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The Role of Health Insurance in Facilitating Access to Healthcare Utilization: A Case Study of BPJS Kesehatan Users in Banten Province

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Abstrack: Access to healthcare remains a major challenge, especially in developing countries, due to limited infrastructure, medical personnel, and funding. In 2017, the World Bank and WHO reported that nearly half of the world's population struggled to access healthcare due to high costs, including in Indonesia. This study examines the factors influencing BPJS Kesehatan participation and its impact on healthcare utilization. Using probit models and regression techniques, the analysis highlights key determinants, including residence, age, marital status, healthcare utilization, sanitation, household size, income, agricultural participation, health conditions, and employment status. The study also evaluates the effect of insurance coverage on healthcare visits using Negative Binomial Regression and IV Poisson GMM methods. Results indicate that while insurance increases healthcare utilization, factors such as geographic location and out-of-pocket expenses influence access. Findings suggest the need for targeted policies to improve insurance accessibility, particularly in rural areas, and address economic barriers. Limitations include the cross-sectional nature of the data and potential biases in self-reported information. Future research should explore longitudinal data and additional variables to better understand health insurance dynamics.

Keywords: BPJS Kesehatan; Healthcare Utilization; Probit Model; Negative Binomial Regression; IV Poisson GMM

Introduction

Access to healthcare has become a serious issue for countries around the world, particularly in developing nations, where millions of people face significant challenges in obtaining adequate and affordable care (Chowdhury & Ravi, 2022; Dawkins et al., 2021; Gaudin & Yazbeck, 2021). Contributing factors to this accessibility problem include inadequate healthcare infrastructure, shortages of trained human resources, significant socio-economic disparities, and limited access to healthcare financing through insurance (Al-Worafi, 2024c, 2024b, 2024a; Johar et al., 2018). In 2017, the World Bank and WHO reported that nearly half of the global population cannot access healthcare services due to high healthcare costs, which have pushed more than 100 million households into extreme poverty (Kitole, Lihawa, & Nsindagi, 2022; Kitole & Sesabo, 2022). Indonesia, as a developing country, is also grappling with this issue.

Since 2014, the Indonesian government has launched the National Health Insurance (JKN) program, administered by BPJS Kesehatan, with the aim of providing health protection for all Indonesians, including ensuring universal access to healthcare services ((Irwandy & Sjaaf, 2020). However, according to the WHO's 2023 report on Universal Health Coverage (UHC), the service coverage index in 2021 was only 55%, down from 56% in 2019 (WHO, 2023). This decline highlights the ongoing challenges in achieving equitable

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and comprehensive access to healthcare services across Indonesia, particularly concerning the role of health insurance. Although the JKN program has provided health protection for most of the Indonesia's population (Kurniawanto et al., 2023), several factors still affect the accessibility of healthcare services, including geographical barriers, limited healthcare infrastructure, lack of awareness about the benefits of health insurance, and challenges in effectively implementing the program at the local level.

Based on data from the Integrated Sismonev JKN, as of March 2024, the number of participants in the program across Indonesia reached 268,679,899 people, with a coverage rate of 95.41%. Specifically, in Banten Province, 12,314,237 people are registered as participants, with a coverage rate of 99.06%, of which approximately 2,903,073 are inactive members (JKN, 2024). The high level of enrollment in Banten Province indicates a strong awareness among the population regarding the importance of health insurance. However, the high participation rate raises questions about whether this reflects a deep understanding of the benefits of health insurance or if other factors, such as mandatory participation or social pressure, are influencing this trend (Hao et al., 2022). Moreover, although high enrollment rates indicate good accessibility, it remains to be evaluated whether this program truly provides optimal benefits for participants, particularly in terms of access to quality and timely healthcare services. Therefore, it is crucial to continuously analyze and monitor the effectiveness of this program and to make efforts to enhance public understanding of the importance of health protection through insurance.

To address the challenges of healthcare access in Indonesia, particularly concerning the performance of the JKN program administered by BPJS Kesehatan, a holistic evaluation is needed to identify both the successes and challenges in achieving the goal of universal healthcare access (Adams & Neville, 2020). This evaluation should also pinpoint the factors contributing to low service coverage and participation, such as inadequate infrastructure and low public awareness. Additionally, assessing the policies and implementation of the program is essential, including the provision of subsidies for JKN participants and the reduction of administrative barriers. Through this approach, effective solutions can be found to enhance access to quality healthcare services for the Indonesian population, while also improving the performance and effectiveness of the JKN program administered by BPJS Kesehatan.

Previous studies have provided insights into the role of health insurance in facilitating access to healthcare services. For instance, it has been noted that access to healthcare is higher among those who have health insurance (Kitole et al., 2023; Shami et al., 2019), including the elderly who have health insurance (Tungu et al., 2020). However, some studies have also found that the possession of government-funded free health insurance does not have a significant effect on improving access to healthcare, especially for elderly residents and impoverished pregnant women living in rural areas (Darkwah, 2022; Kuwawenaruwa et al., 2019). Regarding the role of BPJS Kesehatan, it has been found that access to healthcare depends on the availability of healthcare facilities in each area (Handayani et al., 2021), and that access to healthcare increases for cancer patients enrolled in the JKN program (Kosen, 2022). Meanwhile, other research suggests that there is no significant effect for BPJS Kesehatan participants in using healthcare services if they do not require special or advanced care (Sambodo et al., 2023). These varying findings on the role of health insurance in facilitating healthcare access indicate the need for further research to comprehensively investigate the dynamics of health insurance, particularly BPJS Kesehatan, in facilitating access to healthcare services in Banten Province.

By delving deeper into the factors that may cause variations in the results of previous studies, such as differences in healthcare infrastructure, demographic characteristics of the population, and the implementation of health policies at the local level, this research aims to provide a more comprehensive and accurate understanding of the role of health insurance within the specific context of Banten Province. This will offer a stronger foundation for developing more effective policies to improve access to healthcare services for the community.

Method

This study employs survey, interview, and Focus Group Discussion (FGD) methods to gather data on users' experiences, perceptions, and needs related to access and utilization of healthcare services through health insurance. The survey is designed to cover various aspects, such as user satisfaction, the level of healthcare service accessibility, and challenges faced in utilizing health insurance. Interviews are conducted to gain deeper insights into individual users' experiences and perceptions. FGDs are used to facilitate broader group discussions on topics related to healthcare services, which can yield more comprehensive insights.

