

Healthcare Financing in Focus: Exploring the Economic Drivers of Health Expenditure; Insights from Pakistan

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Abstract

One important socioeconomic factor that influences how much money a nation can devote to its healthcare system is health spending. This study examines the dynamic relationships between Pakistan's Gross Domestic Product in US dollars (GDP), income inequality (GINI), the Human Development Index (HDI), and health expenditure (HEP) between 2000 and 2024. The HDI and its determinants, which are important markers of economic and developmental advancement, are the subject of the study. This study examines the individual and combined effects of these variables on healthcare spending using an Ordinary Least Squares (OLS) regression model. The results show that GDP has a major impact on healthcare spending, with higher economic growth being associated with higher health spending. On the other hand, the study finds a significant inverse relationship between HDI and health spending, indicating that nations with higher HDI typically have healthier populations and, consequently, lower healthcare costs. Furthermore, in this instance, HEP is not significantly impacted by the GINI Index, a measure of income inequality. The findings provide insightful information for policymakers and highlight the significance of both economic and social development factors in comprehending healthcare funding dynamics. This study emphasizes the need for better healthcare funding allocation, especially in Pakistan, where policies regarding healthcare spending are heavily influenced by social and economic development.

KEYWORDS

Health expenditure, Gross domestic product, Human development index, Gini index, Pakistan

1 | INTRODUCTION

1.1 Historical Background and Introduction

Health spending in Pakistan has been a topic of ongoing controversy and worry, especially given the country's socio-economic problems. Pakistan's healthcare system has changed over the years, starting with a few resources and facilities when the country became independent in 1947 (Burki, 2018). Public health spending has gone up a little bit over the years, but it is still a small part of the country's GDP compared to other countries with similar populations (Apeagyei et al., 2024). In the past, Pakistan's health policies have had problems with waste, lack of funding, and unfairness. The gap between urban and rural areas has made it even harder to get good medical care (Saeed,

2025). The country's economic problems, including as inflation, poverty, and unemployment, have made it hard for successive governments to put public health first (Ndzignat Mouteyica & Ngepah, 2024). As the population grows and cities grow, it has become clear that the country needs to spend more on health care. This is because upgrading public health infrastructure is an important part of addressing both the social and economic components of the country's growth (M. M. Rahman, Dyuti, & Tareque, 2025).

Moreover, the dynamic link between economic development and healthcare expenditure is a thoroughly researched domain. The widening disparity between economic output and public health spending in

Pakistan prompts significant inquiries over the efficacy of healthcare finance (K. Khan et al., 2024). According to T. Rahman, Gasbarro, and Alam (2022), the correlation between economic development and healthcare expenditure is a thoroughly researched domain. The widening disparity between economic output and public health spending in Pakistan prompts significant inquiries over the efficacy of healthcare finance. Additionally, Jacques and Noel (2022) state that the absence of a cohesive long-term health policy has impeded progress in public health investment. Peña-Sánchez, Ruiz-Chico, and Jiménez-García (2021) underscore the necessity of synchronizing health expenditures with economic growth to guarantee fair healthcare access for all socioeconomic categories.

Moreover, research by Reilly (2021) suggests that the urban-rural divide in health services remains a persistent challenge, with rural areas receiving disproportionately lower levels of investment. Saleem (2023) also point out that, despite improvements in certain health indicators, Pakistan's healthcare system continues to lag behind other nations in terms of per capita health expenditure. As urbanization accelerates, WHO (2022) highlights the urgent need to address the gaps in health infrastructure, particularly in rapidly growing urban centers. With ongoing debates about the allocation of resources, argued that sustainable healthcare financing must prioritize preventative measures, particularly in combating non-communicable diseases that have become increasingly prevalent in Pakistan (Khan, Nazir, & Afzal, 2024).

Furthermore, the HDI is a combination of three things: life expectancy, education, and per capita income (Barman & Kalita, 2021). It shows how healthy a country's people are as a whole and is often used to compare levels of human development between countries (Priambodo & tPriambodo, 2021). GINI evaluates how unequal income is. A higher GINI value means that money is more unevenly distributed (Zhongbin, 2025). It is important to know how differences in income can affect public policies, such as those about health. Lastly, GDPU is a basic measure of a country's economic health because it shows how much money the country makes (Majee, Dawod, & Abbas, 2022). GDPU is important for figuring out how a country can pay for public services like healthcare. Its connection to health spending can also tell us a lot about the country's economic goals (Sellers, 2025). These variables collectively establish a comprehensive framework for the analysis of socio-economic aspects that impact health expenditure.

