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# Do patients need additional coverage for chronic ailments? Insights from hospital data

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## Abstract:

**BACKGROUND:** Eliminating financial barriers and improving healthcare accessibility pertain to be key elements of the United Nation's sustainable development goals. These have directed health policymakers to advocate private health insurance as a health promotion strategy to enable patients to obtain absolute and affordable medical care when needed. Against this backdrop, the current study investigates the coverage trend and financial risk-protective nature of private health insurance plans.

**MATERIALS AND METHOD:** We examined 12 months' hospital billing data of private health insurance holders with cancer, cardiac, neurological, and renal diseases. The billing and insurance claim data of 5002 patients were extracted from the billing section of a tertiary care teaching hospital located in southern India from April 2022 through March 2023. Five per cent of patients from each disease condition were selected through proportionate random sampling for analysis ( $n = 250$ ). The cost incurred and reimbursement trend under various cost heads were investigated by examining the cost incurred by the patient during the hospitalization and comparing it with the amount reimbursed by the insurance company.

**RESULTS:** The scrutiny exhibits that private health insurance fails to provide comprehensive coverage, resulting in under-insurance among subscribers. Reimbursement received for each cost category is also discussed. To the best of our knowledge, this is the first study that has used institutional data instead of large survey data or patient data.

**CONCLUSION:** The research concludes by soliciting policymakers, healthcare providers, and insurers to develop strategies to enhance the affordability and accessibility of healthcare to promote health and wellness.

## Keywords:

Cost of disease, health promotion, out-of-pocket expenditure, under-insurance, private health insurance

## Introduction

Global demand for health insurance coverage is increasing rapidly<sup>[1]</sup> across lower-middle-income countries (LMICs)<sup>[2,3]</sup> owing to the catastrophic financial repercussions of ill health. Additionally, the economic burden of disease conditions<sup>[4-7]</sup> and partial insurance coverage<sup>[8,9]</sup> warrant immediate action to expand health insurance coverage to prevent the likely financial catastrophe.

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However, LMICs, which largely depend on private health expenditure (PHE) as a share of total health expenditure, are still far from attaining universal health coverage (UHC). PHE has a significant contribution from private health insurance (PHI), which entails a regressive type of pre-payment with a compromised risk-sharing strategy compared to Government Sponsored Health Insurance (GSHI).<sup>[10-12]</sup> Hence, PHI is not considered a suitable means for achieving UHC for countries with a huge economic burden of chronic ailments.<sup>[4,6,10]</sup> On the contrary, scholars have endorsed PHI as a

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health promotion strategy to enable patients to obtain absolute and affordable medical care when needed.<sup>[13-15]</sup> Against this backdrop, the current study investigates the reimbursement pattern and impact of PHI in chronic ailments by analyzing the hospital's billing data.

The existing literature is skewed toward GSHI. Such insights, *inter alia*, cover the assessment of the economic burden of chronic ailments<sup>[4,6,7,10]</sup> and the impact of health insurance.<sup>[3,8,9,16-20]</sup> Severe financial toxicity has been observed among cancer patients with larger family members, undergoing multiple chemotherapy cycles and accessing private healthcare facilities.<sup>[6]</sup> A recent review has also pointed out the prevalence of health coverage disruption among the low-income quintiles with cancer adversely affecting the continuum of care.<sup>[17]</sup>

Evidence from India, regarding the role of GSHI among cancer and cardiac conditions, has reported a minimal reduction in out-of-pocket cost (OOPC).<sup>[20]</sup> They have suggested the broadening of coverage owing to the soaring out-patient costs. Bodhisane<sup>[18]</sup> and Ma *et al.*<sup>[19]</sup> highlighted the dual outcome of health insurance, which reflected an increase in healthcare accessibility among cardiovascular patients, while financial protection remains questionable.

