

## Shielding the Vulnerable: Exploring Health Insurance as Financial Safeguard for Slum Dwellers in Dar es Salaam, Tanzania

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### **Abstract**

*This study explores the interplay between health insurance and out-of-pocket (OOP) expenditures among slum dwellers in Dar es Salaam, where financial barriers significantly impact access to healthcare. Given the economic vulnerabilities of these populations, understanding this relationship is crucial for designing effective health policy interventions. Therefore, the purpose of the research is to estimate the effects of health insurance on OOP expenditures among this demographic. Employing a cross-sectional research design, the study collected data from a sample of 400 households using questionnaire, ensuring a robust representation of the target population. The analysis was conducted using the Probit model to ascertain the initial probabilities of insurance coverage, followed by the two-stage least squares (2SLS) method to account for potential endogeneities and provide a clearer picture of the impact of health insurance on OOP expenditures. Findings from the Probit model indicate demographic characteristics like marital status, and education are significant likelihood of influencing health insurance coverage among slum dwellers. However, the 2SLS model highlights that health insurance reduces the burden of medical expenses, and its effectiveness is contingent upon the breadth of coverage and the healthcare needs of the insured. Based on these insights, the study recommends the expansion of health insurance coverage in slum areas, with a focus on enhancing the comprehensiveness of these insurance plan.*

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## 1. Introduction

The rapid urbanization witnessed in many developing countries, particularly within the African continent, has been closely linked with the proliferation of slum settlements, marked increases in poverty, and greater health disparities (Pandey et al., 2019; Andrew Kitole, 2024). Dar es Salaam, Tanzania, serves as a prime example of this trend, where slum dwellers face daunting challenges due to inadequate living conditions and limited access to essential services (Kitole & Sesabo, 2024; Kitole & Genda, 2024). The financial burden of healthcare, exacerbated by high out-of-pocket (OOP) expenses, poses a significant threat to the health and economic stability of these vulnerable populations (Kitole et al., 2024; Fumbwe et al., 2021).

Healthcare financing is a crucial component of effective health systems and is fundamental to achieving universal health coverage (UHC). According to the World Health Organization (WHO), financial protection is central to UHC, ensuring that individuals have access to health services without the risk of financial hardship (Kitole et al., 2023; Dorjdagva et al., 2017). However, in slum areas, the lack of prepayment and risk-pooling mechanisms often forces residents to rely on OOP payments, increasing their vulnerability to catastrophic health expenditures (Kitole et al., 2022). Indeed, the WHO has highlighted that approximately 100 million individuals are pushed into poverty annually due to such expenses (WHO, 2019).

The stark inequalities in health financing and access to medical care are especially evident in slum communities (WHO, 2019; Kitole et al., 2022). African cities, which are among the fastest-growing urban areas globally, have seen their demographic landscapes transformed, leading to an expansion in the number and size of slums. These areas are typically characterized by overcrowding, poor sanitation, and a lack of safe water, which significantly contributes to the prevalence of diseases such as cholera and tuberculosis (Andrew, 2019). The health risks are compounded by the economic challenges faced by the residents, most of whom are employed in the informal sector and earn precarious, insufficient incomes (Kitole & Sesabo, 2024; Wagstaff et al., 2018).

Despite the clear linkage between health insurance coverage and improved access to healthcare, there is a significant gap in research focusing on how health insurance impacts OOP expenditures in the context of urban slums. Existing studies often overlook the unique conditions and challenges faced by slum dwellers, making it difficult to develop targeted interventions that address their specific needs. This study seeks to bridge this gap by exploring the relationship between health insurance coverage and financial protection against health-related expenses among slum dwellers in Dar es Salaam. The aim is to understand better how health insurance can serve as a buffer against the financial shocks associated with health costs in these high-risk areas.