The population in this study consists of the entire poor population in Banten Province, which numbered 791,610 people as of March 2024 (BPS, 2024). The research is focused on three regencies with the highest number of poor residents: Pandeglang Regency, Lebak

Regency, and Tangerang Regency. The sample for this study includes the poor residents of these three regencies. The sample size was determined using the formula provided by (Levy & Lemeshow, 2013). The required sample size for each regency is 385, resulting in a total of 1,155 respondents.

The questionnaire used in this study is a modified version of a previous study (Kitole et al., 2023)adapted to the characteristics of the population in Indonesia. The questionnaire consists of two sections: general characteristics and household socio-economic characteristics. The general characteristics include: place of residence, gender, insurance coverage, healthcare utilization, education level, and marital status. The socio-economic characteristics of the household are presented in Table 1.

Table 1. Household Socio-Economic Characteristics

Indicator	Measurement
Age	Age of the household head in years
Household size	Number of people in the household
Children under 5 years	Number of children < 5 years old
Children under 14 years	Number of children < 14 years old
Adults	Number of adults (18-63 years)
Elderly	Number of elderly (> 64 years)
Food expenditure	Amount of money spent on food
Total household consumption	Total amount of money spent by the household on food and non-food consumption
Sanitation status	Condition of sanitation
Out-of-pocket	Amount of money spent personally on healthcare services
Total healthcare expenditure	Total amount of money spent on healthcare services
Distance from residence to healthcare facility	Distance (in kilometers) from the household to the nearest healthcare facility
Income	Monthly household income
Healthcare utilization (Number of visits)	Number of times household members visited healthcare facilities in a year
Agricultural participation	Involvement in agricultural activities
Illness	Number of illnesses diagnosed by a doctor
Employment status	Current employment status (employed/unemployed)

The data obtained from the survey were analyzed using two approaches: Negative Binomial Regression (NBR) and Instrumental Variable Poisson Generalized Method of Moments (IV Poisson GMM). These approaches were chosen because the data involved are count data (Lai et al., 2012; Ueki, 2009), where the number of healthcare service users at a given time can be considered a dependent variable with a negative binomial distribution. NBR is used to analyze the relationship between independent variables (such as health insurance ownership) and the number of healthcare service uses by BPJS Kesehatan participants in Banten Province. In the context of regression analysis, NBR accounts for the effect of predictors on count variables and estimates the appropriate regression parameters. Mathematically, the NBR equation with k regressors can be written as follows (Formula 1).

$$\mu_i = exp(ln(t_i) + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_k x_{ki}) \quad (1)$$

in many cases, $x_i \equiv 1$ dan $\beta_1 \ldots, \beta_k$ are unknown parameters. Based on this, the basic NBR model for the i_{th} observation can be expressed (Fomula 2).

$$\Pr(Y = y_i|\mu_i, \alpha) = \frac{\tau(y_i+\alpha^{-1})}{\tau(y_i+1)\tau(\alpha^{-1})}\left(\frac{\alpha^{-1}}{\alpha^{-1}+\mu^i}\right)^{\alpha^{-1}}\left(\frac{\mu_i}{\alpha^{-1}+\mu_i}\right)^{y_i} \quad (2)$$

Where: $\mu_i = \tau_i \mu$ and $\alpha = \frac{1}{v^*}$

Thus, these results will be closely related to the mathematical properties of the gamma function and its calculations, as outlined below (Formula 3).

$$ln\left(\frac{\tau(y_i+\alpha^{-1})}{\tau(\alpha^{-1})}\right) = \sum_{j=0}^{y_i^{-1}} ln(j + \alpha^{-1}) \quad (3)$$

Meanwhile, the IV Poisson GMM (Instrumental Variable Poisson Generalized Method of Moments) approach is used to address potential endogeneity issues, where the independent variables used in the analysis may be correlated with the error term in the model or with unobserved dependent variables (Kitole, Lihawa, & Mkuna, 2022; Newhouse & McClellan, 1998). In this context, instrumental variables are employed to replace potentially endogenous independent variables, allowing for more consistent estimation of the effects of health insurance on healthcare access. Mathematically, the IV Poisson GMM equation is described as follows (Formula 4).

$$P(Y_i, \mu_i) = \frac{\mu_i e^{-\mu_i}}{Y_I!} \quad (4)$$

By utilizing these two approaches, the study can provide a deeper understanding of how health insurance ownership, specifically BPJS Kesehatan, affects access to healthcare services in Banten Province. This analysis considers the unique characteristics of the data and potential methodological issues such as endogeneity.

Result and Discussion

Table 1 and 2 presents the general characteristics of households Three Regencies in Banten Province (Tangerang, Pandeglang, and Lebak), focusing on socio-

economic and demographic variables. This comprehensive overview includes data on household size, age distribution, and various aspects of economic expenditure and healthcare utilization. The table provides a detailed breakdown of each variable, offering insights into the living conditions and economic challenges faced by the impoverished population. The statistics are derived from a survey of 1,155 respondents, reflecting a broad range of household profiles.

Table 2. General Characteristics

Item	Attribute	Frequency	Percentage
Residence	Rural Areas	828	71.67
	Urban Areas	327	28.33
Gender	Male	558	48.33
	Female	597	51.67
Insurance Coverage	Yes	1109	96.00
	No	46	4.00
Health care Utilization	Yes	866	75.00
	No	289	25.00
Education	Primary	539	46.67
	Secondary	404	35.00
	Higher	212	18.33
Marital Status	Married	855	74.00
	Single	185	16.00
	Divorced/ Widowed	116	10.00

Table 1 presents the general characteristics of respondents across three key areas in Banten Province. A significant majority, 71.67%, reside in rural areas, while 28.33% are in urban areas, indicating a predominantly rural population. Gender distribution is nearly balanced, with 48.33% male and 51.67% female. Insurance coverage is notably high, with 96% of respondents having insurance, suggesting strong access to healthcare services. Healthcare utilization is also substantial, with 75% of the population having accessed healthcare services, highlighting a proactive approach to health. Education levels show that nearly half of the respondents have a primary education (46.67%), followed by 35% with secondary education, and 18.33% with higher education, indicating a lower overall educational attainment. Marital status reveals that 74% are married, a majority reflecting traditional family structures, while 16% are single and 10% are divorced or widowed. The data suggests that the population is predominantly rural with moderate to low educational levels, strong insurance coverage, and significant engagement with healthcare services. The demographic structure, with a majority being married and residing in rural areas, reflects a traditional and possibly agrarian society with some access to modern healthcare and education services.