1.2. Significance of the Study

The goal of this study is to look into how Pakistan's health spending affects three main economic indicators: GDP per capita, the HDI, and the GINI. The importance of this study is that it could help policymakers understand what makes people in Pakistan spend

money on health care. The study identifies critical economic determinants influencing health funding, offering information to inform future policy decisions and resource allocation. It is very important to understand these relationships if you want Pakistan's healthcare system to be fairer and last longer.

1.3. Objectives of the Study

This study aims to:

1. Examine how economic development metrics, such as GDP per capita, HDI, and the GINI Index, affect health spending in Pakistan.
2. To identify the key variables influencing health spending between 2000 and 2024.
3. To offer policy recommendations based on the findings that will improve the efficiency and financial use of Pakistan's healthcare funding.

1.4. Literature Review and Theoretical Evidence

1.4.1. Theoretical Evidence

Health expenditure is a defining component in any economy in order to measure the social development in the world. Aligning this component with another economic development indicator, such as GDPU, gives insightful information about the situation of the country (Jean-Paul & Martine, 2018). The theory of economic growth presents this dynamic linkage well. According to this theory, a country's economic growth is dependent on the allocation of its resources among different sectors such as health, education, food (R. Barro, 1996; R. J. Barro, 2013; Mensah & Adukp, 2025; Ramirez, Ranis, & Stewart, 1997).

Moreover, there are a lot of important theories that back up the link between the HDI and HEP. Here are some well-known ideas that back up the link between HDI and HEP. Human Capital Theory stresses the need to invest in people through education, health, and skills training in order to boost productivity and the economy as a whole (Magida, Ncanywa, Sibanda, & Asaleye, 2025). This theory posits that improved health enhances productivity, thereby fostering economic development. Life expectancy is one of the parts of HDI, and it is directly related to health (Mohamed, Mohamed, Weyrah, Isse, & Husein, 2025). The theory posits that increased HEP (healthcare investment) leads to better health outcomes (life expectancy), thereby elevating a country's HDI. This theory posits that countries exhibiting elevated HDI are likely to possess higher HEP, as the enhancement of health is a fundamental catalyst for human capital advancement (Singh et al., 2025).

Furthermore, the dynamic link between income equality and healthcare expenditures is supported by the social determinants of health theory. Numerous social, economic, and environmental factors impact health outcomes, according to this theory (Kalnins & Praitis Hill, 2025). One important social determinant of health is income inequality, as measured by the GINI

Index (Xing, He, Lin, & Pan, 2025). Poorer health outcomes are often the result of more unequal access to health care, nutrition, and education in societies with greater income inequality (Adegoke, Adegoke, & Kayode, 2025). Moreover, in order to address health disparities and guarantee that underprivileged populations receive quality healthcare services, there is frequently a need for HEP as income inequality rises. To lessen these disparities and enhance public health, governments might increase their funding for healthcare.

1.4.2. Economic Development and Healthcare Expenditures

The economy of Pakistan is among those that have seen fluctuations in both price levels and growth (Ali, Gusev, & Khadimullina, 2025). Both natural and human resources are abundant in this economy (Ashraf, Li, Dodor, & Murad, 2018). However, it has not demonstrated resilience in establishing the growth trajectory. The economy of Pakistan has a highly unequal distribution of income (Bukhari, Shoaib, & Nasir, 2021). Opportunities created by employment are insufficient to address the problems of income inequality and poverty (Ashraf et al., 2018). Additionally, the inflation rate and overall price level volatility have been higher in our economy on average (Tian et al., 2025). The impoverished and deprived households suffer when inflation rises (Nisar et al., 2012). There is conflicting evidence regarding the effects of inflation in both empirical research and economic theory literature. According to Wagner's Law of Increasing State Expenditure, countries tend to spend more on public services, such as healthcare, as their wealth increases. As a result, increased GDP may result in higher health spending relative to total national income (Ali et al., 2025).