The urgency of addressing these issues is underscored by global health and development agendas, such as the U.N (Wagstaff et al., 2018; WHO, 2019). Millennium Development Goals, which emphasize the importance of significantly improving the lives of slum dwellers. By focusing on the intersection of health insurance coverage and OOP expenses, this study contributes to the broader efforts to enhance health equity and economic resilience among some of the world's most disadvantaged urban populations.

## 2. Theoretical foundation

The theoretical foundation of the study examining the effects of health insurance on out-of-pocket (OOP) expenditures among slum dwellers in Dar es Salaam is anchored in two pivotal concepts from health economics: the theory of moral hazard and consumer behavior in health care. These frameworks are instrumental in elucidating the underlying mechanisms that influence health insurance uptake and its subsequent impact on healthcare spending.

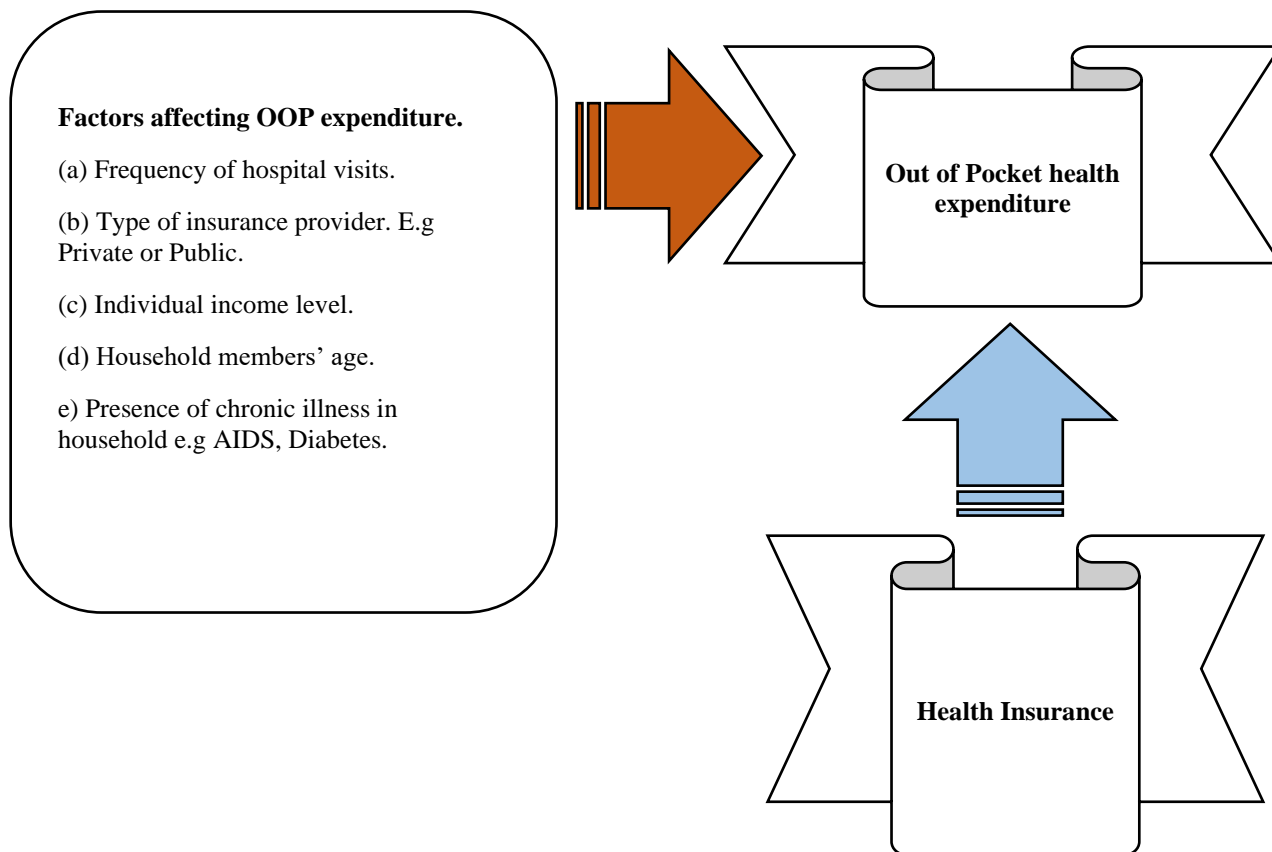
Moral hazard theory is critical in understanding how the protection offered by insurance can alter an individual's behavior towards health risks. Traditionally, moral hazard in health insurance suggests that individuals with coverage are likely to consume more medical services than they would if they were fully responsible for the costs. This increased consumption is primarily because the financial risk associated with healthcare expenses is transferred from the insured to the insurer, reducing the out-of-pocket costs at the point of service. In the context of this study, the theory helps explain potentially higher healthcare utilization patterns among insured slum dwellers, which might lead to increased OOP expenditures despite the presence of coverage.