Discussing the inefficiency of GSHI in preventing financial calamity, among healthcare seekers with chronic ailments, researchers have investigated the outcome of multiple strategies in containing healthcare costs.<sup>[18,21-23]</sup> Likewise, Wu *et al.*<sup>[22]</sup> have hinted at the potential of PHI as a supplementary aid in financial risk protection across high-income countries. Sugunan *et al.*'s<sup>[23]</sup> qualitative literature synthesis reveals that the effectiveness of PHI, in providing financial protection against healthcare costs, is not well-researched across LMICs. Though Sonymol<sup>[3]</sup> scrutinized the cost components of GSHI and PHI from the patient's perspective, the study failed to assess the financial risk-protective nature of PHI. This demands a fresh insight into the role of PHI in reducing costs across chronic ailments by investigating institutional-level data. Hence, the current study answers the following research questions:

- What is the reimbursement pattern toward healthcare costs incurred by PHI holders with chronic diseases?
- What is the disease-specific impact on insurance coverage?

This study makes a few contributions to the literature. The first is its innovative methodology to evaluate the role of PHI using institutional data. Despite significant contributions to the outcomes of private health insurance, methodological concerns are extant due to the limitation of data collection techniques used in large-scale surveys. Scholars have challenged the credibility of primary

data obtained through surveys owing to its inherent recall bias.<sup>[24-28]</sup> Berete *et al.*<sup>[27]</sup>, Sinha<sup>[29]</sup> and Wagstaff<sup>[30]</sup> also have questioned this obscurity in information extracted from large-scale national surveys. This demands a fresh insight into the role of private health insurance in allaying healthcare costs by evaluating data available at the institutional level. The current study is an earnest endeavor in this regard. Second, disclosure of reimbursement patterns under different cost categories may aid health policymakers in designing optimized health plans for their subscribers. Third, from a consumer perspective, insights from this study could help understand the dynamics of reimbursement, which, in turn, can nudge the choice of an optimal healthcare plan in the future. This paper also adds to the body of knowledge in sustainable development goal 3 (Global health and wellbeing) in addressing UHC.

## Materials and Methods

### Study design and settings

This was a cross-sectional study where 1-year billing information of PHI holders, hospitalized with cardiac, cancer, renal, and neurological ailments, was investigated. The billing and insurance claims of patients hospitalized during 2022–2023 in a multi-speciality tertiary care teaching hospital located in a coastal district of South India were extracted. The selected institution is a 2000-bed multi-speciality teaching hospital with out-patient visits of more than six lakh in a year. Moreover, the hospital delivers multiple and diverse partnerships with insurance companies, providing services to more than 15 health insurance companies. The billing data of insured patients were extracted from the health information system and the insurance database of the hospital.

### Study participants and sampling

The hospital had 5002 in-patients with chronic disease conditions subscribed to PHI during the study period. Hence, the sampling frame consisted of 5002 patients. Five per cent of the sampling frame ( $n = 250$ ) was considered for the analysis. The sampling design was proportionate random sampling. Details are given in Table 1.

**Table 1: Number of patients subscribed to PHI and the selected cases**

Disease conditions	Total cases	Selected cases (5% of total)
Cardiac ailments	1497	75
Cancer ailments	1727	86
Renal ailments	1418	71
Neurological ailments	360	18
Total	5002	250

Source: Present study

## Data collections tools and technique

The study's data were extracted from the billing and insurance records of the hospital between April 2022 to March 2023. These records encompass detailed information about reimbursements issued by health insurance companies across specific cost categories. They also conferred comprehensive insights into costs accrued and reimbursements associated with patient services, pharmacy charges, consumables utilized during in-patient care, and room rent. The data acquisition process occurred in two distinct phases, ensuring a comprehensive exploration of the financial dynamics within the specified period, as indicated below [Figure 1].

**Phase 1: In-patient cost:** The in-patient costs consisted of the expenses incurred by the patients during the period of hospitalization categorized into four cost categories (services, medicine, consumables, and room rent), where the reimbursed amount and patient's share were detailed.

**Phase 2: Out-patient cost:** The in-patient costs excluded information on patients' spending on services received on an out-patient basis. We extracted the data from the hospital information system using patients' unique identification codes. This included the cost incurred for the purchase of medicine, diagnostic services, interventions or procedures accessed, and physician and other professional charges.

