

Equity of Financial Protection Under National Health Insurance: A Concentration Index Analysis in East Nusa Tenggara

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ABSTRACT

This study addresses the challenge of financial protection under Universal Health Coverage (UHC), particularly in the context of Indonesia's National Health Insurance (JKN) program. Although JKN has expanded access to healthcare services, evidence indicates that insurance coverage does not always prevent households from experiencing Catastrophic Health Expenditure (CHE), especially in geographically disadvantaged regions such as East Nusa Tenggara (NTT). Therefore, this research aims to evaluate the equity of financial protection by examining the incidence and socioeconomic distribution of CHE among households in NTT. This study employed a quantitative approach using secondary microdata from the 2025 National Socio-Economic Survey (SUSENAS), covering 13,063 households. CHE is defined as out-of-pocket health expenditure exceeding 40% of non-food expenditure. Households are ranked using an asset-based Wealth Index, and inequality is analyzed using the Concentration Index (CI) and Concentration Curve. The results show that 16.89% of households experienced CHE, indicating substantial financial vulnerability. The findings reveal a dual inequity pattern: CHE is concentrated among the poorest households for subsidized beneficiaries (negative CI), while among non-subsidized participants, it is concentrated among the wealthiest (positive CI), reflecting different spending behaviours. In conclusion, JKN has not fully achieved equitable financial protection. Policy interventions should address both access-related costs for the poor and service quality gaps to improve system effectiveness.

INTRODUCTION

Universal Health Coverage (UHC) is a major global goal aiming to ensure that everyone receives quality health services without suffering financial hardship which is explicitly monitored through Sustainable Development Goal indicator 3.8.2 regarding catastrophic health expenditure. To achieve this, Indonesia implemented the National Health Insurance or *Jaminan Kesehatan Nasional* (JKN) (Ardyanto, 2019; Rahmawati & Hsieh, 2024; Susilo et al., 2025). Since its inception, JKN has successfully expanded coverage to millions of citizens. However, recent studies indicate that having insurance coverage does not always guarantee financial protection (Agustina and others 2020). There is often a gap between being a JKN member and actually being protected from high costs, especially in developing regions where the depth of coverage remains shallow (Maulana and others 2022).

East Nusa Tenggara (NTT) presents a critical context for this issue. As an archipelagic province, NTT faces unique geographic and economic challenges. It remains one of the

provinces with the highest poverty rates in Indonesia, where the majority of the population works in the informal agrarian sector (Badan Pusat Statistik 2024). In this region, advanced health facilities are concentrated in urban centres like Kupang City. Consequently, patients living in remote islands or rural areas must often pay significant Out-of-Pocket (OOP) costs for transportation, accommodation, or medicines not available at local clinics, even if their treatment is technically covered by JKN (Mahendradhata and others 2021).

When these Out-of-Pocket payments exceed a household's ability to pay, it results in Catastrophic Health Expenditure (CHE) (Ahmed et al., 2022; Nguyen et al., 2023; Sinha et al., 2016). This is a serious problem because it forces families to cut spending on survival needs, such as food or education, just to pay for health (World Health Organization 2023). Currently, most evaluations only look at the average rate of CHE. This perhaps brought into misleading because a low average number can hide the fact that the poorest families are suffering the most, while the wealthy remain unaffected. We do not clearly know *who* is bearing the heaviest financial burden in NTT.

Therefore, this study aims to evaluate the equity of financial protection in NTT by analyzing the distribution of CHE across socio-economic groups. To ensure a stable ranking of households in this agrarian context, the analysis utilizes an Asset-based Wealth Index rather than monetary income. Specifically, this study employs the Concentration Index (CI) and Concentration Curve methods. As established by O'Donnell and others (2007), these methods are the standard instruments for health equity analysis because they do not merely calculate the average incidence, but explicitly quantify the degree to which a health burden, which in this case, catastrophic expenditure that is disproportionately concentrated among the poor relative to the entire population ranking. By applying these tools, this research will provide a visual and statistical evaluation of whether JKN has successfully shielded vulnerable populations in NTT from medical impoverishment (Erlangga, 2018; Haemmerli, 2022; Lindgren, 2018).