Furthermore, the total monetary value of all goods and services produced inside a nation's borders over a given time period is represented by the GDP, a key economic indicator. Because it directly reflects the volume of production, consumption, and income generation, it is frequently used to assess a country's economic health and development (Balk, 2025). Conversely, HEP quantifies the amount of money spent on healthcare services, including both public and private spending (Yerushalmi & Ziv, 2025). Since higher economic output usually enables higher government spending on health infrastructure and services, the relationship between GDP and HEP is well-established in economic literature (Magida et al., 2025). There is typically more money available to support public health programs as economies expand, which can result in better health outcomes and more equal access to medical care (Mouteyica & Ngepah, 2025). Assessing how economic growth affects the development of the health sector and the general well-being of the populace requires an understanding of this dynamic.

1.4.3. Human Development and Healthcare Expenditure

Furthermore, life expectancy, education, and per capita income are the three main factors that make up the HDI, a composite metric that evaluates a nation's overall level of development (Bagolin & Comim, 2008; Dagohoy, Bugarin, & Casinillo, 2025; Priambodo & tPriambodo, 2021). Compared to GDP alone, HDI offers a more comprehensive picture of development and is frequently used to assess a country's social and economic advancement (Schepelmann, Goossens, & Makipaa, 2009). It highlights the significance of human well-being, which goes beyond economic production to encompass health and education. Better life expectancy, income levels, and educational attainment are all reflected in a higher HDI, which indicates a higher standard of living (Grimm, Harttgen, Klasen, & Misselhorn, 2008). In order to improve HDI, especially in the life expectancy dimension, HEP is essential. Better health outcomes follow from having access to high-quality healthcare services, which is ensured by adequate health spending (Fisher, Goodman, Skinner, & Bronner, 2009). Higher life expectancy, a crucial HDI component, is typically seen in countries with greater healthcare spending (Anand & Sen, 2000). Public health spending is crucial for enhancing human development outcomes, according to the correlation between HEP and HDI (Ranis, Stewart, & Ramirez, 2000). Furthermore, since healthier populations are more likely to seek and finish education, health spending can also have an indirect impact on educational outcomes (Arendt, 2005). As a result, there is a reciprocal relationship between HDI and HEP; better health can result in better development indicators, and better human development can increase a nation's capacity to make health investments (Kirkcaldy, Furnham, & Siefen, 2004). Understanding this relationship is essential for developing policies that target both social and economic development in developing countries like Pakistan (Hussain, Majeed, Muhammad, & Lal, 2010; Mughal & Baig, 2024).

1.4.4. GINI Index and Health Expenditure

A measure of income inequality within a nation or population is the Gini Index, sometimes referred to as the Gini Coefficient (Charles, Gherman, & Paliza, 2022; De Maio, 2007; Lee & Suh, 2025; Thomas, Wang, & Fan, 2003). The Italian statistician Corrado Gini created it in 1912. With 0 denoting perfect equality (everyone has the same income) and 1 denoting maximum inequality (one person has all the income while others have none), the index ranges from 0 to 1 (Charles et al., 2022). The Gini Index, which clearly illustrates how evenly or unevenly resources are distributed among a population, is frequently used to quantify differences in income or wealth distribution (Sudswong, Plangprasopchok, & Amornbunchornvej, 2025). Given that income inequality frequently has a substantial impact on public health

outcomes, the Gini Index and HEP are closely related. Access to high-quality healthcare is usually more unequal in societies with greater income inequality, as indicated by a higher Gini Index (Abbasi, Karimi Dehkordi, SoleimanvandiAzar, Roohravan Benis, & Nojomi, 2025). For underprivileged groups, this discrepancy may result in worse health outcomes, raising health expenses for both individuals and governments. On the other hand, more equitable access to healthcare services tends to be associated with more equitable income distribution, which enhances public health outcomes and lowers the overall need for high health expenditure (Horvey, 2025). Therefore, by improving population health and lowering the cost of healthcare, addressing income inequality through targeted policies may not only lower the Gini Index but also maximize health spending (Ugwu et al., 2025).