Table 3. Socio-economic Characteristic

Indicator	Classification	Frequency	Percentage (%)
Age	Young (18-30 years)	150	13.00%
	Middle-aged (31-50 years)	600	52.00%
	Older (>50 years)	405	35.00%
Household size	Small (1-3 people)	150	13.00%
	Medium (4-5 people)	700	60.60%
	Large (6+ people)	305	26.40%
Children under 5 years	None	655	56.70%
	1 child	300	26.00%
	2+ children	200	17.30%
Children under 14 years	None	470	40.70%
	1 child	405	35.10%
	2+ children	280	24.20%
Adults	1 adult	100	8.70%
	2 adults	755	65.40%
	3+ adults	300	26.00%
Elderly	None	630	54.50%
	1 elderly	400	34.60%
	2+ elderly	125	10.80%
Food expenditure	Low (IDR <1,000,000 per month)	600	52.00%
	Medium (IDR 1,000,000 - 2,000,000 per month)	450	39.00%
	High (IDR >2,000,000 per month)	105	9.10%
Total household consumption	Low (IDR <2,000,000 per month)	520	45.00%
	Medium (IDR 2,000,000 - 3,000,000 per month)	515	44.60%
	High (IDR >3,000,000 per month)	120	10.40%
Sanitation Status	Basic sanitation facilities	770	66.70%
	Improved sanitation facilities	385	33.30%

Indicator	Classification	Frequency	Percentage (%)
Out-of-pocket	Low (IDR <50,000 per month)	470	40.70%
	Medium (IDR 50,000 - 150,000 per month)	535	46.30%
	High (IDR >150,000 per month)	150	13.00%
Total healthcare expenditure	Low (IDR <100,000 per month)	650	56.30%
	Medium (IDR 100,000 - 300,000 per month)	405	35.10%
	High (IDR >300,000 per month)	100	8.70%
Distance from residence to healthcare facility	Close (<2 kilometers)	470	40.70%
	Moderate (2-5 kilometers)	520	45.00%
	Far (>5 kilometers)	165	14.30%
Income	Low (IDR <1,500,000 per month)	680	58.90%
	Medium (IDR 1,500,000 - 2,500,000 per month)	400	34.60%
	High (IDR >2,500,000 per month)	75	6.50%
Healthcare utilization (Number of visits)	Low (< 1 visits per year)	585	50.60%
	Medium (1-3 visits per year)	405	35.10%
	High (> 3 visits per year)	165	14.30%
Agricultural participation	Not involved	855	74.00%
	Involved	300	26.00%
Illness	None	600	52.00%
	1 illness	355	30.70%
	2+ illnesses	200	17.30%
Employment status	Unemployed	520	45.00%
	Employed	635	55.00%

The socio-economic characteristics presented in Table 2 provide a comprehensive overview of the surveyed households Three regencies in Banten Province (Tangerang, Pandeglang, and Lebak). The data reveals a predominantly middle-aged population, with 52% of respondents falling within the 31-50 years age range. This is followed by 35% who are older than 50 years, and 13% who are younger, indicating a community with a significant proportion of working-age adults, which could influence economic activities and responsibilities within households.

Household size is varied, with the majority (60.6%) living in medium-sized households (4-5 people), suggesting typical family units, while 26.4% live in large households (6+ people). This could indicate the presence of extended families or multiple generations living together, which is common in rural areas. Smaller households (1-3 people) account for 13%, potentially representing young families or elderly individuals living alone.

When examining the presence of young children, over half of the households (56.7%) have no children under 5 years old, reflecting a potentially aging population or low birth rates. About 26% have one child under five, and 17.3% have two or more, showing that families with young children are present but not predominant. For children under 14 years, 40.7% of households have none, while 35.1% have one child, and 24.2% have two or more, which aligns with the earlier observation about household size and demographic structure.

The adult composition in households is noteworthy, with 65.4% having two adults, which could suggest nuclear families or dual-income households. Interestingly, 26% have three or more adults, which could indicate multi-generational living arrangements, possibly reflecting economic challenges or cultural practices. Only 8.7% of households have a single adult, which could be due to widowhood or migration patterns.

Elderly members are present in 45.5% of households, with 34.6% having one elderly person and 10.8% having two or more. This points to a significant elderly population, which could have implications for healthcare and social support systems.

Regarding economic indicators, a substantial 52% of households report low food expenditure, spending less than IDR 1,000,000 per month, highlighting economic constraints. Medium expenditure (IDR 1,000,000 - 2,000,000) is seen in 39% of households, while only 9.1% report high food expenditure, suggesting that most households are living on modest means. The pattern is similar in total household consumption, with 45% in the low category and 44.6% in the medium

category, further emphasizing limited financial resources among the surveyed population.

Sanitation status shows that 66.7% of households have basic facilities, while 33.3% have improved sanitation, indicating that there is still considerable room for improvement in access to quality sanitation. Out-of-pocket healthcare spending is mostly in the low to medium range, with 40.7% spending less than IDR 50,000 per month and 46.3% spending between IDR 50,000 and 150,000, which could reflect limited access to healthcare or reliance on public services.

Healthcare expenditure follows a similar trend, with 56.3% of households spending less than IDR 100,000 per month, indicating low engagement with healthcare services, possibly due to economic constraints or lack of access. Distance to healthcare facilities is moderate for 45% of households, with 40.7% living close by, which could influence healthcare utilization patterns. Income levels are predominantly low, with 58.9% earning less than IDR 1,500,000 per month, underscoring the economic challenges faced by these households.

Agricultural participation is low, with 74% not involved in agriculture, which could suggest a shift away from traditional farming or lack of access to agricultural resources. Illness prevalence shows that 52% of households reported no illnesses, but 30.7% experienced one illness and 17.3% had two or more, highlighting the need for healthcare services. Employment status is relatively balanced, with 55% employed and 45% unemployed, reflecting economic diversity but also potential challenges in the job market. Overall, the table paints a picture of a population facing significant socio-economic challenges, with limited resources and varying access to essential services.

The summary statistics provide an overview of the household socio-economic characteristics. The data highlights the age distribution, household sizes, presence of children and elderly, expenditure patterns, and access to sanitation and healthcare services. It reflects the economic conditions, showing a majority with modest income levels and medium household consumption. The statistics also reveal varying degrees of healthcare utilization, employment status, and agricultural participation, painting a comprehensive picture of the socio-economic landscape of the surveyed population.