Universal Health Coverage (UHC) has become a central global health agenda because it seeks to ensure that all individuals can access needed health services without experiencing financial hardship. One of the key indicators used to monitor this commitment is Sustainable Development Goal 3.8.2, which measures catastrophic health expenditure as a sign of inadequate financial protection (Organization, 2021; Verguet et al., 2017). In many countries, the expansion of health insurance has been regarded as an essential strategy to achieve this goal (Hatanaka et al., 2015; Tangcharoensathien et al., 2015; Xu et al., 2015). However, growing international evidence shows that insurance enrollment alone does not automatically eliminate the risk of severe out-of-pocket spending, particularly in settings marked by inequality, weak service distribution, and structural barriers to access.

In Indonesia, the implementation of *Jaminan Kesehatan Nasional* (JKN) represents a major policy effort to advance UHC by extending health insurance protection to a broad segment of the population. This program has significantly increased coverage and improved formal access to health services. Nevertheless, previous studies cited in the article, including Agustina et al. (2020) and Maulana et al. (2022), suggest that the existence of insurance membership does not necessarily translate into real financial protection, especially for vulnerable populations. This means that despite policy expansion, insured households may still face economic strain when seeking care, indicating that the depth and equity of protection

remain unresolved concerns within the Indonesian health system (Carey et al., 2020; Karpman & Acs, 2020; McMorroo et al., 2017).

This issue becomes especially important in East Nusa Tenggara (NTT), a province characterized by an archipelagic geography, limited infrastructure, and persistent poverty. The article explains that NTT remains one of the provinces with the highest poverty levels in Indonesia, while many of its residents depend on the informal agrarian sector for their livelihoods. In such a setting, access to higher-level health services is heavily concentrated in urban centers such as Kupang City. As a result, households in remote islands and rural areas often face substantial non-medical costs, including transportation, accommodation, and the purchase of unavailable medicines, even when their treatment is formally covered by JKN.

The magnitude of the problem is reflected in the empirical findings presented in the study. Using SUSENAS 2025 microdata from 13,063 households, the article reports that 16.89% of households in NTT experienced catastrophic health expenditure, showing that nearly one in six households still faced severe financial pressure from health-related spending. Among households using inpatient services, the burden was even more alarming, with 67.38% of subsidized beneficiaries and 63.46% of non-subsidized participants experiencing catastrophic expenditure. These figures indicate that financial vulnerability remains high despite insurance participation and that the problem extends beyond medical fees alone.

The article also draws on relevant previous studies from recognized scholarly sources to build the research context. Agustina et al. (2020) discuss the broader progress and challenges of UHC in Indonesia, while Maulana et al. (2022) examine how JKN coverage influences out-of-pocket payments among vulnerable groups. Mahendradhata et al. (2021) highlight limitations in the Indonesian healthcare system, and Rahvy and Gani (2024) specifically show barriers to inpatient care utilization in East Nusa Tenggara after JKN implementation. In addition, the study uses the analytical framework of O'Donnell et al. (2007), which establishes the Concentration Index and Concentration Curve as standard tools for evaluating equity in health financing. Together, these studies provide a strong foundation, yet they also reveal that more context-specific evidence is still needed.

A major research gap emerges from the fact that many earlier evaluations focus primarily on the average incidence of catastrophic expenditure without adequately identifying who bears the heaviest burden across socioeconomic groups. Average rates can be misleading because they may conceal whether the poorest households suffer disproportionately while richer groups remain relatively protected, or whether different mechanisms of spending operate across classes. In the context of NTT, this gap is particularly significant because the province combines geographic fragmentation, poverty, and uneven service availability, creating a setting in which the distribution of financial hardship may be as important as its overall prevalence.

The urgency of this research lies in the need to assess whether JKN truly delivers equitable financial protection in a structurally disadvantaged region. If catastrophic expenditure continues to affect insured households, especially the poor, then policy success cannot be judged merely by coverage expansion. The article shows that the poor remain vulnerable because they must bear indirect and logistical access costs, while wealthier households may incur high expenditures for different reasons, such as bypassing standard services in search of better-quality care. Without understanding these distinct patterns, health financing reforms may

remain ineffective and fail to support the broader target of equitable UHC achievement in Indonesia.

The novelty of this study is located in its explicit analysis of equity through the distribution of catastrophic health expenditure across socioeconomic groups in East Nusa Tenggara. Rather than relying solely on income, the study ranks households using an asset-based Wealth Index, which is considered more stable and appropriate for an agrarian context. It then applies the Concentration Index and Concentration Curve to reveal what the article identifies as a “dual inequity”: a pro-poor concentration of catastrophic burden among subsidized beneficiaries and a pro-rich concentration among contributory members. This approach moves beyond conventional measurement and provides a more nuanced understanding of how financial protection actually functions within the JKN scheme.

