Ophthalmologica Indonesiana
Vol. 52 No. 2 2026, 123-132
E-ISSN: 2460-545X | P-ISSN: 0126-1193
Publisher: Perdami (Perhimpunan Dokter Spesialis Mata Indonesia)

Original Article

The Hidden Costs of Inpatient Glaucoma Treatment: Out-of-Pocket Burden at a Tertiary Care Hospital in Yogyakarta

Sang Ayu Putu Udara Pradnyadewi[1], Krisna Dwi Purnomo Jati[2], Meta Rahma An Nazzila[3], Tatang Talka Gani[4]

[1,2,3,4]Departement of Ophtalmology, Faculty of Medicine, Public Health and Nursing, Gadjah Mada University, Yogyakarta

Corresponding email: pradnyadewiudara28@gmail.com

ARTICLE INFO

Article History
Received : 11-04-2026
Revised : 03-06-2026
Accepted : 30-08-2026
Published : 31-08-2026

Keywords
Out of pocket healthcare expenditure
Financial burden
Direct non-medical cost
Indirect cost
Glaucoma treatment
Hospitalization

Access this article online

https://doi.org/10.35749/journal.v51i2.102146

Quick Response Code:

ABSTRACT

Introduction and Objective: Glaucoma requires lifelong care, generating out-of-pocket (OOP) costs despite insurance coverage. This study assessed OOP expenditure among hospitalized glaucoma patients covered by Indonesia's National Health Insurance (JKN). Methods: A hospital-based cross-sectional study included 40 purposively selected glaucoma inpatients from December 2024 to February 2025. Self-reported data were collected through structured interviews. Multiple linear regression examined associations between sociodemographic and cost-related factors and total OOP expenditure. Results: Participants' mean age was 56 years, with a male-to-female ratio of 1:1.9; 52.5% were unemployed and received subsidized JKN contributions. Mean OOP expenditure per hospitalization was IDR 640,090, comprising direct non-medical expenses (92%) and indirect costs (8%). Transportation (mean IDR 352,670; 61% of direct non-medical costs), meals for accompanying relatives (mean IDR 184,125; 32%), and indirect costs (mean IDR 50,375) were significantly associated with total OOP expenditure (all $p < 0.001$). The model explained 84.3% of expenditure variance ($R^2 = 0.843$). Conclusion: Transportation and meals for accompanying relatives dominated direct non-medical OOP costs, highlighting the need to strengthen financial protection for patients and their households.

Ophthalmologica Indonesiana
Vol. 52 No. 2 2026, 123-132

Introduction

Ody paragraph is written using Avenir 10pt with 1 space. Each new paragraph indents in 6 pt. The content of introduction usually the background of research, position of the research towards the other similar research. It can be a brief literature review. Reference cited according to Vancouver, numbered in accordance with the order of references in the research and in accordance with the sequence number in the bibliography. The number is written after dot "." in superscript. In writing the citations and references, authors are recommended to use reference management software, such as: Mendeley® with Vancouver Style. Glaucoma is one of the leading causes of blindness worldwide and requires ongoing medical management, which may include hospitalization in certain cases. Despite the availability of various health insurance schemes, many patients continue to face a substantial financial burden due to out-of-pocket (OOP) expenses. The diagnosis of glaucoma remains complex even in advanced medical settings, requiring comprehensive screening, specialized diagnostic tools, trained personnel, and adequate infrastructure—resources that are typically limited to tertiary healthcare centers. As a result, individuals living in rural areas encounter significant barriers in accessing appropriate eye care, including challenges related to transportation to urban medical facilities. These obstacles directly affect their health-seeking behavior and contribute to the risk of glaucoma progressing to irreversible blindness.

A cross-sectional study in India found that the cost of glaucoma medications alone could range from 13% to 123% of a lower-income patient's monthly earnings (1). In Nigeria, although the average monthly cost of glaucoma medications was approximately USD 40, additional indirect expenses—such as diagnostic tests, transportation, and caregiver support—added an estimated USD 105.4 per month (2).

