.0%	0.0%
	2022	193	100.0%	0.0%
	2023	214	100.0%	0.0%
	2024	252	100.0%	0.0%
	2025	263	100.0%	0.0%

Cash % and Credit % are row percentages of that department's total admissions in the given year. ENT, Plastic Surgery, and Psychiatry recorded 0% credit admissions in every year of the study period.

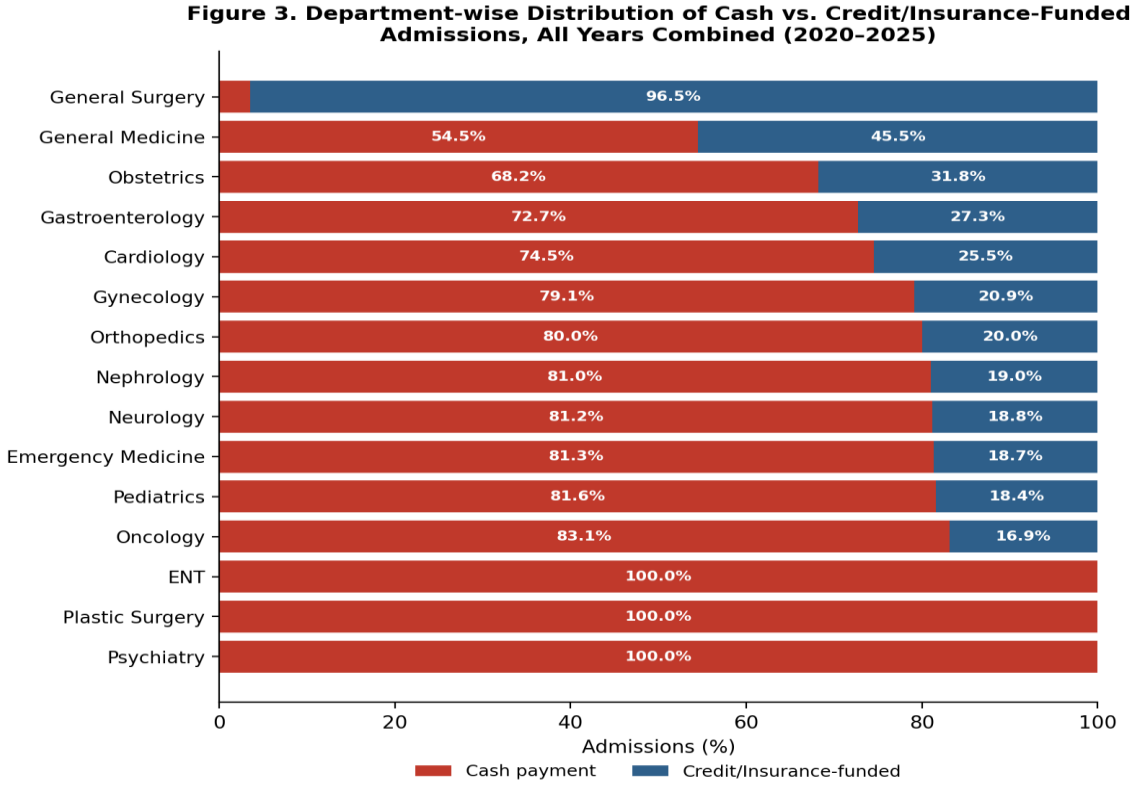


Figure 3. Department-wise Distribution of Cash vs. Credit Admissions, All Years Combined (2020–2025)
Pearson chi-square test of independence (department × payment mode), six years combined: $\chi^2(14) = 12550.2$, $p < 0.001$.

Department wise payment mode varied markedly in both magnitude and year on year stability. General Surgery stood out as almost entirely Credit: (insurance/fund financed across the full period (96.5% credit overall), and notably reached 100% credit financing in four consecutive years (2021-2024) before a small cash share (9.9-10.0%) reappeared in 2020 and 2025. General Medicine was the only other department where cash and credit shares were close to balanced, and even here in Table 5. Credit category share rose from 34.3% in 2020 to a peak of 49.7% in 2023 and 2024 before

falling back to 41.7% in 2025, echoing the overall hospital wide 2025 pattern. At the other end, ENT, Plastic Surgery, and Psychiatry recorded 0% credit financing in every single year from 2020 to 2025 without exception, confirming that this is a structural, scheme empanelment level exclusion rather than a transient or declining pattern. Most remaining departments (Obstetrics, Gynecology, Orthopedics, Nephrology, Gastroenterology, Oncology, Pediatrics, Emergency Medicine, Neurology) showed a broadly consistent gradual rise in credit share from 2020 through 2023 and 2024, followed by at least a partial pullback in 2025, mirroring the overall trend rather than following independent department specific trajectories.

DISCUSSION

This six year hospital level data analysis found that just over a third (36.1%) of inpatient admissions at this tertiary-care trust hospital were financed through insurance or other third party funding, whereas the remaining 63.9% paid in cash. This proportion sits broadly in line with national survey evidence that roughly half of Indian households remain without any health insurance coverage,[4] and is consistent with the persistence of high out of pocket expenditure documented in the most recent National Health Accounts.[3] It also illustrates, at the level of a single institution, the "missing middle" phenomenon described in national level analyses, a substantial population that is neither reliably captured by government schemes nor by private insurance.[5]

Credit payment mode did not rise steadily over the six years. It went up from 31.0% in 2020 to 41.4% in 2024, and then dropped back to 32.1% in 2025. Because of this up-and-then-down pattern, the trend test (Cochran-Armitage $Z = 0.86$, $p = 0.392$) found no steady upward or downward trend, even though the share clearly changed from year to year ($\chi^2(5) = 247.7$, $p < 0.001$). So, this data does not support the idea that insurance use simply kept increasing. The reason for the drop in 2025 cannot be identified from hospital records alone. Several explanations are possible, such as changes in which insurance schemes the hospital works with, changes in how many patients hold or are able to use insurance, or changes in the types of patients admitted. Private hospitals have also reported delays and rejections of claims under India's major public insurance schemes,[12,14] which could make both hospitals and patients less willing to use insurance for an admission. Data from later years would show whether the 2025 drop continues or was a one-year change.