Based on this context, the purpose of the research is to evaluate the equity of financial protection under JKN in East Nusa Tenggara by analyzing the incidence and socioeconomic distribution of catastrophic health expenditure. More specifically, the study seeks to determine whether the burden of health spending is disproportionately concentrated among the poor or the rich and to identify how this pattern differs between subsidized beneficiaries (PBI) and non-subsidized participants (non-PBI). Through this focus, the study aims to provide a clearer explanation of whether JKN has succeeded in protecting vulnerable households from medical impoverishment in an archipelagic and economically fragile region.

The contribution of this research is both theoretical and practical. Theoretically, it enriches the literature on health financing equity by demonstrating that catastrophic expenditure should be interpreted not only in terms of incidence but also in terms of its social distribution and underlying mechanisms. Practically, the findings offer evidence for policymakers to design more targeted interventions, such as support for transportation and accommodation for poor households in remote islands, as well as improvements in service quality to reduce bypass behavior among wealthier members. Therefore, the objectives of this study are to measure the incidence of catastrophic health expenditure, assess its distribution across wealth groups, and examine inequality patterns by insurance status, while its benefits lie in informing more equitable health financing policies and strengthening progress toward genuine Universal Health Coverage in East Nusa Tenggara and similar disadvantaged regions.

METHOD

Data Source and Study Design

This study employed a quantitative approach utilizing secondary microdata from the National Socio-Economic Survey (SUSENAS) conducted in March 2025. The specific unit of analysis is households located in the Province of East Nusa Tenggara (NTT). The dataset used for this analysis is a processed dataset that already includes a comprehensive Household Wealth Index variable. This index was derived from a prior Principal Component Analysis (PCA) of 18 asset and housing variables, ensuring that the socio-economic ranking reflects long-term structural wealth rather than fluctuating short-term income, which is particularly relevant for the agrarian context of NTT.

Operational Definition of Catastrophic Health Expenditure

The primary outcome variable in this study is the incidence of Catastrophic Health Expenditure (CHE). Following the standard methodology established by the World Health

Organization (Xu and others 2007) and the World Bank's guidelines on health equity (O'Donnell and others 2007), CHE is defined using the "Capacity to Pay" (CTP) approach. A household is classified as incurring catastrophic expenditure if their Out-of-Pocket (OOP) payments for health services exceed a threshold of 40% of their non-food expenditure. Non-food expenditure is utilized as the denominator because food is considered a non-discretionary survival need; spending beyond this threshold implies that the household is sacrificing other basic necessities to pay for healthcare. Mathematically, the incidence (CHE_i) is determined by the following formula (Tadiwos, Kassahun, and Mebratie 2025):

$$CHE = \begin{cases} 1, & \text{if } \frac{OOP_i}{Nonfood_i} > 0,4 \\ 0, & \end{cases}$$

Where OOP_i represents the total costs paid by household i for medical services, drugs, and health-related transportation, and $Nonfood_i$ represents the household's non-food expenditure (calculated as Total Expenditure minus Food Expenditure), which serves as the proxy for the household's effective capacity to pay.

Study Variables and Database Structure

To facilitate the reproducibility of this study, the specific variables extracted from the SUSENAS dataset are listed in Table 1. The primary outcome, Incidence of CHE (KODE), is a binary variable derived by comparing the monthly catastrophic burden (BK_B) against the household's monthly non-food expenditure (NONFOOD_B). Furthermore, to distinguish the impact of the National Health Insurance (JKN) scheme, this study utilizes specific utilization codes. Inpatient service utilization is identified through codes R1204, separated into Subsidized Beneficiaries (PBI) and Non-PBI members. Similarly, outpatient utilization is identified through codes R1109. This distinction is critical to evaluating whether the financial protection provided by JKN differs between the subsidized poor and the contributory independent participants.

Table 1. Operational Definition of Variables and Database Codes

Variable Concept	Database Code	Operational Definition
Household Welfare	quintile	Household ranking based on the Asset-based Wealth Index (1=Poorest to 5=Richest).
Capacity to Pay	NONFOOD_B	Monthly non-food expenditure, used as the denominator for calculating financial burden.
Catastrophic Burden	BK_B	Monthly Out-of-Pocket (OOP) health expenditure.
CHE Incidence	KODE	Binary variable: value 1 if $\frac{BK_B}{NONFOOD_B} > 40\%$, otherwise 0.
Inpatient Utilization	R1204_A R1204_B	/ Utilization of inpatient services under JKN: PBI (Subsidized) vs. Non-PBI (Contributory).
Outpatient Utilization	R1109_A R1109_B	/ Utilization of outpatient services under JKN: PBI (Subsidized) vs. Non-PBI (Contributory).