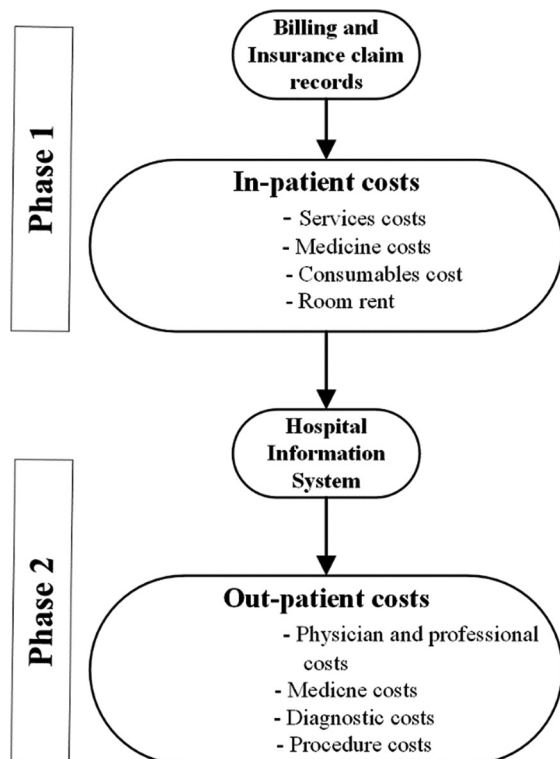


Figure 1: Phases of data collection

## Definition of terms

- **Total hospital cost (THC):** The in-patient and out-patient expenditure incurred by the patient during the period of hospitalization. This information was collected for a period of 4 months, including 1 month before the admission and 3 follow-up months.<sup>[31]</sup>
- **OOPC:** The cost incurred by the in-patient after receiving reimbursement from the health insurance company.<sup>[32]</sup>
- **Total in-patient costs (TICs):** The cost incurred for service availed as in-patient was categorized into four sub-costs [Table 2].<sup>[33]</sup>
  - **Package cost:** The cost of the pre-defined package of services tailored for the treatment of a particular ailment. Predominantly packages for cardiac ailments.
  - **Service cost:** This mainly involved administrative and equipment costs such as admission charges, diagnostic and laboratory charges, and physicians and other professional charges.
  - **Consumables cost:** The cost charged by the hospitals for the utilization of consumable items such as personal protective equipment, bedpans, gauze pieces, and so on.
  - **Pharmacy costs:** The amount charged by the hospitals for the medicines consumed by the patient during the period of hospitalization on an in-patient basis. Here, the medicine purchased by the patient on an out-patient basis is not considered.
  - **Room cost:** The cost charged by the hospital for the utilization of bed facilities by the patient. This covered the cost incurred for the utilization of patient beds in general wards, emergency rooms, semi-special rooms, and special and deluxe rooms.
- **Reimbursed amount:** This included the cost reimbursed by the health insurance company under different cost heads.<sup>[32]</sup>

We used R (V.2.4.0) for coding and analysis of the captured data. The expenditures incurred were presented in mean and median estimates. The data of 250 patients were used to estimate the reimbursement provided by the insurance company and patient share toward the expenditure incurred. The cost incurred was calculated as follows:

## Ethical consideration

The study received the required ethics approval from the "Institutional Ethics Committee, Kasturba Hospital and Kasturba Medical College", Karnataka, India, with ethics code number IEC: 346/2021.

## Results

### Private health insurance reimbursement pattern among chronic ailment patients

This section outlines the total in-patient cost and reimbursement received for PHI holders hospitalized

with chronic ailments. The highest in-patient cost experienced by patients hospitalized is with renal ailments (median = \$880) and cardiac ailments (median = \$775), respectively. The median expenditure for patients with cancer and neurological ailments is \$267 and \$658, respectively. The PHI reimburses the in-patient costs incurred by the patient’s plans under five cost heads: “Packages”, “Services”, “Consumables”, “Medicine,” and “Room”. The highest coverage is accorded to the services received for renal ailments (median = \$685). Similarly, regarding the cost incurred for medicine, PHI holders received a median coverage of \$79, where the patient share is \$25. Looking at the total in-patient cost, the PHI holders received a median reimbursement of \$815 for renal ailments [Table 3].