The marked shift in payer composition of state government schemes share of credit/funded admissions falling from 59.8% to 49.1%, while private insurance share nearly doubled from 22.7% to 40.6% is consistent with the broader expansion of India's private health insurance market observed since the onset of the COVID-19 pandemic, with industry analyses reporting double digit annual growth in health insurance premiums through 2024-2025.[13] This shift may reflect a combination of rising private insurance penetration among the hospital's catchment population and possible changes in the hospital's own empanelment relationships with specific state scheme providers over time; the dataset cannot distinguish between these explanations.

The department wise findings carry direct operational relevance. General Surgery's near total insurance financing (96.5%, reaching 100% in four consecutive years) mirrors the pattern long reported for government sponsored tertiary care schemes in this region, which are structured around a defined package of procedures - heavily weighted toward surgical and cardiac interventions, rather than general outpatient type care.[7,9] Conversely, the complete absence of funded admissions in ENT, Psychiatry, and Plastic Surgery across all six years, in every single year without exception, indicates a structural, scheme

level exclusion rather than a transient gap, and is consistent with the well documented limitation that India's major publicly funded schemes cover only a defined package of conditions, with psychiatric care in particular remaining largely outside the ambit of most tertiary care insurance packages nationally.[6] This has a direct equity implication: patients requiring care in these departments at this hospital bear the full cost out of pocket regardless of their insurance status.

The consistently longer length of stay among credit patients, observed in every comparable department ($p < 0.001$ throughout), parallel findings from claims based analyses of South India's state sponsored Aarogyasri scheme, where nephrology similarly emerged as the department with by far the longest length of stay among scheme beneficiaries.[9] This cross study consistency lends some support to a clinical explanation that the nephrology and oncology admissions financed through third party schemes may disproportionately involve more complex, resource intensive conditions such as dialysis dependent renal failure cases, though administrative factors specific to claims processing and more conservative discharge practice under third party funded care cannot be excluded with this dataset alone.

The slightly higher proportion of male patients among funded admissions (51.4% vs. 49.7% among cash admissions, $p < 0.001$) is consistent with prior claims based evidence from South Indian government sponsored schemes, which similarly found men overrepresented among beneficiaries relative to women even for conditions that are not sex-specific, suggesting that the disparity reflects differential health seeking behavior, household decision making around insured care rather than a differing underlying burden of disease.[11] Younger age among credit patients (median 37 vs. 44 years) likely reflects the concentration of employment linked state and central government schemes, several of which cover public sector undertaking employees and their dependents, within the working age population.

Strengths and Limitations

This study's principal strength is its use of six years of complete, routinely collected hospital administrative data rather than self-reported survey data, allowing continuous, facility level tracking of payer mix, department level variation, and length of stay that household surveys cannot provide. Several limitations should be noted.

First, the trust hospital setting, while methodologically advantageous for comparing Cash and Credit utilization within one institution, limits generalizability to purely government or purely private hospital settings. Second, the absence of a pre-pandemic (pre-2020) baseline means the Pandemic phase versus post pandemic phase comparison cannot be interpreted as a true before/after analysis of COVID-19's impact. Third, the consistently longer length of stay among credit admissions cannot be attributed to this dataset alone to clinical severity, conservative discharge practice, or insurance processing time. Fourth, we excluded the readmission details and Fifth, we couldn't specifically categorize credit into full reimbursement or co-pay types. Taken together, these findings are based on the data available from one hospital for 2020–2025 and need to be followed up with data from earlier years (before 2020), later years (after 2025), and other hospitals too. Such studies would show whether the patterns seen here, such as the 2025 change in payment mode, continue over time, and would add to our understanding of how inpatient care in India is paid for.

CONCLUSION

Over a six year period, just over a third of inpatient admissions at this tertiary care hospital were financed through credit funding, with a payer mix that shifted markedly toward private insurance. Credit utilization did not follow a simple, steadily rising trajectory; it rose through the

Pandemic to mid pandemic recovery years before reversing in the most recent 2025 year of data. This may reflect real changes in how people used health services and insurance, or changes in the hospital's own insurance tie-ups; this study cannot tell which, and data from later years are needed Department-level analysis revealed structural gaps in scheme coverage, with departments like ENT, Psychiatry, and Plastic Surgery entirely excluded from insurance financing throughout the study period, alongside consistently longer hospital stays among Credit(insured/funded) patients across every department where comparison was possible. These findings demonstrate the operational value of routinely collected hospital claims data as a complement to national household surveys for tracking health financing patterns in India, and point to specific, actionable gaps in scheme coverage and claims processing efficiency relevant to hospital administrators, insurers, and policymakers working toward universal health coverage.

Declaration by Authors

Declaration of Generative AI and AI assisted technologies: During the preparation of this paper, the authors used Grammarly to prevent grammatical errors, enhance fluency and readability. Later, we reviewed and edited the content as necessary. We will take full responsibility for the content of the publication.

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