Inequality Analysis with Concentration Index

To evaluate the equity of financial protection, households are first ranked from the poorest to the richest using the asset-based Wealth Index. The distribution of catastrophic expenditure across these socio-economic groups is then analyzed using the Concentration Curve and the Concentration Index (CI). As explicitly detailed in the World Bank's guide to health equity techniques (O'Donnell and others 2007), the Concentration Curve plots the cumulative percentage of the population (ranked by wealth) on the x-axis against the cumulative percentage of the health variable (CHE) on the y-axis.

The Concentration Index (CI) provides a precise statistical magnitude for this inequality, defined as twice the area between the concentration curve and the line of equality. The index is calculated using the convenient covariance formula:

$$CI = \frac{2}{\mu} cov(h_i, r_i)$$

In this equation, h_i is the health variable (incidence of CHE), μ is the mean of h , and r_i is the fractional rank of the household in the wealth distribution. The value of CI ranges from -1 to +1. A negative value indicates a "pro-poor" inequality, meaning that catastrophic costs are concentrated among the poor population. Conversely, a positive value indicates a "pro-rich" concentration. All data cleaning, stratification, and inequality analyses were performed using R Statistical Software.

RESULTS AND DISCUSSION

Descriptive Overview of Household Capacity and Health Spending

The analysis included a total sample of 13063 households representing the population of East Nusa Tenggara (NTT). The descriptive statistics of the key monetary variables used to calculate financial protection are presented in Table 2. The average monthly non-food expenditure, which serves as the proxy for capacity to pay, was recorded at IDR 149.751. Meanwhile, the average Out-of-Pocket (OOP) health expenditure for households incurring medical costs was IDR 41.092. It is important to note the high standard deviation in medical spending, indicating that while many households spend little, a subset of the population faces extreme costs associated with catastrophic events.

Table 2. Descriptive Statistics of Expenditure Variables (IDR/Month)

Variable	Mean	Median	Min	Max
Capacity to Pay (Non-Food)	149751	107554	7243	7349111
OOP Health Expenditure	41092	8333	0	5401500

The Incidence of Catastrophic Health Expenditure (CHE)

Following this baseline, the analysis quantified the extent of financial protection using the specific metric defined by Sustainable Development Goal indicator 3.8.2. The results revealed that 16.89% of the total 13063 sampled households in East Nusa Tenggara incurred catastrophic health expenditure. This indicates that nearly one in six families in the province spent more than 40% of their capacity to pay on medical costs which represents a significant deviation from the global UHC targets. When stratified by specific service utilization, the data uncovers even deeper vulnerabilities. Among households utilizing inpatient care, the incidence

of catastrophe is extremely high regardless of status. Specifically, 67.38% of PBI subsidized beneficiaries who were hospitalized experienced catastrophic expenditure. This counter intuitive finding highlights that even with fully subsidized premiums, the poorest patients face substantial hidden costs. As noted by Mamun and Alam in archipelagic regions, the cost of reaching a health facility often exceeds the medical fees themselves creating a double burden for subsidized patients such as paying for emergency transportation from remote islands or purchasing medicines unavailable at the facility that devastates their limited financial capacity. Similarly, 63.46% of non-PBI contributory beneficiaries experienced catastrophe indicating that the financial shock of hospitalization in NTT is a universal challenge.

Distribution of Catastrophic Burden by Wealth Quintile

To understand the socio-economic gradient of this financial vulnerability, the incidence of CHE was further decomposed by wealth quintiles (Q1 to Q5). This breakdown, presented in Figure 1, reveals the distinct structural nature of the burden faced by subsidized versus contributory members. For PBI (Subsidized) beneficiaries, the proportion of households experiencing catastrophe remains persistently high across the lower quintiles. As illustrated in the data, the incidence is highest in Quintile 1 (Poorest) and Quintile 2, confirming that the subsidy is insufficient to buffer the poorest households from the shock of access-related costs. The trend remains relatively flat or slightly decreasing as wealth increases, which aligns with the negative Concentration Index found in this study.