Another important theory is the Consumer Behavior in Health Care. This theoretical perspective focuses on how individuals make decisions regarding their health insurance purchases and usage of healthcare services, based on their assessments of risk and preferences for security against uncertain health events. The theory integrates the principles of risk aversion and expected utility, where individuals opt for insurance to mitigate the financial risks of unforeseen medical costs. For slum dwellers, factors such as income levels, perceived health status, and the anticipated benefits of insurance coverage play a crucial role in their decisions to acquire and maintain health insurance. This theory is particularly relevant to understanding the low penetration of health insurance in impoverished settings, where economic constraints and a lack of understanding about insurance benefits might deter enrollment.

By integrating moral hazard and consumer behavior theories, the study comprehensively addresses the dynamics of health insurance in a slum context. It provides insights into not only why and how often slum dwellers utilize their insurance but also the effectiveness of such insurance in actually reducing the financial burden of healthcare. This dual-theoretical approach facilitates a nuanced analysis of the interplay between health insurance coverage and healthcare expenditures, highlighting the complex decision-making processes involved in health-related financial planning among economically vulnerable populations.

Therefore, the theoretical foundation of this study not only guides the empirical investigation but also enriches the understanding of health insurance's role as both a financial tool and a health resource in slum areas. These insights are vital for crafting targeted health policy interventions that aim to enhance the uptake and effectiveness of health insurance among marginalized urban populations, thereby improving their access to and affordability of healthcare services.

**Figure 1: Conceptual Framework**



### **3. Methods of analysis**

#### **3.1 Unit of analysis**

The target population for this study comprises residents of slum areas across various municipalities in Dar es Salaam. These individuals are typically classified as economically disadvantaged, living in conditions that fall below acceptable standards, particularly in terms of sanitation and access to basic services like clean water. Such environments predispose residents to a higher risk of illnesses and infections. The study aims to examine the extent of health insurance coverage within these communities. Furthermore, by analyzing the average out-of-pocket (OOP) expenses, this research seeks to assess the financial protective power of health insurance among these vulnerable populations. This investigation will provide insights into the effectiveness of health insurance in mitigating the economic impact of health care costs on individuals living in impoverished conditions.

#### **3.2 Size of the sample**

According to the latest Tanzania census survey 2022, Tanzania's population increased to 61,093,105 in 2022, up from the 45,928,923 reported in the previous census in 2012. Within this demographic, Dar es Salaam, the economic hub of the nation, accounts for 2,698,652 individuals. Approximately 60% of Dar es Salaam's population, or 1,619,192 people, reside in slum areas. The study focused on this segment of the population in various parts of the region. To determine the sample size for the research, the Yamen formula (1967) was utilized, resulting in a selection of

400 respondents from the slum areas of Dar es Salaam Region. Data for the study were collected using diverse research instruments aimed at gathering efficient and reliable information. Primary data were obtained directly from respondents through a combination of open-ended interviews and questionnaires.