2 MATERIAL AND METHOD

2.1. Research Methodology

This study's research approach is predicated on analyzing the influence of socio-economic variables, including HDI, GINI, and GDPU, on HEP in Pakistan from 2000 to 2024. These variables have been chosen because they are known to affect healthcare spending and the larger socio-economic context. The theory posits that GDPU and HDI are pivotal in influencing the extent of health expenditure, but GINI may compel the government to increase healthcare funding to rectify access inequities. The interactions among these elements are anticipated to elucidate the impact of economic growth and social development on health expenditure decisions and priorities in Pakistan. The study employs a multivariate regression model to examine the individual and collective impacts of these variables on health expenditure. This paradigm will assist in assessing the effects of enhancements in economic output, human development, and income distribution on the allocation of resources for health services, especially in a developing nation such as Pakistan.

2.1.1. Data Collection

The data used in this research extends from 2000 to 2024. The World Bank, the United Nations Development Programme (UNDP), the World Health Organization (WHO), and Pakistan's Ministry of Finance are some of the reliable sources that will be used to get the data for these variables. Table 1 shows a description of the following variables.

2.1.2. Equation Model

This article uses Ordinary Least Squares (OLS) regression to estimate the model. This will make sure that the relationships between HDI, GINI, GDPU, and

HEP are linear and that the assumptions of the regression model are met. This model helps in figuring out how much each independent variable and all of them together affect health spending. The following regression model will be employed: Statistical software like Stata will be used to do the regression analysis.

$$HEP_t = \beta_0 + \beta_1 GDPU_t + \beta_2 HDI_t + \beta_3 GINI_t + \epsilon_t$$

Where:

- HEP_t is the health expenditure at time t .
- HDI_t is the Human Development Index at time t .
- $GINI_t$ is the GINI Index at time t .
- $GDPU_t$ is the Gross Domestic Product in USD at time t .
- β_0 is the intercept term,
- $\beta_1, \beta_2, \beta_3$ are the coefficients for each independent variable, and
- ϵ_t is the error term.

2.2. Research Analysis

Table 3 represents the correlation matrix. The correlation matrix shows a number of crucial links between the variables. There is a moderate positive connection (0.73) between HEP and GDPU, which means that more health spending is linked to more economic output. There is also a moderate positive association (0.36) between HEP and the GINI, which means that more economic inequality may lead to more health spending. The correlation between HEP and HDI is very poor (-0.0014), which means that there is no strong link between health spending and human development. There is a moderate positive connection (0.34) between GDPU and HDI, which means that higher economic output is linked to better human development, aligned with a study by (Singh et al., 2025). There is a weak positive correlation (0.20) between GINI and HDI, which means that there is a small link between income inequality and human development, although it is not strong. In general, these relationships provide us an idea of how social and economic factors could affect health spending in Pakistan.

2.2.1. Descriptive Statistics

The descriptive statistics, as shown in Table 2, in this study provide significant insights into Pakistan's socio-economic conditions from 2000 to 2024. The average HEP is 2.57% of GDP, with a range of 2.04% to 2.99%. The GDPU changes a lot, with an average of 240 billion USD and a range of values from 97.1 billion USD to 375 billion USD. The HDI stays rather stable, with an average of 0.5414, which shows that human development is steady. The GINI, which measures income inequality, has an average of 31.59, with values between 28.7 and 41.9. These data give a complete picture of the factors that affect health spending in Pakistan, showing how economic growth, human development, and socioeconomic disparity all play a role.

This study measures VIF, with a mean of 1.38, and all VIF values below 10; it appears that your model does not have a multicollinearity issue. A variable is usually

highly correlated with other variables in the model if its VIF is greater than 10, which may cause instability in the coefficient estimates (Kalnins & Praitis Hill, 2025). All of

Table 1: Variable Descriptions and Measurement

Variable	Description	Measurement Unit	Expected Impact
Human Development Index (HDI)	A composite index measuring per capita income, education and life expectancy	Index (0-1 scale)	-/+
GINI Index (GINI)	A measure of income inequality, where 0 represents perfect equality and 100 denotes maximum inequality.	Index (0-100 scale)	-/+
Gross Domestic Product in USD (GDP)	The total market value of all final goods and services produced by Pakistan, measured in US dollars.	USD (in billions)	+
Health Expenditure (HEP)	Total spending on healthcare services.	Percentage of GDP or USD	Dependent Variable

Table 2: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum	Units
HEP	2.57	0.27	2.04	2.99	Percentage of GDP
GDP	240	94.4	97.1	375	Billions of USD
HDI	0.5414	0.0269	0.441	0.558	Decimal (0-1 scale)
GINI	31.59	3.31	28.7	41.9	Index (0-100 scale)

Table 3: Correlation Matrix

Variable	HEP	GDP	HDI	GINI
HEP	1.0000			
GDP	0.7275	1.0000		
HDI	-0.0014	0.3386	1.0000	
GINI	0.3581	0.5516	0.2022	1.0000

the VIF values in this instance fall well within the acceptable range, indicating that there is little correlation between the independent variables (GDP, GINI, and HDI) and that the model's output should be trustworthy. Table 4 represents VIF.