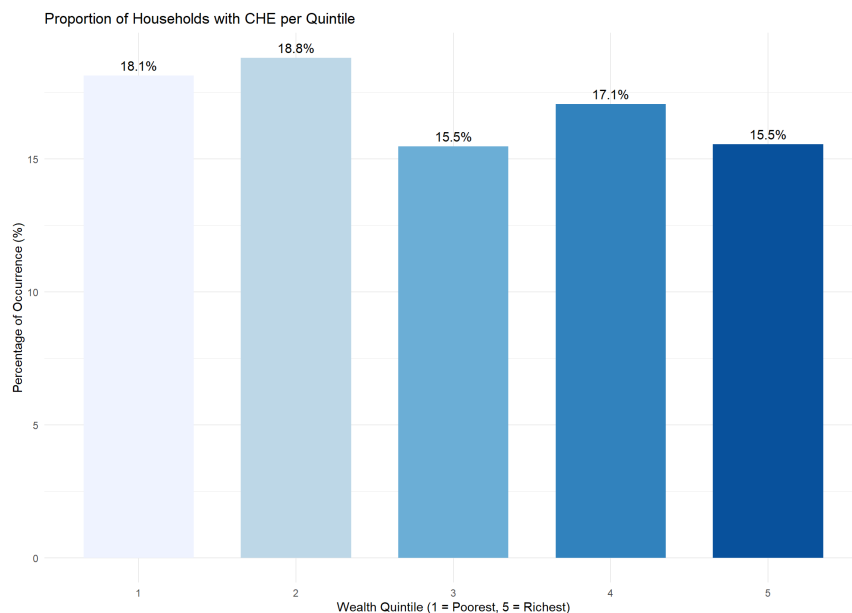


Figure 1 Proportion of Households with Catastrophic Health Expenditure by Wealth Quintile and Insurance Status

Inequality Analysis of Inpatient Care

While the incidence rates appear similar, the distribution of this burden reveals two completely opposing realities when analyzed through the Concentration Index (CI). For PBI beneficiaries, the CI for inpatient care is -0.027. As visualized in the Concentration Curve, the distribution line for PBI users arches above the 45-degree diagonal line of equality. This pattern confirms a Pro-Poor Inequality, meaning that within the subsidized group, financial catastrophe

is not randomly distributed but is concentrated among the absolute poorest households in Quintile 1. The curve rises steeply at the beginning of the x-axis, indicating that the bottom 20% of the population bears a disproportionately large share of the catastrophic cases. This aligns with the hypothesis that for the poorest agrarian families in NTT, even small out-of-pocket costs for travel or food during a hospital stay can trigger a financial collapse.

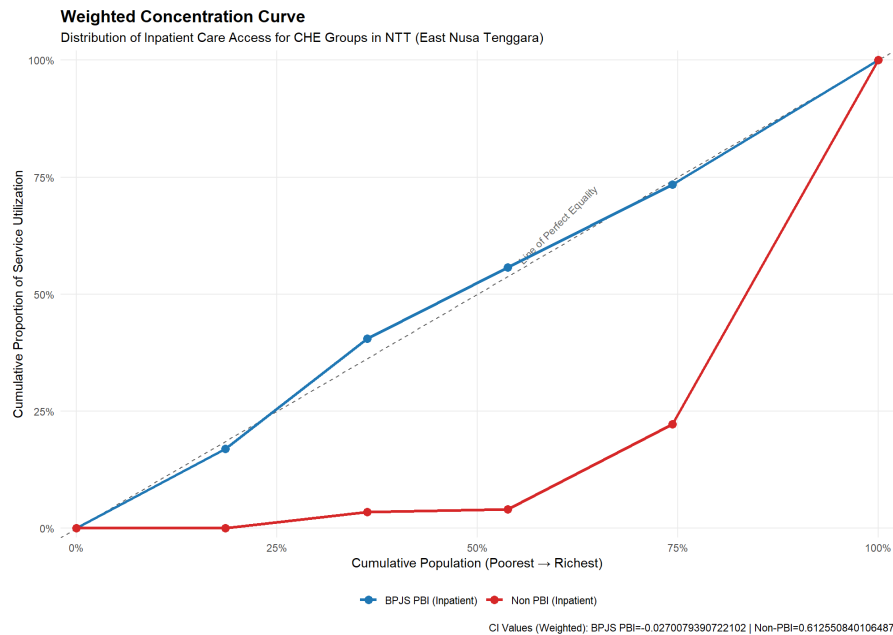


Figure 2 Concentration Curves of In patient CHE (PBI vs Non-PBI)