### 3.3 Analytical modeling

#### 3.3.1 Factors influencing health insurance uptake among slum dwellers

Moreover, in exploring the factors that influence the uptake of health insurance among slum dwellers, the study employed a probit model. This model was chosen for its ability to effectively estimate the likelihood that slum dwellers will opt for health insurance. Consequently, the probit model utilized in this study incorporates an equation that describes the determinants of health insurance uptake as follows:

$$y_i^* = \beta w' + \mu_i \text{ where } \mu_i \sim (0, \delta^2) \dots \dots \dots (1)$$

$y_i^*$  is the dependent variable which assume unobservable status,  $\beta$  represents the independent variable,  $w'$  represents the coefficient of the independent variable and  $\mu_i$  is the error term with standard normal distribution (Dimoso & Andrew, 2021). Basing on this function, the probit model is delivered to analyse determinants or factors affecting health insurance uptake among slum dwellers. Since  $y_i^*$  is unobservable, what we observe is  $y_i$  which takes only two values as described in equation 2:

$$y_i^* > 0, y_i = 1 \text{ if uptake health insurance} \dots \dots \dots (2)$$

$$y_i^* \leq 0, y_i = 0 \text{ if do not uptake health insurance}$$

Because the probability that the slum dwellers uptake on health insurance is greater than zero ( $y^* > 0$ )

$$prob(y = 1) = prob(y_i^* > 0) \dots \dots \dots (3)$$

Or less than or equal to zero ( $y^* \leq 0$ )

$$prob(y = 0) = prob(y_i^* \leq 0) \dots \dots \dots (4)$$

The likelihood of health insurance uptake is herein presented by unobservable factors through the dependent variable as follows:

$$\text{Health insurance uptake} = \begin{matrix} 1 \text{ if uptake health insurance} & * > 0 \\ 0 \text{ if not uptake health insurance} & * < 0 \end{matrix} \dots \dots \dots (5)$$

If  $y_i^* = 0$  then  $y = 1$  implying that health insurance is uptake. Therefore, the probability that health insurance is uptake is based on the assumption that the probability density function of  $e_i$  assumed being  $f(\mu_i)$  which results in the creation of new parameter

$$\text{Prob}(y_i = 1|x) = \int_{-\infty}^{x'\beta} f(\mu_i) du = F(x'_i\beta) \dots \dots \dots (6)$$

$$\text{Prob}(y_i = 1|x) = 2\pi^{-\frac{1}{2}} \exp\left(-\beta x_i^2\right) \dots \dots \dots (7)$$

Now, based on the variables used in this study the Probit model is therefore presented as;

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 D_i + \mu_i \dots \dots \dots (8)$$

Whereas the  $\beta_0$  is the constant term while  $\beta_1$  and  $\beta_2$  are the parameters that will be estimated in the probit equation. On the other hand,  $X_i$  are the covariates while  $D_i$  represents group of all dummy variables used in this study. Now, since the Probit model is well addressed under the marginal effects which help to explain the extent of effects of health insurance uptake, then equation 8 is therefore transformed in order to get the marginal of variations in the repressors as shown at equation 9:

$$\frac{dy}{dx_i} = \beta_i \phi(\beta_1 + \beta_n) \dots \dots \dots (9)$$

Thus, the general estimated equation for this study is given as;

*Healthinsuranceuptake*

$$\begin{aligned} &= \beta_0 + \beta_1 \text{married} + \beta_2 \text{male} + \beta_3 \text{PrivateEmp} + \beta_4 \text{PublicEmp} + \beta_5 \text{Cheap} \\ &+ \beta_6 \text{Primary} + \beta_7 \text{Secondary} + \beta_8 \text{Tertiary} \\ &+ \beta_9 \text{NumberofDependents} \dots \dots \dots (10) \end{aligned}$$

### 3.3.2 The effect of health insurance on Out-of-Pocket Payments

This study employs the Two-Stage Least Squares (2SLS) methodology to analyze the effect of health insurance on out-of-pocket (OOP) payments. In this model,  $OOP_i$  represents the out-of-pocket payment for individual  $i$ , and  $Insurance_i$  is a binary variable indicating whether individual  $iii$  has health insurance (1 if insured, 0 otherwise). The variable  $X_i$  includes control factors that may influence  $OOP_i$ , such as age, income, and health status. The parameters  $\beta_0, \beta_1, \beta_2$  are estimated, and  $\epsilon_i$  denotes the error term.