The global campaign for the financial protection of people during illness has always been a major issue. In 2005, the WHO passed a resolution urging countries to strengthen their health systems in order to attain or sustain universal health coverage (3). Indonesia has established the National Health Insurance *Jaminan Kesehatan Nasional* (JKN) program as part of the government's efforts to provide financial protection for the public against the costs of accessing healthcare services. The JKN program itself has been implemented since January 1, 2014.

According to the World Bank, estimates from the Indonesia Public Expenditure Review indicate that approximately 2.3 million people experience catastrophic health expenditures each year, while over 4 million are pushed further into poverty due to health-related costs (3). These financial burdens often arise from expenses not fully covered by health insurance or government programs. In Indonesia, despite financial assistance provided through the JKN, studies have shown that vulnerable populations still face substantial out-of-pocket (OOP) expenditures, which continue to negatively impact their financial stability—even among those with insurance coverage (4).

OOP healthcare expenses are typically divided into three primary categories: direct

medical cost, direct non-medical cost, and indirect cost. Direct medical costs encompass expenses such as hospitalization, medications, medical supplies, and consultation fees. Direct non-medical costs cover transportation, meals, and accommodation for both patients and their kin. Lastly, indirect costs refer to the loss of income experienced by patients or their kin due to work absences during hospitalization (5). Elevated out-of-pocket expenses might result in treatment delays and inferior clinical outcomes, especially for chronic illnesses such as glaucoma. This study seeks to examine out-of-pocket expenses incurred during a single hospitalization for glaucoma care.

Method

This study employs a cross-sectional design conducted at tertiary care hospital from December 2024 to February 2025. Participants were included in the study if they were 18 years of age or older, had a confirmed diagnosis of glaucoma, were hospitalized in the ward during the study period, were covered by the National Health Insurance (JKN). Therefore, the OOP expenses examined in this research were those not covered by JKN, including direct non-medical costs (such as transportation, accommodation, and meals) and indirect costs (such as income loss experienced by the patient and their next of kin).

Data were collected through structured telephone interviews using a standardized questionnaire. Contact information was retrieved from medical records with institutional approval. To reduce recall bias, interviews were conducted within 14 days after hospital discharge. Before starting the interviews, participants were informed about the study objectives and procedures, and verbal consent was obtained. If a participant was unable to provide valid information, their data were excluded and replaced by another eligible subject. All data were anonymized to protect confidentiality. The study protocol was reviewed and approved by the appropriate Ethics Committee (Ref. No. KE/FK/0578/EC/2025), in accordance with institutional and international ethical standards.

The primary outcome in this study was out-of-pocket (OOP) expenditure, defined as personal costs not reimbursed by JKN. These included direct non-medical costs (e.g., transportation, meals, accommodation, and chaperone expenses) and indirect costs due to income loss experienced by the patient and/or their accompanying family members. Indirect costs were researched the number of days and value worked by the patient and kin. Since accurately calculating the lost income of patients and their next of kin due to hospitalization was not feasible, the lost income was estimated based on the minimum daily wage (as per labor law) multiplied by the number of hospitalization days. Independent variables included patient sociodemographic characteristics such as age, gender, education level, occupation, monthly income, and residence.

Descriptive statistics were used to summarize participant characteristics and OOP expenditures. To assess the relationship between sociodemographic factors and total OOP costs, multiple linear regression analysis was performed. Data entry was performed using Microsoft Excel, and statistical analyses were carried out using SPSS version 27 (IBM Corp., Armonk, NY, USA). Missing data were

Ophthalmologica Indonesiana
Vol. 52 No. 2 2026, 123-132

managed by case substitution based on predefined criteria, without the use of data imputation. Bias was minimized through strict sampling criteria, prompt data collection, standardized instruments, and interviewer training.

Results

Among the 40 glaucoma patients involved in the study, 65% were female and 35% were male, resulting in a male-to-female ratio of 1:1.9. The mean age of participants was 56 years, with a predominant 52.5% being unemployed, and 47.5% employed. This study had inpatients with JKN coverage hospitalized for glaucoma, undergoing scheduled procedures within a three-day treatment duration in the ward. Of the participants, 52.5% were identified as Subsidized Contribution Recipients (PBI), whilst the remaining 47.5% comprised non-PBI patients, specifically individuals employed in the formal sector and enrolled with JKN through their employers. The income classification in this study indicated that 58% of patients earned below IDR 500,000. Sixty-five percent of patients originated from the Yogyakarta Special Region (DIY), while the remaining thirty-five percent were from outside DIY (Table 1).