In stark contrast, the CI for Non-PBI inpatient care is +0.613. Visually, the curve for non-PBI users sink deeply below the diagonal line, indicating a strong Pro-Rich Inequality. Here, the burden of catastrophe is concentrated among the wealthiest households in Quintile 5. This shape suggests a phenomenon of voluntary catastrophe, where wealthier patients likely bypass the standard JKN referral system to access VIP rooms or private hospitals. Consequently, they incur high costs by choice to secure better comfort or perceived quality, rather than out of necessity. Conversely, people who occupied as informal workers and those in rural areas are facing significant barrier to utilizing inpatient care despite having JKN coverage, primarily due to accessibility issues (Rahvy and Gani 2024).

Inequality Analysis of Outpatient Care

A similar pattern of inequality is observed in the utilization of outpatient services. The CI value for PBI outpatient care is -0.092, which is notably more negative than the inpatient

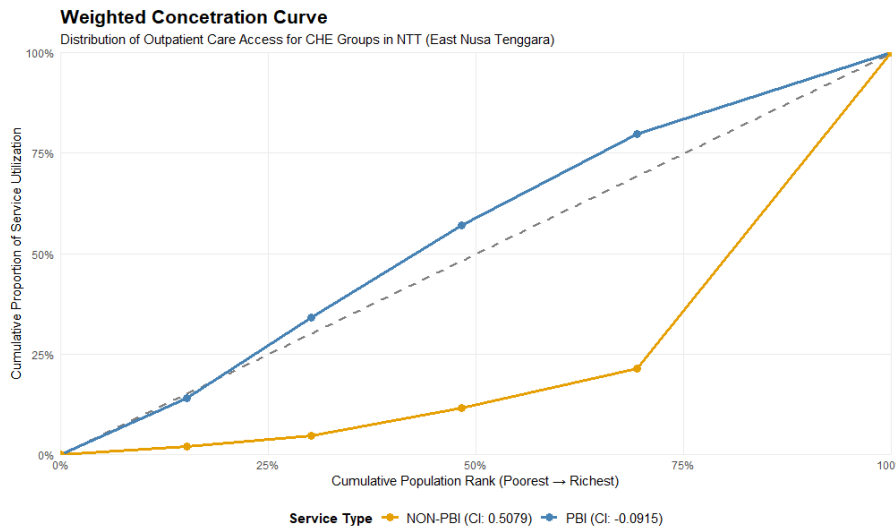


Figure 3 Concentration Curves of Out patient CHE (PBI vs Non-PBI)

index. The curve lies above the equality line, suggesting that for routine outpatient visits, the burden of cumulative small costs such as repeated transportation to *Puskesmas* or buying over-the-counter drugs appears to weigh disproportionately on the poor. Conversely, the CI for Non-PBI outpatient care is +0.508, with the curve lying below the line. This indicates that high spending on outpatient care is concentrated among the wealthy. This pattern may reflect a tendency among higher-income households to utilize private clinics or non-capitated services that are not fully covered by the national scheme, rather than relying solely on public facilities.

Interpretation and Analysis of the Dual Inequity

These findings expose a fundamental divergence in how financial catastrophe affects the population of East Nusa Tenggara. The statistical evidence points to two distinct mechanisms of impoverishment that operate simultaneously within the same health system. To understand this duality, it is necessary to examine the structural drivers of spending for the subsidized and contributory groups separately.

For the PBI segment, the negative Concentration Index confirms that financial catastrophe remains a phenomenon concentrated among the poor. This statistical evidence indicates that while the JKN scheme successfully removes the direct barrier of medical fees it fails to mitigate the ancillary costs of access which are particularly severe in an archipelagic province. As noted by Mamun and Alam, the geographic challenges in such regions create a double burden where patients from remote islands must often pay for sea transportation and family accommodation. Since advanced healthcare infrastructure is heavily concentrated in urban hubs like Kupang City, patients from peripheral areas face excessive logistic expenses that frequently exceed the cost of the medical treatment itself and are not currently covered by the standard benefit package. Consequently, a referral to a provincial hospital often forces an agrarian family to absorb the travel costs for both the patient and necessary caregivers leading to high cumulative spending on food and off-site accommodations. Furthermore, the regressive nature of routine care indicated by the deeper negative CI for outpatient services suggests that cumulative small costs create a logistical shadow cost. This hidden financial weight disproportionately devastates the limited economic capacity of agrarian households who rely on daily income. The data implies that the poorest members are facing a dilemma where they must pay out of pocket to resolve drug stock outs at public facilities by purchasing supplies

from private pharmacies or cover repeated local transport costs for chronic treatment. This evidence suggests that for the PBI population catastrophe is not driven by the price of doctors but by the high price of reaching them.