For cancer conditions, the highest coverage is provided for the cost incurred for services (median = \$165), followed by medicine (median = \$81). Coverage is significantly low for consumables and beds, where the patient’s share remains higher with a median cost of \$10. Most cardiac cases are provided with treatment packages where PHI plans provide full coverage. However, this pattern is not followed in other disease conditions. The median reimbursement received under the package category for cardiac patients is \$697, and the median expenditure incurred is estimated at \$58. The insurance has covered a major share incurred for services (median = \$407), medicines (median = \$90), and consumables (median = \$21). A similar pattern is observed for patients hospitalized with neurological ailments where health insurance has reimbursed a larger share of the cost incurred for services (median = \$400) and medicines (\$132). In a nuanced examination of the data, it has been ascertained that despite the minimal coverage offered against bed-related expenses, the patient’s financial burden continues to soar across all disease conditions.

### Disease-based out-patient cost, THC, and insurance coverage

This section deals with the THC incurred by the patients, including the out-patient cost. The out-patient cost is calculated based on the payment done by the patients for diagnosis, purchase of medicine, or procedures related to the ailment on an out-patient basis. The data divulge that the patients have chosen health insurance premiums that have limited or no coverage over out-patient costs.

**Table 2: Calculation of healthcare expenditure**

Total Hospital Costs	Out-patient cost + Total in-patient Cost
Out-of-Pocket Cost	Total Hospital Costs – Reimbursed amount
Total In-patient Costs	Package cost + Service cost + Consumable cost + Pharmacy cost + Room cost

Source: present study

This has resulted in a huge impact on the THC and OOPC for the patients. The median out-patient cost incurred for the patient is estimated at \$109.

Patients with cancer ailments have reported the highest median out-patient cost (\$356), followed by patients with neurological ailments (\$149). The lowest out-patient cost is reported by patients who underwent treatment for cardiac ailments (\$48) [Table 4]. Likewise, patients hospitalized for renal conditions have reported out-patient costs of \$113.

Table 4 depicts the median insurance coverage for THC with respect to the identified disease conditions. It is to be noted that despite being insured, the OOPC is prevalent. It varies from \$129 for patients with cardiac ailments to \$376 for patients hospitalized due to cancer conditions. Patients with renal ailments have experienced the least OOPC (median = \$178), while patients with neurological ailments have an OOPC of \$226. The results highlight that the insurance coverage opted by the patients has limited reimbursement of out-patient costs. Therefore, under-insurance is observed among PHI holders. Hence, the burden of expenditure for healthcare seeking of private insurance holders is discerned to be substantially high.

## Discussion

One of the key findings of this research is the unraveling of the reimbursement pattern received by patients with cardiac, cancer, renal, and neurological ailments and who have subscriptions with PHI. This helps health policymakers design optimum health insurance plans based on utilization and reimbursement trends. Our argument is consistent with Baione’s<sup>[34]</sup> observation regarding the role of various “reimbursement rules” in designing optimal health insurance plans. The total health expenditure and out-patient costs experienced by PHI holders with chronic disorders were also depicted. The results disclosed that when the costs for services and medicines received significant coverage, the costs for consumables and room rent received minimal weightage, resulting in a major contribution to total healthcare costs. These observations are consistent with past studies which underscore the role of room cost and other non-medical costs in escalating the economic burden among insurance holders with chronic ailments.<sup>[20,26,35,36]</sup> However, Stadhouders<sup>[37]</sup> ascribe only an insignificant role to room cost in healthcare cost escalation. Another possibility of high patient share toward bed cost is increased utilization of intensive care units and the upgradation of in-patient bed facilities from general wards to deluxe or super deluxe rooms, which is not covered in the health insurance plans opted. This trend has been previously reported among