The primary outcome of this study was the total mean out-of-pocket (OOP) cost incurred during one hospitalization at tertiary care hospital, which amounted to IDR 640,090. Direct non-medical costs accounted for 92% of this total, while indirect costs contributed 7.98%. Direct non-medical expenses included lodging (IDR 4,000; 1%), miscellaneous items such as tissues and oil (IDR 34,540; 6%), kin meal expenses (IDR 184,125; 32%), and transportation (IDR 352,670; 61%). Transportation from patients' homes to the hospital was the largest single contributor to direct non-medical costs regardless of length of stay. Indirect costs represented income lost by patients' kin during hospitalization; 25% of kin experienced income loss averaging IDR 50,375 per day, accounting for 8% of the total mean OOP cost (Table 3).

The dataset to be processed underwent normality and heteroscedasticity tests. These classical assumption tests revealed that the data was normal and showed no signs of heteroscedasticity. Table 4 presents the analysis of the influence of sociodemographic factors on inpatient OOP expenses during one-time hospitalization. Multiple linear regression was used to evaluate the impact of sociodemographic factors on inpatient OOP costs, yielding an R-squared value of 0.843, indicating that 84.3% of the variance in OOP costs was explained by the model. The regression equation identified transportation expenses, kin meal expenses, and indirect costs as significant positive predictors of OOP spending ($P<0.001$ for all). Specifically, increases in these costs were strongly associated with higher overall OOP expenses.

Table 1. Sample Demographic Characteristics

OOP Cost Components	Mean (SD)
Direct Non Medical Cost (IDR)	589,715(±363,846)
- Transportation Costs (IDR)	352,670(±314,856)
- Kin Meal Expenses(IDR)	184,125(±149,990)
- Other Kin Expenses(IDR)	38,040 (±104,901)
Indirect Cost (IDR)	50.375 (±109.936)

Multiple linear regression analysis is described in the form of the following equation,

$Log\ (OOP\ cost) = -419{,}075.490 + 0.719\ X_7 + 0.336\ X_8 + 0.470\ X_{11}$

Where:

- X_7 = transportation expenses
- X_8 = kin meal expenses
- X_{11} = indirect costs (income loss by kin)

Potential confounders such as age, sex, employment status, income level, and geographic origin were included in the regression model based on previous literature and their relevance to healthcare costs. Including these confounders helped to isolate the specific effects of transportation, kin meals, and indirect costs on the OOP expenses of glaucoma inpatients.

Table 2. Direct Non-medical and Indirect Cost

Variable	n	%
1. Gender		
Woman	26	65%
Man	14	35%
2. Age		
15-30	5	12.5%
31-45	1	2.5%
46-60	21	52.5%
>60	13	32.5%
3.JKN		
PBI	21	52.5%
Non-PBI	19	47.5%
4. Occupation		
Unemployed	21	52.5%
Employed	19	47.5%
5. Patient Income		
<500.0000	11	58%
500.000-2.000.000	3	16%
2.000.000-5.000.000	3	16%
5.000.000-10.000.000	2	11%
6. Province		
Inside Yogyakarta	26	65%
Outside Yogyakarta	14	35%
7. Home distance		
<1km	0	0%
1-5km	1	2.5%
6-10km	6	15%
10-15km	0	0%
16-20km	3	7.5%
>20 km	30	75%
8. Time Travel		
11-60 minute	5	12.5%
>60 minutes	35	87.5 %
9. Lost Income		
50.000 - 150.000	5	50%
150.000 - 250.000	0	-
250.000 - 350.000	4	40%
350.000 - 450.000	1	10%