The 2SLS model requires an instrument,  $Z_i$ , that affects the likelihood of having insurance but does not directly influence out-of-pocket payments. In this study the access to information about insurance is used as an instrument. The first stage predicts the probability of having insurance based on the instrumental variable and control variables. The second stage then assesses the impact of the predicted insurance status on out-of-pocket payments, controlling for the same set of variables.

#### 3.3.2.1 First Stage:

$$Insurance_i = \gamma_0 + \gamma_1 Z_i + \gamma_2 X_i + \epsilon_i \dots \dots \dots (11)$$

Whereas  $Insurance_i$  is the dependent variable in the first stage,  $Z_i$  is the instrumental variable,  $X_i$  includes the same control variables as before,  $\gamma_0, \gamma_1, \gamma_2$  are parameters to be estimated,  $\epsilon_i$  is the error term in the first stage.

**3.3.2.2 Second Stage:**

$$OOP_i = \alpha_0 + \alpha_1 \widehat{Insurance}_i + \alpha_2 X_i + \mu_i \dots \dots \dots (12)$$

Whereas  $\widehat{Insurance}_i$  is the predicted value of insurance from the first stage,  $\alpha_0, \alpha_1, \alpha_2$  are parameters to be estimated in the second stage,  $\mu_i$  is the error term in the second stage.

**4. Results**

**4.1 Description of the respondents’ characteristics**

The demographic characteristics of the respondents are detailed in Table 1, providing insights into the composition of the study sample. The gender distribution among the participants shows a slight female majority, with 217 female respondents, accounting for 54.25% of the total, compared to 183 male respondents or 45.75%. This suggests a relatively balanced gender representation within the sample.

Age-wise, the respondents are fairly distributed across three age groups. The largest group consists of individuals aged 18 to 30 years, comprising 38.00% of the sample with 152 respondents. This is followed by those aged 31 to 43 years, who make up 34.75% of the population with 139 respondents. The smallest group is those aged 44 years and older, representing 27.25% of the sample with 109 respondents.

In terms of educational attainment, the majority of the respondents have completed primary education, with 175 individuals or 43.75% falling into this category. Those with secondary education represent 24.75% of the sample, totaling 99 respondents. The group with tertiary education is smaller, comprising 12.25% of the sample, which amounts to 49 respondents. Additionally, 77 respondents, or 19.25% of the sample, have no formal education. These figures highlight a diverse educational background among the study participants, indicating varied levels of literacy and educational exposure.

**Table 1 Respondents’ demographic characteristics**

	Attributes	Number of Respondents	Percentage (%)
Sex	Female	217	54.25%
	Male	183	45.75%
Age	18 - 30	152	38.00%
	31 - 43	139	34.75%
	44+	109	27.25%
Level of Education	Primary	175	43.75%
	Secondary	99	24.75%
	Tertiary	49	12.25%
	No education	77	19.25%

Moreover, Table 2 provides a comprehensive overview of health insurance coverage among the respondents, differentiated by their demographic characteristics such as sex, age, and level of education. Each category sheds light on distinct patterns and implications concerning health insurance uptake. Among the respondents, females showed a higher rate of health insurance coverage compared to males, with 46.54% of female respondents having insurance versus 39.34% of male respondents. This suggests that health insurance outreach or availability might be more effective or targeted towards women, or that women may prioritize health security more than men.