Table 4: Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
GDP	1.56	0.641978
GINI	1.44	0.695469
HDI	1.13	0.884999
Mean VIF	1.38	

Furthermore, several significant findings are revealed by the Ordinary Least Squares (OLS) regression model that looks at the relationship between the HDI, GINI, GDP, and HEP. Table 5 represents the summary of the model and of OLS regression model measurements. First, with a p-value of 0.0002 and an F-statistic of 10.54, the model is statistically significant overall, suggesting that the predictors account for a significant amount of the variation in HEP. According to the model's R-squared value of 0.6008, HDI, GINI, and GDP account for roughly 60.08% of the variation in HEP. When examining the individual coefficients, the study finds that the HDI coefficient is negative (-2.84), indicating that the relationship between higher human development and lower health spending per capita is only marginally significant (p-value = 0.071) at the 10% significance level. Although the GINI coefficient is likewise negative (-0.0046), the p-value of 0.738 suggests that this variable does not statistically significantly explain differences in health spending per capita. Conversely, the GDP coefficient is positive

(2.47e-12), with a statistically significant but tiny impact (p-value = 0.000), suggesting a strong correlation between higher GDP and higher per capita health spending. The model still explains a significant amount of the variation in HEP, according to the adjusted R-squared value of 0.5438, even after considering the number of predictors. While the effects of HDI and GINI are either weak or not significant in this model, the results show that GDP is a particularly strong and statistically significant predictor.

Table 5: Ordinary Least Squares Model Measurement

Statistic	Value
Number of Observations	25
F-statistic (F)	10.54
Prob > F	0.0002
R-squared	0.6008
Adjusted R-squared	0.5438
Root Mean Squared Error (RMSE)	0.18482

2.3. Model Summary

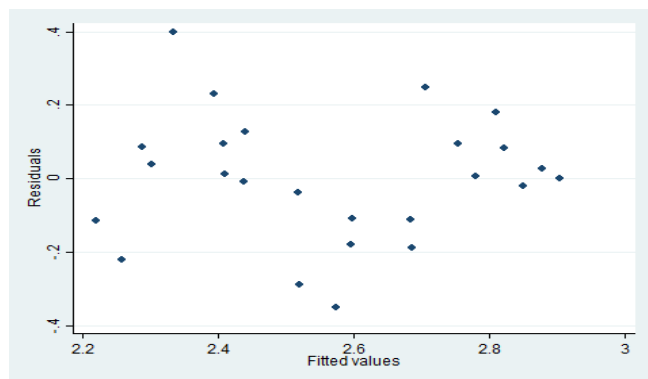
Moreover, *rvfplot* is also presented in the study, which is one of the fundamental tenets of Ordinary Least Squares (OLS) regression is homoscedasticity, which states that the variance of the residuals (errors) should be constant across all levels of the fitted values (predicted values). This is evaluated by the *rvfplot* also known as Residual vs. Fitted Values Plot (Mitchell, 2008). There is no discernible pattern or trend in the *rvfplot*, which displays randomly distributed residuals around 0. This implies that the model's homoscedasticity (constant variance of residuals) assumption is true. With no indications of heteroscedasticity or model misspecification, the plot generally supports the model's validity. Fig 1 below shows the *rvfplot* graph.