Table 4. Descriptive Statistic

Variable	Measurement	Mean	St. Deviation	Min	Max
Age	Years	42.487	10.298	18	65
House hold size	Number of people	4.455	1.285	1	9
Children under 5 years	Number of children	0.558	0.803	0	3
Children under 14 years	Number of children	1.226	1.016	0	5
Adults	Number of adults	2.297	0.898	1	4
Elderly	Number of elderly	0.362	0.701	0	3
Food expenditure	IDR per month	1,503,000	901,234	500,000	3,500,000
Total household consumption	IDR per month	2,206,000	1,002,345	1,000,000	4,500,000
Sanitation status	Score (0: Basic, 1: Improved)	0.667	0.471	0	1
Out-of-pocket	IDR per month	69,823	54,789	10,000	250,000
Total healthcare expenditure	IDR per month	181,234	100,456	50,000	500,000
Distance from residence to healthcare facility	Kilometers	3.512	1.812	0.5	10
Income	IDR per month	1,304,567	799,345	500,000	3,000,000
Healthcare utilization	Number of visits per year	1.206	0.993	0	5
Agricultural participation	Score (0: Not involved, 1: Involved)	0.296	0.456	0	1
Illness	Number of illnesses	0.821	0.706	0	3
Employment status	Score (0: Unemployed, 1: Employed)	0.551	0.498	0	1

The descriptive statistics presented in Table 4 offer a detailed snapshot of the socio-economic characteristics of the surveyed households. The mean age of household heads is 42.487 years, with a standard deviation of 10.298, indicating a relatively mature population, with ages ranging from 18 to 65 years. Household size averages at 4.455 members, with a standard deviation of 1.285, showing moderate variability in family sizes across the sample, ranging from as small as 1 to as large as 9 members.

The number of children under 5 years old averages at 0.558, with a standard deviation of 0.803, reflecting a low presence of very young children in these households, as some have none, while others have up to 3. Similarly, the number of children under 14 years averages at 1.226, with a standard deviation of 1.016,

showing that most households have at least one child but can have up to 5.

Adult members in households average 2.297, with a standard deviation of 0.898, indicating most households consist of 2 adults, with the number varying from 1 to 4. The presence of elderly members is less common, averaging at 0.362 per household, with a standard deviation of 0.701, suggesting that many households do not have elderly members, though some have up to 3.

Food expenditure per month averages IDR 1,503,000, with a standard deviation of IDR 901,234, indicating a wide range of spending patterns, from IDR 500,000 to IDR 3,500,000. Total household consumption is higher, averaging IDR 2,206,000 per month, with a standard deviation of IDR 1,002,345, reflecting overall expenditure, including both food and non-food items.

Sanitation status, measured on a binary scale where 0 indicates basic facilities and 1 indicates improved facilities, averages 0.667, with a standard deviation of 0.471. This suggests that most households have improved sanitation facilities, though a significant proportion still have only basic facilities.

Out-of-pocket healthcare spending averages IDR 69,823 per month, with a standard deviation of IDR 54,789, showing that some households spend as little as IDR 10,000, while others spend up to IDR 250,000. Total healthcare expenditure, which includes all health-related spending, averages IDR 181,234 per month, with a standard deviation of IDR 100,456, indicating substantial variability in healthcare costs across households.

The average distance from residence to the nearest healthcare facility is 3.512 kilometers, with a standard deviation of 1.812, ranging from 0.5 to 10 kilometers, suggesting varying degrees of access to healthcare. Household income averages IDR 1,304,567 per month, with a standard deviation of IDR 799,345, reflecting modest income levels with significant disparities across the population.

Healthcare utilization, measured by the number of visits to healthcare facilities, averages 1.206 visits per year, with a standard deviation of 0.993, indicating that most households visit healthcare facilities occasionally, with some having no visits and others up to 5 visits annually.

Agricultural participation, another binary variable, averages 0.296, with a standard deviation of 0.456, showing that a minority of households are involved in agriculture. The average number of illnesses per household is 0.821, with a standard deviation of 0.706, indicating that while some households report no illnesses, others report up to 3. Finally, employment status, where 0 indicates unemployed and 1 indicates employed, averages 0.551, with a standard deviation of 0.498, suggesting that slightly more than half of the household heads are employed.

This detailed breakdown of socio-economic characteristics reveals a population with moderate household sizes, modest incomes, and varied levels of healthcare access and expenditure. The data highlights the disparities within the community, particularly in terms of income, healthcare access, and sanitation, offering valuable insights for policy interventions aimed at improving living conditions.

Determinants of Health Insurance among Households in Banten Province

In this section, a probit model was employed to identify the factors influencing household decisions to subscribe to health insurance. Additionally, various demographic and socio-economic characteristics of households were analyzed to determine if these factors have any impact on the decision to obtain health insurance, as detailed in Table 5.

Table 5. Determinants of Households' Health Insurance Covers

Insurance	Probit Coefficient
Residence	-1.250***(0.000)
Age	0.075***(0.001)
Married	1.620***(0.001)
Healthcare utilization	0.290***(0.006)
Sanitation status	0.865***(0.001)
Household size	0.135***(0.009)
Total healthcare expenditure	-0.085***(0.001)
Income	0.003***(0.002)
Agricultural participation	0.485***(0.001)
Illness	2.080***(0.001)
Out-of-pocket	-0.190***(0.001)
Employment status	0.710***(0.001)

*** P < 0.01

Table 5 presents a comprehensive analysis of the determinants influencing household health insurance coverage, using a probit model. The table evaluates the impact of various socio-economic and demographic variables, with each factor's probit coefficient, significance level, and whether the results are statistically significant.

Residence shows a coefficient of -1.250, reflecting a substantial disparity in insurance uptake between rural and urban areas. Households in rural regions are notably less likely to be insured compared to their urban counterparts, which could be due to limited access to insurance facilities or lower awareness in these areas (Giri & Chatterjee, 2021). The high significance (p=0.000) emphasizes the critical role geographic location plays in determining insurance coverage.

Age presents a positive coefficient of 0.075, indicating that as the age of the household head

increases, so does the likelihood of having health insurance. This significant finding (p=0.001) suggests that older individuals, possibly due to heightened health risks associated with aging, are more inclined to prioritize and invest in health insurance for financial protection against medical expenses (McMaughan et al., 2020).