**Table 3: Private health insurance reimbursement pattern against in-patient expenditure (amount in \$)**

Disease Conditions	Packages		Services		Pharmacy		Consumables		Room		Total In-patient cost		
	Reimbursed amount	Patient share	Reimbursed amount	Patient share	Reimbursed amount	Patient share	Reimbursed amount	Patient share	Reimbursed amount	Patient share	Reimbursed amount	Patient share	Total
Cardiac													
Min	0	0	0	0	0	0	0	0	0	0	0	0	172.06
Median (Mean)	179 (467)	0 (4)	407 (667)	0 (150)	90 (322)	51 (193)	21 (64)	0 (43)	0 (25)	7 (57)	697 (1545)	58 (447)	775 (1992)
Max	1274	192	4510	5121	3142	2071	654	1259	543	1968	10419	5572	12040
SD	433	24	853	754	473	337	130	161	83	230	1631	703	1922
Cancer													
Min	-	-	15	0	0	0	0	0	0	0	0	0	44
Median (Mean)	-	-	165 (424)	2 (46)	81 (215)	9 (64)	0.66 (25)	0.048 (13)	0 (12)	10 (34)	246.66 (676)	21 (157)	267 (833)
Max	-	-	2586	1167	2656	1035	227	21	264	477	5019	2406	5496
SD	-	-	582.78	165.26	419.47	156.03	38.41	42.78	34.08	64.02	847.63	348.40	971
Renal													
Min	-	-	0	0	0	0	0	0	0	0	0	0	7.21
Median (Mean)	-	-	685 (428)	7 (18)	79 (113)	25 (76)	51 (77)	0 (17)	0 (19)	33 (55)	815 (637)	65 (227)	880 (864)
Max	-	-	2600	142	778	1365	884	223	161	332	3774	1582	1969
SD	-	-	444	28	131	197	131	34	39	66	619	233	444
Neurological													
Min	-	-	143	0	0	0	0	0	0	11	0	12	187
Median (Mean)	-	-	400 (539)	3 (14)	132 (273)	0 (77)	15 (64)	0 (24)	54 (99)	46 (68)	601 (972)	57 (183)	658 (1155)
Max	-	-	2475	126	1759	466	334	255	722	240	3753	846	4599
SD	-	-	542	3	132	0	15	0	54	46	905	224	1069

Source: the present study (₹1=\$0.012)

**Table 4: Total healthcare cost and insurance coverage (amount in \$)**

Disease Conditions	Numerical Summaries	Out-patient cost	In-patient cost	Total Hospital Cost (OPC + IPC)	Reimbursed Amount	OOPC
Cardiac	Min	0	172.06	200	0	9
	Median (Mean)	48 (79)	775 (1992)	823 (2071)	697 (1545)	129 (526)
	Max	838	12040	12040	10419	5718
	SD	123	1922	1919	1631	714
Cancer	Min	31	44	200	32	37
	Median (Mean)	356 (518)	267 (833)	623 (1351)	247 (676)	376 (675)
	Max	3132	5496	5920	5019	3170
	SD	533	971	1160	847.63	695
Renal	Min	7	7.21	116	63.23	41
	Median (Mean)	113 (276)	880 (864)	993 (1140)	815 (637)	178 (503)
	Max	1967	1969	5417	3774	2574
	SD	444	444	944	619	520
Neurological	Min	11	187	277	0	85
	Median (Mean)	169 (333)	658 (1155)	827 (1488)	601 (972)	226 (516)
	Max	2950	4599	4863	3753	2989
	SD	661	1069	1236	905	661

Source: the present study

healthcare seekers with chronic ailments in different research settings.<sup>[38]</sup>

In our study, the highest in-patient costs were reported by PHI holders with renal, cardiac, and neurological disorders. We retrospect similar findings reported in India<sup>[28,39]</sup> and a few developed nations.<sup>[40,41]</sup> Though the PHI has covered the cost incurred under “packages” for cardiac patients, the OOPC is prevalent due to lower coverage for other cost heads. For other diseases, partial coverage was provided toward the costs incurred for services, consumables, and medicine.