In stark contrast, the positive Concentration Index for contributory members indicates an inequality concentrated among the wealthy that is driven by fundamentally different factors. This pattern reflects a quality driven expenditure where wealthier households voluntarily incur catastrophic costs. Rather than facing access barriers these members appear to fall into a spending trap where they pay mandatory premiums but frequently bypass the tiered JKN referral system to access private specialists or VIP classes. As highlighted by Rahvy and Gani, this behavior is often a response to perceived quality gaps in standard wards and a preference for faster service. This structural bypassing indicates that the wealthy are engaging in defensive spending to secure better comfort or perceived clinical quality. They are likely utilizing private providers that demand significant top up fees or seeking treatment in major health hubs outside the province such as Bali or Jakarta. Thus, while the statistic counts as catastrophic expenditure because it exceeds the 40% threshold, it represents a consumption choice rather than a failure of the social safety net. This divergence underscores that financial protection in NTT is currently functioning as a leaky bucket where it fails to protect the poor from logistic costs while simultaneously failing to retain the wealthy within the public system due to service limitations.

CONCLUSION

This study assessed financial protection equity under Indonesia's JKN scheme in East Nusa Tenggara (NTT) using 2025 SUSENAS data, finding that catastrophic health expenditure (CHE) exceeded 60% among hospitalized patients, placing the province off track for SDG 3.8.2 targets and confirming that insurance membership alone does not prevent medical impoverishment. Decomposition analysis revealed a dual inequity: PBI (subsidized) beneficiaries showed a negative Concentration Index, indicating the financial burden fell disproportionately on the poorest households driven largely by non-medical costs such as transportation in this geographically fragmented archipelagic region while non-PBI members showed a positive Concentration Index, suggesting wealthier households incurred catastrophic spending through choice-driven behavior such as bypassing the public referral system for higher-tier private care. The findings underscore that a one-size-fits-all policy approach is inadequate, and the authors recommend targeted interventions: social protection supplements like travel grants or island-based patient lodges for PBI members, and strengthening the public referral system to reduce costly out-of-pocket top-ups among non-PBI members. For future research, a mixed-methods study disaggregating the specific cost components driving CHE across these two groups combining household expenditure surveys with qualitative interviews on care-seeking behavior and provider choice would be valuable to more precisely identify whether access barriers or consumption preferences are the primary mechanisms, ultimately informing more equitable UHC policy design in remote and island-based health systems.