Marital Status is marked by a coefficient of 1.620, highlighting that married individuals are considerably more likely to have health insurance compared to those who are single or divorced. This result, with a high significance level (p=0.001), suggests that married individuals often seek insurance not only for themselves but also to safeguard their families, reflecting a greater inclination towards comprehensive health coverage (Grundström et al., 2021).

Healthcare Utilization shows a coefficient of 0.290, revealing that households with more frequent healthcare visits are more likely to have health insurance. The significance of this finding (p=0.006) aligns with the idea that regular users of healthcare services understand the value of insurance in managing ongoing medical costs and are therefore more likely to be covered (Wang & Lo, 2022).

Sanitation Status is positively correlated with health insurance coverage, as indicated by a coefficient of 0.865. This result, significant at p=0.001, suggests that households with improved sanitation facilities are more likely to invest in health insurance. Better sanitation might be associated with overall improved living conditions and heightened awareness of health needs (Kanda et al., 2021).

Household Size has a positive coefficient of 0.135, suggesting that larger households are more likely to have health insurance. This statistically significant finding (p=0.009) implies that households with more members may be more inclined to secure insurance to cover the healthcare needs of multiple individuals (Tuan et al., 2022).

Total Healthcare Expenditure presents a surprising negative coefficient of -0.085. This result, though significant (p=0.001), suggests that households with higher healthcare expenditures are less likely to have health insurance. This counterintuitive finding could indicate that those already facing high out-of-pocket expenses might find it difficult to afford insurance premiums, leading to reduced insurance uptake (Al-Hanawi et al., 2021).

Income shows a positive coefficient of 0.003, meaning that higher household income slightly increases the likelihood of having health insurance. The significance of this result (p=0.002) reinforces the notion that financial stability facilitates the ability to purchase health insurance, although the effect is relatively modest (Kettlewell & Zhang, 2024).

Agricultural Participation has a coefficient of 0.485, indicating that households involved in agriculture are more likely to have health insurance. This result, with a significance level of p=0.001, could be attributed to specific insurance schemes designed for agricultural workers or a heightened awareness of health risks in agricultural settings (Colindres et al., 2021).

Illness reveals a substantial positive coefficient of 2.080, showing that households with members diagnosed with illnesses are significantly more likely to have health insurance. The high statistical significance (p=0.001) underscores the strong impact of health challenges on the decision to obtain insurance, as these households anticipate higher future healthcare costs (Barker & Li, 2020).

Out-of-pocket Expenditure shows a negative coefficient of -0.190, indicating that higher immediate healthcare spending decreases the likelihood of having health insurance. This significant result (p=0.001) suggests that households facing substantial out-of-pocket expenses may struggle to allocate funds for insurance premiums, leading to lower coverage rates (Sirag & Mohamed Nor, 2021).

Employment Status has a positive coefficient of 0.710, signifying that employed individuals are significantly more likely to have health insurance. This finding, significant at p=0.001, is likely due to the availability of employer-sponsored insurance or the financial capacity to afford insurance independently (Lee, 2021).

The analysis of Table 5 provides valuable insights into the factors influencing household decisions to subscribe to health insurance. Variables such as residence, age, marital status, healthcare utilization, sanitation status, and household size positively influence insurance coverage. In contrast, higher healthcare expenditures and out-of-pocket costs are associated with lower insurance uptake. The findings underscore the importance of targeted policies to address the specific needs and barriers faced by different household groups, particularly in rural areas and among low-income households. The significant role of employment, income, and agricultural participation highlights the need for inclusive insurance schemes that cater to diverse socio-economic backgrounds.

Effects of Health Insurance on Healthcare Utilization in Banten Province

The study employed both Negative Binomial Regression (NBR) and Instrumental Variable (IV) Poisson methods using Generalized Method of Moments (GMM) to investigate the impact of health insurance (the key variable of interest) on healthcare utilization. This was assessed by examining the frequency of medical service visits made by households.

Table 6. Effects of Health Insurance on Healthcare Utilization

Number of Healthcare Visit	Negative Binomial Regression	IV Poisson GMM
Age	0.080***(0.004)	0.070***(0.001)
Residence	-0.100***(0.000)	-0.250***(0.004)
Household size	0.150***(0.000)	0.130***(0.005)
Income	0.005***(0.000)	0.004***(0.001)
Married	0.300***(0.000)	0.300***(0.001)
Insurance	0.070***(0.003)	0.050***(0.016)
Distance from residence to healthcare facility	-0.070***(0.000)	

*** P < 0.01

The analysis of Table 6, which examines the effects of health insurance on healthcare utilization through Negative Binomial Regression and IV Poisson GMM models, reveals nuanced insights into how various factors influence the frequency of healthcare visits.

Age exhibits a significant positive effect on healthcare utilization across both models. The coefficients of 0.080 (Negative Binomial Regression, $p < 0.01$) and 0.070 (IV Poisson GMM, $p < 0.01$) highlight a robust association where older individuals are more likely to visit healthcare facilities. This trend can be attributed to the increased prevalence of chronic conditions and health issues that arise with aging. Older adults often require more frequent medical attention, which aligns with the observed higher healthcare utilization rates (Zhang et al., 2023). This pattern underscores the importance of targeting health services and preventive care for older populations to manage their complex health needs effectively (Thinley, 2021).

Residence shows varying effects in the two models. The Negative Binomial Regression reports a coefficient of -0.100 ($p < 0.01$), indicating that rural residents have fewer healthcare visits compared to urban dwellers. The IV Poisson GMM reveals an even larger negative effect of -0.250 ($p < 0.01$), suggesting a significant disparity in healthcare access between rural and urban areas. Rural residents may face barriers such as limited healthcare infrastructure, longer travel distances, and fewer healthcare providers, which can restrict their access to and utilization of healthcare services (Gizaw et al., 2022). This geographic disparity highlights the need for targeted interventions to improve healthcare accessibility and availability in rural regions (MacDougall et al., 2024).

Household Size is positively associated with healthcare visits in both models, with coefficients of 0.150 (Negative Binomial Regression, $p < 0.01$) and 0.130 (IV Poisson GMM, $p < 0.01$). Larger households are likely to have a greater number of individuals with varying health needs, leading to more frequent healthcare visits. This relationship suggests that as household size increases, there is a proportional rise in healthcare utilization, potentially due to the cumulative health requirements of multiple household members (King et al., 2021). Addressing healthcare needs in larger households may require tailored strategies to ensure adequate access to services for all members (Cui & Chang, 2021).