Ophthalmologica Indonesiana
Vol. 52 No. 2 2026, 123-132

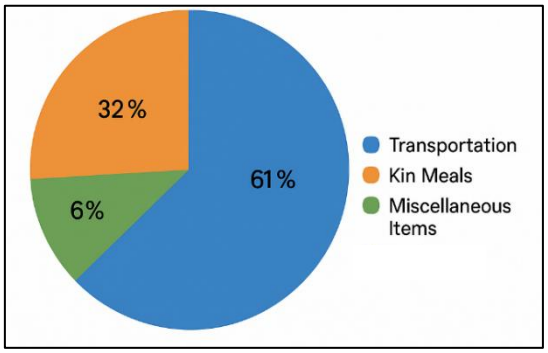

Figure 1. Average Direct Non-Medical Cost In Glaucoma Inpatients

Discussion

In this study, the inpatient data for glaucoma cases showed more female patients compared to male patients, with a male-to-female ratio of 1:1.9. This finding is consistent with a hospital-based study conducted in Port Harcourt, Nigeria, which reported a male-to-female ratio of 2:3. The average age range of the sample in this study was 56 years, which is higher than similar studies conducted in Port Harcourt, Nigeria (55.4 years), and in South Africa, which reported average ages of 52.6 years and 53.5 years, respectively (6). One study by Singh and Khokhar examines OOP expenditures among households in urban India, noting that younger individuals, particularly those without stable employment, often report lower healthcare utilization due to financial constraints (7). This financial limitation can skew the data regarding OOP expenditures, thus leading researchers to focus on age groups that are more likely to participate in the workforce and bear healthcare costs effectively.

In response to the high levels of OOP expenditure and its impact on access to health services for the poor, the Government of Indonesia introduced a national health insurance scheme, JKN (8). As a result, the demand for healthcare services has continued to rise. In this study, all patients utilized JKN during their three-day hospitalization period, with 52.5% of the sample categorized as Subsidized Contribution Recipients (PBI), while the remaining 47.5% were non-PBI patients. There was no significant difference observed between these two types of JKN membership. In this study, a total of 65% of patients came from within the Yogyakarta Special Region (DIY), while the remaining 35% were from outside the region.

Table 3. Factors Influencing Out-Of Pocket (OOP) Healthcare Expense

Variables	Coefficient	P > |t|	95%CI	
			Lower Bound	Upper Bound
(Constant)	-328732.695	0.184	-822854.849	165389.460
Age (X1)	18299.828	0.577	-48049.585	84649.240
BPJS (X2)	84728.546	0.176	-40196.437	209653.528
Education (X3)	-29751.250	0.229	-79303.373	19800.874
Occupation (X4)	7965.324	0.893	-111971.007	127901.655
Distance (X5)	115152.851	0.574	-299137.685	529443.388
Travel Time (X6)	188680.234	0.058	-7123.511	384483.980
Transportation Cost (X7)	0.861	<0.001	0.695	1.027
Kin Meal Expenses (X8)	0.815	<0.001	0.428	1.201
Patient Income (X9)	41183.800	0.141	-14448.447	96816.047
Kin income (X10)	9586.408	0.716	-43851.878	63024.693
Indirect Cost (X11)	0.715	0.036	0.051	1.379

Table 4. Factors Influencing Out-Of Pocket (OOP) Healthcare Expense

Variables	Coefficient	P > |t|	95%CI
Age (X1)	0.029	0.715	(0.29;0.637)
BPJS (X2)	-0.143	0.095	(-0.143;0.095)
Education (X3)	-0.081	0.276	(-0.81;0.276)
Occupation (X4)	0.008	0.922	(0.08;0.654)
Distance (X5)	-0.149	0.164	(-0.149;0.361)
Travel Time (X6)	0.235	0.09	(0.235;0.573)
Transportation Cost (X7)	0.719	<0.001	(0.719;0.450)
Kin Meal Expenses (X8)	0.336	<0.001	(0.336;0.566)

However, since Yogyakarta encompasses a wide geographical area, 75% of participants had to travel more than 20 kilometers from their homes to reach the tertiary care hospital.