3 DISCUSSION

Expanding upon the preliminary results, the findings underscore the significance of economic variables,

Table 6

Variable	Coefficient	Standard Error	t-value	p-value	95% Confidence Interval
HDI	-2.837954	1.491269	-1.90	0.071	[-5.939218, 0.2633107]
GINI	-0.0046241	0.0136676	-0.34	0.738	[-0.0330475, 0.0237992]
GDP	2.47e-12	4.99e-13	4.96	0.000	[1.43e-12, 3.51e-12]
Constant	3.656083	0.8558273	4.27	0.000	[1.876292, 5.435873]

**Fig. 2:** Ryfplot Presentation

Specifically, GDP, in shaping health spending per capita. More resources are devoted to healthcare as a nation's economy expands, according to the positive and statistically significant correlation between GDP and HEP (Ibukun & Omisore, 2025; Kinge et al., 2025; Singh et al., 2025). Nonetheless, intriguing questions are brought up by the weak and barely significant correlation between HDI and HEP. Higher levels of human development are typically linked to better access to healthcare, education, and living standards; however, in this instance, they appear to be somewhat inversely correlated with per capita health spending and aligned with the studies (Julistia, Kurniawan, & Hasimi, 2025; Pham, Thuy, & Cau Giay, 2025; Ribeiro et al., 2025). This may suggest that more developed nations already have a strong healthcare system in which further investment yields diminishing returns. Notably, the GINI index in this model is not significant; these findings are in alignment with previous literature (Gu, Zhang, & Liu, 2025; Kar & Sa, 2025). The findings indicate that, in this instance, income inequality has no direct impact on healthcare spending, even though it can have an impact on social determinants of health and healthcare accessibility. There could be a number of reasons for this, including the fact that health spending is prioritized and is more closely related to economic growth than to wealth distribution or social inequality (Cerra, Lama, & Loayza, 2021). Additionally, it may highlight the intricate relationship between inequality and health outcomes, which may call for more sophisticated modeling or the addition of more variables in order to capture the impact fully. Furthermore, the OLS assumption of constant variance of residuals is upheld by the rvfplot, which validates the lack of heteroscedasticity in terms of model diagnostics. By implying that the regression results are not skewed by unequal variance in errors, this enhances the validity of the model's estimates. There is no sign of

omitted variable bias or the need for more intricate transformations, and the absence of patterns or trends in the residuals further demonstrates that the model's specification is appropriate.

3.1. Limitations and Future Implications

The current analysis does have certain limitations, though, such as the omission of possible confounding factors like government spending priorities, efficiency, and healthcare policies. To gain a better understanding of the dynamics of health spending, future studies should investigate the role of these factors and test different model specifications. Furthermore, the lack of significance of GINI and the weak significance of HDI underscore the necessity of additional research on their association with healthcare spending, perhaps taking into account more variables or more detailed data. In order to boost healthcare spending, policymakers should prioritize economic growth, but they should also take into account other social determinants and disparities that could impact healthcare quality and access.

3.2. Conclusion

This study investigates the factors influencing HEP, focusing on GDP, HDI, and GNI per capita. The results demonstrate that GDP is the most significant predictor of HEP, with higher economic output leading to increased healthcare spending. This finding aligns with the notion that wealthier countries have more resources to allocate to healthcare. In contrast, the relationship between HDI and HEP is weak and marginally significant, suggesting that while higher human development generally improves healthcare access, it does not necessarily result in higher per capita health expenditure. Similarly, GINI, a measure of income inequality, was found to have no significant effect on health expenditure.

The model explains about 60% of the variation in HEP, and the residual diagnostics confirm that the model is well-specified with no violations of key assumptions. This reinforces the robustness of the estimates and the validity of the conclusions drawn. The findings underscore the importance of economic growth in shaping healthcare funding, while also pointing to the need for further research into other factors that may influence health expenditure, particularly social and political determinants. Ultimately, this study offers valuable insights for policymakers working to improve healthcare systems, emphasizing the role of economic

development in fostering adequate health expenditure. Overall, even though GDP is still the best indicator of health spending, more study is required to fully comprehend the relationship between HDI and inequality, perhaps taking into account other elements like healthcare efficiency or governmental health policies.

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Author Contributions

Dr. Usman helped develop the ideas and also worked on the writing, software implementation, data analysis, and methodology. Dr. Basit and Fredrick Asare Boakye wrote the first draft and were in charge of collecting and checking the data.

Disclosure of Potential Conflict

The authors affirm that they have no conflicts of interest regarding the study, authorship, and publishing of this work.

Statement about Data Availability

This study did not involve the creation of datasets or analysis; therefore, the sharing of data is not applicable to this research.

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