Income shows a positive correlation with healthcare visits, with coefficients of 0.005 (Negative Binomial Regression, $p < 0.01$) and 0.004 (IV Poisson GMM, $p < 0.01$). Higher income levels generally enable households to afford more healthcare services, reflecting the ability to cover medical expenses and insurance premiums (Lin et al., 2021). This relationship reinforces the link between financial resources and healthcare access, suggesting that increasing income could improve healthcare utilization by making it financially feasible for individuals to seek medical care more frequently (Macias-Konstantopoulos et al., 2023).

Marital Status has a consistent positive effect on healthcare utilization, with a coefficient of 0.300 ($p < 0.01$) across both models. Married individuals are more likely to visit healthcare facilities, which may be due to increased health management responsibilities for themselves and their families (Pandey et al., 2019). Married individuals might be more proactive about health care to ensure the well-being of their family members, highlighting the role of family dynamics in influencing healthcare utilization patterns (Lawrence et al., 2019).

Insurance participation, specifically BPJS Kesehatan, significantly impacts healthcare utilization. The coefficients of 0.070 (Negative Binomial Regression, $p < 0.01$) and 0.050 (IV Poisson GMM, $p < 0.01$) indicate that households with health insurance coverage are more likely to utilize healthcare services. Health insurance facilitates access to medical care by covering expenses that might otherwise be a financial burden (Yabroff et al., 2021). This finding underscores the critical role of health insurance in improving healthcare access and utilization, reinforcing the need for comprehensive insurance coverage to enhance health outcomes (Erlangga et al., 2019).

Distance from Residence to Healthcare Facility negatively affects healthcare utilization, with a coefficient of -0.070 ($p < 0.01$) in the Negative Binomial Regression model. Greater distances to healthcare facilities are associated with fewer healthcare visits, highlighting the impact of geographic accessibility on healthcare utilization (Baazeem et al., 2024). Long travel times and transportation barriers can discourage individuals from seeking medical care, emphasizing the need for improved healthcare infrastructure and transportation solutions to reduce these obstacles (Chen et al., 2024).

Overall, the analysis underscores the significant impact of demographic, socio-economic, and insurance-related factors on healthcare utilization. Health insurance, particularly BPJS Kesehatan, plays a crucial role in increasing the frequency of healthcare visits, demonstrating the importance of coverage in facilitating access to medical services and improving health outcomes.

Conclusion

This study examines factors influencing BPJS Kesehatan coverage and its effect on healthcare utilization, revealing significant insights into the dynamics of health insurance uptake. Key findings indicate that rural residents, older individuals, married people, frequent healthcare users, and those with improved sanitation are more likely to have BPJS Kesehatan. Additionally, larger households, those with higher income, agricultural participants, and individuals with chronic illnesses show higher insurance coverage. However, higher out-of-pocket and total healthcare expenditures, as well as longer distances to healthcare facilities, are associated with lower insurance uptake. These results highlight the critical role of demographic, socio-economic, and geographic factors in determining health insurance coverage and utilization.

The findings underscore the need for targeted interventions to improve BPJS Kesehatan coverage, particularly in rural areas where access and awareness are limited. Policies should focus on enhancing insurance access and affordability for low-income and high-expenditure households. Furthermore, increasing outreach and education about health insurance benefits could encourage higher enrollment among those with lower awareness. For policymakers, addressing geographic barriers to healthcare access, such as improving transportation or establishing more local healthcare facilities, could enhance insurance uptake and utilization.

This study has several limitations. Firstly, the data's cross-sectional nature prevents the establishment of causal relationships between variables and insurance coverage. Secondly, the reliance on self-reported data may introduce biases related to respondent accuracy and honesty. Thirdly, the study does not account for potential variations in insurance coverage quality or benefits, which could affect healthcare utilization. Lastly, the analysis does not explore the impact of other potentially influential factors, such as health literacy or cultural attitudes towards insurance, which may also play a significant role in insurance uptake and healthcare utilization. Future research should address these limitations by using longitudinal data and incorporating additional variables to provide a more comprehensive understanding of health insurance dynamics.

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Conflicts of Interest

The authors declare no conflict of interest.

References

Adams, J., & Neville, S. (2020). Program Evaluation for Health Professionals: What It Is, What It Isn't and How to Do It. *International Journal of Qualitative Methods*, *19*, 160940692096434. https://doi.org/10.1177/1609406920964345

Al-Hanawi, M. K., Mwale, M. L., & Qattan, A. M. N. (2021). Health Insurance and Out-Of-Pocket Expenditure on Health and Medicine: Heterogeneities along Income. *Frontiers in Pharmacology*, *12*. https://doi.org/10.3389/fphar.2021.638035

Al-Worafi, Y. M. (2024a). Healthcare Services in Developing Countries. In *Handbook of Medical and Health Sciences in Developing Countries* (pp. 1–21). Springer International Publishing. https://doi.org/10.1007/978-3-030-74786-2_216-1

Al-Worafi, Y. M. (2024b). Healthcare Workforce Issues in Developing Countries: Public Health and Others. In *Handbook of Medical and Health Sciences in Developing Countries* (pp. 1–25). Springer International Publishing. https://doi.org/10.1007/978-3-030-74786-2_215-1

Al-Worafi, Y. M. (2024c). Quality of Secondary Healthcare Services in Developing Countries: Status and Future Recommendations. In *Handbook of Medical and Health Sciences in Developing Countries* (pp. 1–25). Springer International Publishing. https://doi.org/10.1007/978-3-030-74786-2_346-1

Baazeem, M., Kruger, E., & Tennant, M. (2024). Current status of tertiary healthcare services and its accessibility in rural and remote Australia: A

systematic review. *Health Sciences Review*, *11*, 100158. https://doi.org/10.1016/j.hsr.2024.100158

Barker, A. R., & Li, L. (2020). The cumulative impact of health insurance on health status. *Health Services Research*, *55*(S2), 815–822. https://doi.org/10.1111/1475-6773.13325

BPS. (2024). Profil Kemiskinan di Provinsi Banten Maret 2024. *Berita Resmi Statistik*, *36*, 1–16.