The regression analysis revealed that transportation, meals for kin, and indirect costs significantly influenced out-of-pocket expenses (P<0.001), explaining 84.3% of the cost differences, while the other 15.7% was due to factors not covered in the study. This robust model suggests that reducing these specific cost components—such as by improving hospital access, subsidizing transport, or limiting the need for companions—could substantially lower patients' financial burdens. Additionally, decentralizing glaucoma surgical services to more accessible secondary-level hospitals could reduce referral-based costs.

The primary reason transportation costs dominate direct non-medical expenses is that patients in rural or underserved areas must travel long distances to access surgical care. In situations where surgical facilities are not readily accessible, patients are required to be referred to urban centers that are more adequately outfitted, resulting in a substantial increase in their OOP transportation expenses (1).

Additionally, research in Uganda among HIV and hypertension patients consistently identified transportation time as a significant driver of monthly OOP spending (9). A study by Anggraini revealed that In Indonesia, particularly in rural areas, patients diagnosed with glaucoma frequently encounter long distances, limited public transportation, and high travel expenses that can delay referral and subsequent treatment (8). In this study, 75% of patients resided more than 20 kilometers away from the tertiary care hospital, resulting in a journey time greater than 60 minutes. Bhojani et al. also revealed that transportation costs constituted the largest portion of non-medical expenses in Bangalore, India, which aligns with the findings of the current study (4).

Kin meal expenses are associated with higher financial burdens. Despite their occasional underestimation, these expenditures significantly contribute to the cumulative financial strain associated with healthcare spending (10). Hospital policy directly links the number of companions to meal costs, limiting the number to one per patient to minimize expenses. Indirect costs also have a significant impact, as the findings of this study indicate that higher indirect costs increase overall out-of-pocket (OOP)

Ophthalmologica Indonesiana
Vol. 52 No. 2 2026, 123-132

expenditures. In this study, indirect cost accounted for 8% of the total OOP expenses. In other developing countries, such as in a study in Ghana, indirect costs related to healthcare were specifically highlighted, including wages lost while accompanying patients for consultations and treatments, underlining the economic aspects of glaucoma caregiving that are often overlooked (11). A study from a tertiary glaucoma clinic in Nigeria estimated the indirect costs incurred per visit by both patients and their companions (6). The findings revealed that income loss differed by occupational class, with professionals experiencing the highest productivity losses and unemployed individual the lowest— a pattern that is consistent with the results of this study.

Despite the strength of its findings, this study has several limitations. First, recall bias may have influenced the accuracy of cost data, particularly indirect costs reported through questionnaires. Second, household income estimation relied on uniform assumptions across family members due to difficulties in collecting precise income data, which may have introduced misclassification. Third, the sample size was limited (n=40) and drawn from a single tertiary care hospital, restricting the generalizability of the results.

However, the study also possesses notable strengths. The methodology included validated regression modeling with a strong R^2 value (0.843) and a detailed cost breakdown that adds clarity to policy implications. One relevant study by Nayak et al. focuses specifically on the socioeconomic burden of glaucoma in India, outlining OOP costs associated with both outpatient and inpatient care (12). Their findings offer useful information about how these financial pressures manifest among patients, supporting the importance of detailed cost breakdowns in policy formation—even under a national insurance system like JKN in Indonesia.

In terms of implications, this research contributes important insights into the hidden financial burdens that persist despite public insurance coverage. Policymakers should consider strengthening secondary health services in underserved areas, enhancing JKN to cover indirect costs, and implementing family burden-reduction strategies like meal subsidies or companion restrictions. Nonetheless, caution is advised in generalizing these findings. The context-specific nature of care at a tertiary hospital and regional differences in infrastructure, access, and referral practices mean that results may differ in other settings. Future studies with larger and more diverse samples are warranted to capture the broader national experience and refine cost-reduction strategies in glaucoma care.

Conclusion

Understanding the financial burden of OOP expenditures for glaucoma patients requiring inpatient healthcare is critical for evaluating its impact on healthcare accessibility and overall quality of life. This burden not only affects the decision-making process for undergoing invasive or prolonged treatments but also has broader implications for chronic disease management and long-term visual outcomes. Existing literature in related conditions provides insight into the multifaceted ways in which high OOP expenditures can influence patient outcomes,

and these findings are relevant when extrapolated to inpatient glaucoma care.