REFERENCES

- Agustina, R., et al. (2020). Universal health coverage in Indonesia: Concept, progress, and challenges. *The Lancet*, 393(10166), 75–102. [https://doi.org/10.1016/S0140-6736\(18\)31647-7](https://doi.org/10.1016/S0140-6736(18)31647-7)
- Ahmed, S., Ahmed, M. W., Hasan, M. Z., Mehdi, G. G., Islam, Z., Rehnberg, C., Niessen, L. W., & Khan, J. A. M. (2022). Assessing the incidence of catastrophic health expenditure and impoverishment from out-of-pocket payments and their determinants in Bangladesh: Evidence from the nationwide Household Income and Expenditure Survey 2016. *International Health*, 14(1), 84–96.
- Ardyanto, T. D. (2019). The importance of socialization in achieving universal health coverage: Case study of Jaminan Kesehatan Nasional (JKN) implementation in two different region in Central Java province. *Jurnal Kedokteran dan Kesehatan Indonesia*.
- Badan Pusat Statistik. (2024). *Statistik Indonesia 2024*. Badan Pusat Statistik.
- Carey, C. M., Miller, S., & Wherry, L. R. (2020). The impact of insurance expansions on the already insured: The Affordable Care Act and Medicare. *American Economic Journal: Applied Economics*, 12(4), 288–318.
- Erlangga, D. (2018). *The impact evaluation of public health insurance in Indonesia on access to care, financial protection, and health status* [Doctoral dissertation, University of York].
- Haemmerli, M. (2022). *On the road to universal health coverage: Measuring socioeconomic inequalities in access to and use of high quality care in Indonesia* [Doctoral dissertation, London School of Hygiene & Tropical Medicine].
- Hatanaka, T., Eguchi, N., Deguchi, M., Yazawa, M., & Ishii, M. (2015). Study of global health strategy based on international trends: Promoting universal health coverage globally and ensuring the sustainability of Japan's universal coverage of health insurance system: Problems and proposals. *Japan Medical Association Journal*, 58(3), 78.
- Karpman, M., & Acs, G. (2020). *Unemployment insurance and economic impact payments associated with reduced hardship following CARES Act*. Urban Institute.
- Lindgren, M. (2018). *Mapping socioeconomic disincentives to public health insurance usage among informal sector workers: A case study on Lombok, Indonesia*.
- Mahendradhata, Y., et al. (2021). The capacity of the Indonesian healthcare system to respond to COVID-19. *Frontiers in Public Health*, 9, 649819. <https://doi.org/10.3389/fpubh.2021.649819>
- Mamun, A. A., & Alam, M. (2025). Promoting equity in public health: Addressing inequality and social disparities. *Health Science Reports*, 8(5), e70821. <https://doi.org/10.1002/HSR2.70821>
- Maulana, N., et al. (2022). How Jaminan Kesehatan Nasional (JKN) coverage influences out-of-pocket (OOP) payments by vulnerable populations in Indonesia. *PLOS Global Public Health*, 2(7), e0000203. <https://doi.org/10.1371/journal.pgph.0000203>
- McMorrow, S., Gates, J. A., Long, S. K., & Kenney, G. M. (2017). Medicaid expansion increased coverage, improved affordability, and reduced psychological distress for low-income parents. *Health Affairs*, 36(5), 808–818.
- Nguyen, H. A., Ahmed, S., & Turner, H. C. (2023). Overview of the main methods used for estimating catastrophic health expenditure. *Cost Effectiveness and Resource Allocation*, 21(1), 50.
- Organization, W. H. (2021). *Global monitoring report on financial protection in health 2021*. World Health Organization.
- Rahmawati, T., & Hsieh, H.-M. (2024). Appraisal of universal health insurance and maternal health services utilization: Pre-and post-context of the Jaminan Kesehatan Nasional implementation in Indonesia. *Frontiers in Public Health*, 12, 1301421.

- Rahvy, A. P., & Gani, A. (2024). Inpatient care utilization after JKN: A study case in East Nusa Tenggara. *Indonesian Journal of Health Administration (Jurnal Administrasi Kesehatan Indonesia)*, 12(1), 120–128. <https://doi.org/10.20473/JAKI.V12I1.2024.120-128>
- Sinha, R., Chatterjee, K., Nair, N., & Tripathy, P. (2016). Determinants of out-of-pocket and catastrophic health expenditure: A cross-sectional study. *British Journal of Medicine and Medical Research*, 11(8), 1–11.
- Susilo, D., Lila, W. L. P., Sukmayeti, E., Asante, A., Jan, S., Thabrany, H., Tangcharoensathien, V., Wiseman, V., & Liverani, M. (2025). Can Indonesia achieve universal health coverage? Organisational and financing challenges in implementing the national health insurance system. *SSM-Health Systems*, 100138.
- Tadiwos, Y. B., Kassahun, M. M., & Mebratie, A. D. (2025). Catastrophic and impoverishing out-of-pocket health expenditure in Ethiopia: Evidence from the Ethiopia Socioeconomic Survey. *Health Economics Review*, 15(1). <https://doi.org/10.1186/s13561-025-00602-1>
- Tangcharoensathien, V., Mills, A., & Palu, T. (2015). Accelerating health equity: The key role of universal health coverage in the Sustainable Development Goals. *BMC Medicine*, 13(1), 101.
- Verguet, S., Woldemariam, A. T., Durrett, W. N., Norheim, O. F., & Kruk, M. E. (2017). Is the sustainable development goal target for financial risk protection in health realistic? *BMJ Global Health*, 2(3).
- World Health Organization. (2023). *Tracking universal health coverage: 2023 global monitoring report*. World Health Organization.
- Xu, Y., Huang, C., & Colón-Ramos, U. (2015). Moving toward universal health coverage (UHC) to achieve inclusive and sustainable health development: Three essential strategies drawn from Asian experience. *International Journal of Health Policy and Management*, 4(12), 869.