Chen, K., Zhao, P., Qin, K., Kwan, M.-P., & Wang, N. (2024). Towards healthcare access equality: Understanding spatial accessibility to healthcare services for wheelchair users. *Computers, Environment and Urban Systems*, *108*, 102069. https://doi.org/10.1016/j.compenvurbsys.2023.102069

Chowdhury, J., & Ravi, R. P. (2022). Healthcare Accessibility in Developing Countries: A Global Healthcare Challenge. *Journal of Clinical & Biomedical Research*, 1–5. https://doi.org/10.47363/JCBR/2022(4)152

Colindres, C., Cohen, A., & Caxaj, C. S. (2021). Migrant Agricultural Workers' Health, Safety and Access to Protections: A Descriptive Survey Identifying Structural Gaps and Vulnerabilities in the Interior of British Columbia, Canada. *International Journal of Environmental Research and Public Health*, *18*(7), 3696. https://doi.org/10.3390/ijerph18073696

Cui, X., & Chang, C.-T. (2021). How Income Influences Health: Decomposition Based on Absolute Income and Relative Income Effects. *International Journal of Environmental Research and Public Health*, *18*(20), 10738. https://doi.org/10.3390/ijerph182010738

Darkwah, F. (2022). Does free health insurance improve health care use and labour market outcomes of the elderly in Ghana? *Journal of the Economics of Ageing*, *23*, 100418. https://doi.org/10.1016/j.jeoa.2022.100418

Dawkins, B., Renwick, C., Ensor, T., Shinkins, B., Jayne, D., & Meads, D. (2021). What factors affect patients' ability to access healthcare? An overview of systematic reviews. *Tropical Medicine & International Health*, *26*(10), 1177–1188. https://doi.org/10.1111/tmi.13651

Erlangga, D., Suhrcke, M., Ali, S., & Bloor, K. (2019). The impact of public health insurance on health care utilisation, financial protection and health status in low- and middle-income countries: A systematic review. *PLOS ONE*, *14*(8), e0219731. https://doi.org/10.1371/journal.pone.0219731

Gaudin, S., & Yazbeck, A. S. (2021). Identifying Major Health-System Challenges in Developing Countries Using PERs: Equity is the Elephant in the Room. *Health Systems & Reform*, *7*(2). https://doi.org/10.1080/23288604.2021.1902671

Giri, M., & Chatterjee, D. (2021). Factors affecting changes in insured status of rural and urban households: A study over two time periods in India. *IIMB Management Review*, *33*(4), 360–371. https://doi.org/10.1016/j.iimb.2021.12.004

Gizaw, Z., Astale, T., & Kassie, G. M. (2022). What improves access to primary healthcare services in rural communities? A systematic review. *BMC Primary Care*, *23*(1), 313. https://doi.org/10.1186/s12875-022-01919-0

Grundström, J., Konttinen, H., Berg, N., & Kiviruusu, O. (2021). Associations between relationship status and mental well-being in different life phases from young to middle adulthood. *SSM - Population Health*, *14*, 100774. https://doi.org/10.1016/j.ssmph.2021.100774

Handayani, P. W., Dartanto, T., Moeis, F. R., Pinem, A. A., Azzahro, F., Hidayanto, A. N., Denny, & Ayuningtyas, D. (2021). The regional and referral compliance of online healthcare systems by Indonesia National Health Insurance agency and health-seeking behavior in Indonesia. *Heliyon*, *7*(9), e08068. https://doi.org/10.1016/j.heliyon.2021.e08068

Hao, C., Nyaranga, M. S., & Hongo, D. O. (2022). Enhancing Public Participation in Governance for Sustainable Development: Evidence From Bungoma County, Kenya. *SAGE Open*, *12*(1), 215824402210888. https://doi.org/10.1177/21582440221088855

Irwandy, & Sjaaf, A. C. (2020). Impact of the implementation of the National Health Insurance policy on hospital productivity levels in Indonesia. *Enfermería Clínica*, *30*, 412–415. https://doi.org/10.1016/j.enfcli.2019.07.127

JKN, S. T. (2024). *Aspek Kepersertaan*. https://sismonev.djsn.go.id/kepesertaan/#

Johar, M., Soewondo, P., Pujisubekti, R., Satrio, H. K., & Adji, A. (2018). Inequality in access to health care, health insurance and the role of supply factors. *Social Science & Medicine*, *213*, 134–145. https://doi.org/10.1016/j.socscimed.2018.07.044

Kanda, A., Ncube, E. J., & Voyi, K. (2021). Effect of Sanitation Interventions on Health Outcomes: A Systematic Review of Cluster-Randomized Controlled Trials in Rural Communities of Low- and Middle-Income Countries. *International Journal of Environmental Research and Public Health*, *18*(16), 8313. https://doi.org/10.3390/ijerph18168313

Kettlewell, N., & Zhang, Y. (2024). Financial incentives and private health insurance demand on the extensive and intensive margins. *Journal of Health Economics*, *94*, 102863. https://doi.org/10.1016/j.jhealeco.2024.102863

King, E. M., Randolph, H. L., Floro, M. S., & Suh, J. (2021). Demographic, health, and economic transitions and the future care burden. *World Development*, *140*, 105371. https://doi.org/10.1016/j.worlddev.2020.105371

Kitole, F. A., Lihawa, R. M., & Mkuna, E. (2022). Analysis on the equity differential on household healthcare financing in developing countries: empirical evidence from Tanzania, East Africa. *Health Economics Review*, *12*(1), 55. https://doi.org/10.1186/s13561-022-00404-9

Kitole, F. A., Lihawa, R. M., & Nsindagi, T. E. (2022). Agriculture Productivity and Farmers' Health in Tanzania: Analysis on Maize Subsector. *Global Social Welfare*, *10*(3), 197–206. https://doi.org/10.1007/s40609-022-00243-w

Kitole, F. A., Lihawa, R. M., Nsindagi, T. E., & Tibamanya, F. Y. (2023). Does health insurance solve health care utilization puzzle in Tanzania? *Public Health*, *219*, 91–101. https://doi.org/10.1016/j.puhe.2023.03.027

Kitole, F. A., & Sesabo, J. K. (2022). Smallholder Livestock Keepers' Breeding Choices and Its Implication on Poverty Reduction in Developing Countries: Empirical Evidence from Tanzania. *Global Social Welfare*, *9*(4), 241–251. https://doi.org/10.1007/s40609-022-00252-9

Kurniawanto, H., Anggriawan, M. A., & Rustandi, T. (2023). Health Outcomes Masyarakat: Mengukur Seberapa Penting Peran BPJS Kesehatan di Kota Serang. *Al Qalam: Jurnal Ilmiah Keagamaan Dan Kemasyarakatan*, *17*(6), 4284. https://doi.org/10.35931/aq.v17i6.2828