The analysis of the out-patient costs revealed that cancer conditions outweighed all other disease conditions, followed by neurological ailments. Similar findings have been widely reported irrespective of geographical boundaries, emphasizing the burden of out-patient costs among chronic ailments.<sup>[42-44]</sup> However, these studies did not report the insurance status of the study participants. Also, the pernicious effects of out-patient charges have been proclaimed by Sabermahani<sup>[36]</sup> and Ayogu *et al.*<sup>[45]</sup> with a focus on uninsured or insured by not-for-profit health plans.

Though PHI provides minimal protection for in-patient expenditure, low coverage toward out-patient costs and non-medical expenditures (consumables and room costs) in total healthcare costs are highlighted in our study. This can be related to the findings of Peng<sup>[26]</sup> and Gambhir *et al.*,<sup>[46]</sup> which have depicted the inefficiency of PHI in providing out-patient coverage to the increasing demand. Our findings have validated the past observations regarding the unsuitability of PHI as a solution to achieve UHC.<sup>[4,6,12]</sup> Moreover, our findings reiterate Gambhir *et al.*'s<sup>[46]</sup> and Balqis-Ali NZ *et al.*'s<sup>[47]</sup>

argument about the quantitative welfare gains of top-up insurance as the standard full-coverage policy will be ineffective in covering the anticipated highly expensive treatment options for chronic illness.

### Limitations and recommendation

This study is not free from limitations. We did not include the costs incurred by patients to visit other healthcare settings. For example, a patient is likely to seek medical support from other service providers. This might have underestimated the total healthcare cost and share of health insurance. The present study could not capture the full episodes of hospitalization pertaining to a disease condition but rather only part thereof. Therefore, the total expenditure and reimbursement received are not captured. However, to the best of our knowledge, this is the first study that assessed the reimbursement trends received by PHI holders hospitalized with chronic diseases using institutional data. Second, only a few PHI policies provide minimal coverage for out-patient services at higher premiums, which are not considered.

We would like to make a few suggestions for the direction of future research from the following perspectives. Despite minimal coverage, PHI holders report OOPC among patients with chronic diseases. Low coverage toward the room costs raises a concern regarding the health insurance literacy of PHI holders. Though health insurance awareness is high, health insurance literacy requires further investigation. We propose a few research questions to set the path for future scholarly engagements. What is the intensity of OOPC faced by PHI? How far is the viability of having a top-up plan to safeguard expensive treatment

options for chronic illness? Is there any association between the premium paid, sum insured, and degree of OOPC? Do the subscribers face catastrophic health expenditure (CHE) or impoverishment? Are PHI holders insurance literate? Is there any available source to improve the literacy? Is there any association between health insurance literacy and choice of PHI plans?

## Conclusion

The study examined the role of PHI in alleviating financial burden among patients with chronic disease conditions. Billing information of PHI holders with cancer, renal, cardiac, and neurological disease conditions was extracted from the hospital information system and analyzed to uncover the reimbursement pattern of PHI under various cost categories. As per the author's knowledge, this is the first attempt to showcase the contribution of PHI to healthcare costs using billing data from a healthcare setting.

Our results have affirmed the phenomenon of under-insurance among PHI holders. Inadequate coverage, coupled with unexpected health events and the resultant inevitable healthcare-seeking episodes, will have a substantial toll on patients' economic security. Hence, this necessitates the indispensability of an auxiliary mechanism, in terms of embedded add-ons to health insurance policies, to ward off any probable financial catastrophe due to unaffordable healthcare expenses. We also appeal to an integrated solution by policymakers, insurance companies, and healthcare service providers to design a comprehensive solution to mitigate the under-insurance problem and thereby promote affordable and equitable access to health and wellness in response to the global call for universal health coverage (MDG # 3).

## Ethics statement and funding

The research was rolled out after obtaining necessary institutional approval from the Institutional Ethics Committee, Kasturba Hospital and Kasturba Medical College, Manipal Academy of Higher Education, Manipal, India, vide ethics code No. 346/2021). This research has not received any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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## Conflicts of interest

There are no conflicts of interest.

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