Reducing OOP costs for glaucoma inpatient care is essential for various reasons. First, it lowers the financial barriers that delay early intervention and effective disease management, thereby reducing the risk of irreversible vision loss. Second, it alleviates the overall economic burden on patients and healthcare systems by curbing the disproportionate allocation of resources to inpatient services. Finally, it enhances treatment adherence and quality of life, particularly among socioeconomically disadvantaged populations.

Declarations

Statement on the Use of Artificial Intelligence

Artificial Intelligence was used to assist in drafting the declarations section of this manuscript.

Author contribution statement

Sang Ayu Putu Udara Pradnyadewi contributed to study conceptualization and design, data collection, statistical analysis, data interpretation, and original draft preparation. Krisna Dwi Purnomo Jati contributed to study conceptualization, methodological supervision, critical manuscript review and revision, publication correspondence, and final approval. Tatang Talka Gani contributed to study conceptualization, clinical guidance, expert supervision, critical manuscript review, and final approval. Meta Rahma An Nazzila contributed to data analysis and interpretation, literature review, manuscript revision and refinement, and final approval.

Funding statement

The authors received no financial support for the research, authorship, or publication of this article.

Conflict of interest

The authors declare no conflicts of interest related to the research, authorship, or publication of this article.

References

1. Thapa SS, Paudyal I, Joshi PL, Singh K, Parajuli A. Glaucoma in Developing Countries. Nepalese Journal of Ophthalmology. 2021;13(1):112-21.
2. Adio Adedayo O, Onua. Economic burden of glaucoma in Rivers State, Nigeria. Clinical Ophthalmology. 2012:2023.
3 Couturier V, Srivastava S, Hidayat B, De Allegri M. Out-of-Pocket expenditure and patient experience of care under-Indonesia's national health insurance: A cross-sectional facility-based study in six provinces. The International Journal of Health Planning and Management. 2022;37(S1):79-100.
4. Maulana N, Soewondo P, Adani N, Limasalle P, Pattnaik A. How Jaminan Kesehatan Nasional (JKN) coverage influences out-of-pocket (OOP) payments by vulnerable populations in Indonesia. PLOS Global Public Health. 2022;2(7):e0000203.
5. Sabermahani A, Sirizi MJ, Zolala F, Nazari S. Out-of-Pocket Costs and Importance of Nonmedical and Indirect Costs of Inpatients. Value in Health Regional Issues. 2021;24:141-7.
6. Bello SU, Eze UA, Umar MM, Babalola OE, Abdull M. Direct non-medical and

indirect costs of glaucoma care in a Nigerian Tertiary Eye Clinic. Discover Public Health. 2024;21(1).
7. Prakash Singh S, Khokhar A. Out-of-pocket expenditures and catastrophic expenditures on inpatient care among households of an urban village in Delhi. The Journal of Medicine Access. 2023;7.
8. Mahendradhata Y. The Republic of Indonesia Health System Review. In: Hort K, editor.2017.
9. Cameron DB, Morrell LC, Kagoya F, Kiggundu JB, Hutchinson B, Twine R, et al. Current out of pocket care costs among HIV and hypertension co-morbid patients in urban and peri-urban Uganda. PLOS Global Public Health. 2024;4(9):e0003423.
10. Arora R, Dugar N, Saxena V, Jaiswal SK, Kumari C, Cook N, et al. PP66 Increasing Burden Of Out-Of-Pocket Healthcare Expense On Patients. International Journal of Technology Assessment in Health Care. 2019;35(S1):50-.
11. Adda M, Amon S, Nonvignon J, Aikins M, C Aryeetey G. Economic cost of management of glaucoma in public and private health facilities in the Tema metropolis in Ghana. Ghana Medical Journal. 2024;58(1):17-25.
12. Nayak B, Gupta S, Kumar G, Dada T, Gupta V, Sihota R. Socioeconomics of long-term glaucoma therapy in India. Indian Journal of Ophthalmology. 2015;63(1):20-4.