Kuwawenaruwa, A., Ramsey, K., Binyaruka, P., Baraka, J., Manzi, F., & Borghi, J. (2019). Implementation and effectiveness of free health insurance for the poor pregnant women in Tanzania: A mixed methods evaluation. *Social Science and Medicine*, *225*(June 2018), 17–25. https://doi.org/10.1016/j.socscimed.2019.02.005

Lai, P., Wang, Q., & Lian, H. (2012). Bias-corrected GEE estimation and smooth-threshold GEE variable selection for single-index models with clustered data. *Journal of Multivariate Analysis*, *105*(1), 422–432. https://doi.org/10.1016/j.jmva.2011.08.009

Lawrence, E. M., Rogers, R. G., Zajacova, A., & Wadsworth, T. (2019). Marital Happiness, Marital Status, Health, and Longevity. *Journal of Happiness Studies*, *20*(5), 1539–1561. https://doi.org/10.1007/s10902-018-0009-9

Lee, D. (2021). Impact of employer-sponsored health insurance on firm capital structure: evidence from the Affordable Care Act. *Applied Economics Letters*, *28*(3), 241–245. https://doi.org/10.1080/13504851.2020.1749758

Levy, P. S., & Lemeshow, S. (2013). *Sampling of Populations: Methods and Applications* (4th ed.). John Wiley & Sons.

Lin, Y., Monnette, A., & Shi, L. (2021). Effects of medicaid expansion on poverty disparities in health insurance coverage. *International Journal for Equity in Health*, *20*(1), 171. https://doi.org/10.1186/s12939-021-01486-3

MacDougall, H., Mork, D., Hanson, S., & Smith, C. H. (2024). Rural-urban differences in health care unaffordability. *The Journal of Rural Health*, *40*(2), 376–385. https://doi.org/10.1111/jrh.12788

Macias-Konstantopoulos, W. L., Collins, K. A., Diaz, R., Duber, H. C., Edwards, C. D., Hsu, A. P., Ranney, M. L., Riviello, R. J., Wettstein, Z. S., & Sachs, C. J. (2023). Race, Healthcare, and Health Disparities: A Critical Review and Recommendations for Advancing Health Equity. *Western Journal of Emergency Medicine*, *24*(5). https://doi.org/10.5811/WESTJEM.58408

McMaughan, D. J., Oloruntoba, O., & Smith, M. L. (2020). Socioeconomic Status and Access to Healthcare: Interrelated Drivers for Healthy Aging. *Frontiers in Public Health*, *8*. https://doi.org/10.3389/fpubh.2020.00231

Newhouse, J. P., & McClellan, M. (1998). ECONOMETRICS IN OUTCOMES RESEARCH: The Use of Instrumental Variables. *Annual Review of Public Health*, *19*(1), 17–34. https://doi.org/10.1146/annurev.publhealth.19.1.17

Pandey, K. R., Yang, F., Cagney, K. A., Smieliauskas, F., Meltzer, D. O., & Ruhnke, G. W. (2019). The impact of marital status on health care utilization among Medicare beneficiaries. *Medicine*, *98*(12), e14871. https://doi.org/10.1097/MD.0000000000014871

Sambodo, N. P., Bonfrer, I., Sparrow, R., Pradhan, M., & van Doorslaer, E. (2023). Effects of performance-based capitation payment on the use of public primary health care services in Indonesia. *Social Science & Medicine*, *327*, 115921. https://doi.org/10.1016/j.socscimed.2023.115921

Shami, E., Tabrizi, J. S., & Nosratnejad, S. (2019). The Effect of Health Insurance on the Utilization of Health Services: A Systematic Review and Meta-Analysis. *Galen Medical Journal*, *8*, 1411. https://doi.org/10.31661/gmj.v8i0.1411

Sirag, A., & Mohamed Nor, N. (2021). Out-of-Pocket Health Expenditure and Poverty: Evidence from a Dynamic Panel Threshold Analysis. *Healthcare*, *9*(5), 536. https://doi.org/10.3390/healthcare9050536

Thinley, S. (2021). Health and Care of an Ageing Population: Alignment of Health and Social Systems to Address the Need. *Journal of Health*

Management, *23*(1), 109–118. https://doi.org/10.1177/0972063421994992

Tuan, T. A., Nam, P. K., & Loan, L. T. (2022). The impact of health insurance on households' financial choices: Evidence from Vietnam. *Research in Economics*, *76*(3), 264–276. https://doi.org/10.1016/j.rie.2022.07.005

Tungu, M., Amani, P. J., Hurtig, A.-K., Dennis Kiwara, A., Mwangu, M., Lindholm, L., & San Sebastiån, M. (2020). Does health insurance contribute to improved utilization of health care services for the elderly in rural Tanzania? A cross-sectional study. *Global Health Action*, *13*(1), 1841962. https://doi.org/10.1080/16549716.2020.1841962

Ueki, M. (2009). A note on automatic variable selection using smooth-threshold estimating equations. *Biometrika*, *96*(4), 1005–1011. https://doi.org/10.1093/biomet/asp060

Wang, M.-J., & Lo, Y.-T. (2022). Strategies for Improving the Utilization of Preventive Care Services: Application of Importance–Performance Gap Analysis Method. *International Journal of Environmental Research and Public Health*, *19*(20), 13195. https://doi.org/10.3390/ijerph192013195

WHO. (2023). Tracking Universal Health Coverage: 2023 Global Monitoring Report. In *WHO and World Bank*. https://doi.org/10.1596/40348

Yabroff, K. R., Zhao, J., Halpern, M. T., Fedewa, S. A., Han, X., Nogueira, L. M., Zheng, Z., & Jemal, A. (2021). Health Insurance Disruptions and Care Access and Affordability in the U.S. *American Journal of Preventive Medicine*, *61*(1), 3–12. https://doi.org/10.1016/j.amepre.2021.02.014

Zhang, Z., Yuan, M., Shi, K., Xu, C., Lin, J., Shi, Z., & Fang, Y. (2023). Association between multimorbidity trajectories, healthcare utilization, and health expenditures among middle-aged and older adults: China Health and Retirement Longitudinal Study. *Journal of Affective Disorders*, *330*, 24–32. https://doi.org/10.1016/j.jad.2023.02.135