The distribution of health insurance across age groups reveals significant differences. Young adults (18-30 years) have an insurance coverage rate of 48.68%, which is the lowest among the age groups. This could indicate a lack of affordability or perceived need for insurance among younger individuals who might consider themselves healthier. In contrast, respondents aged 31-43 and those 44 and older have much higher coverage rates at 74.82% and 76.14%, respectively. This significant increase with age could reflect a greater recognition of the benefits of health insurance as age increases and health concerns become more prevalent.

**Table 2: Distribution of health insurance by respondents' characteristics**

Characteristics	Attributes	Health insurance		Total
		Yes	No	
Sex	Female	101 (46.54%)	116 (53.46%)	217
	Male	72 (39.34%)	111 (60.66%)	183
Age	18 - 30	74 (48.68%)	78 (51.32%)	152
	31 - 43	104 (74.82%)	35 (25.18%)	139
	44+	83 (76.14%)	26 (23.86%)	109
Level of Education	Primary	52 (29.71%)	123 (70.29%)	175
	Secondary	60 (60.61%)	39 (39.39%)	99
	Tertiary	33 (67.35%)	16 (32.65%)	49
	No education	58 (75.34%)	19 (24.66%)	77

Education level is a crucial determinant of health insurance coverage. Respondents with primary education have the lowest coverage at 29.71%, suggesting that lower education levels may be associated with lower economic status or less awareness of insurance benefits. Those with secondary education show a marked improvement in coverage at 60.61%, while tertiary educated respondents have a coverage rate of 67.35%. Interestingly, respondents with no formal education have a high insurance coverage rate of 75.34%, which could be due to targeted social welfare programs or community-based health insurance schemes that focus on the most vulnerable populations.

These findings highlight the disparities in health insurance coverage related to demographic factors, suggesting areas where policy interventions could be most effective. For example, enhancing insurance awareness and affordability among the young and less educated could be a



critical focus. Additionally, the high coverage among the uneducated might point to successful targeted interventions that could be expanded or modeled in other demographic segments. The implications of these findings are significant for policymakers, health insurers, and public health officials aiming to improve health insurance penetration and equitable access to healthcare services across different societal groups.

#### 4.2 Determinants of slum dweller uptake for health insurance

Table 3 provides a detailed analysis of the marginal effects of various determinants on the uptake of health insurance among slum dwellers. The analysis offers valuable insights into how certain demographic and socioeconomic factors influence health insurance decisions, highlighting critical areas for policy and intervention strategies.

The data indicates that marital status plays a significant role in health insurance coverage, showing a positive marginal effect of 0.186. Married individuals are more likely to have health insurance, possibly due to the shared responsibility and heightened awareness of health needs within families. This observation suggests that family-oriented health insurance policies could be particularly effective in slum areas. In contrast, the study reveals a notable gender gap in health insurance coverage; being male is associated with a negative impact on insurance uptake, with a marginal effect of -0.454. This significant disparity underscores the need for targeted interventions to increase the awareness and perceived value of insurance among men to help close this gap.

Furthermore, employment type emerges as a strong predictor of health insurance coverage. Individuals in private employment demonstrate a significantly high positive impact (0.510) on insurance uptake, likely attributable to better job benefits and higher income levels. Similarly, public employment shows a positive effect of 0.294, suggesting that job security and government employee benefits also contribute to higher insurance rates. These findings support policies that encourage or mandate employer-provided health insurance, which could substantially increase coverage rates among these groups.

**Table 3: Marginal Effects for the determinants of health insurance uptake/coverage among slum dwellers**

Variable	dy/dx	Std. Err.	Z	P>z	95% Confidence Interval		X
Marital status (Married)	0.1862702	0.07299	2.55	0.011	0.043215	0.329326	0.402
Sex (Male)	-0.4542572	0.06083	-7.47	0.000	-0.573475	-0.33504	0.685
Private employment	0.5096909	0.06863	7.43	0.000	0.375177	0.644204	0.185
Public employment	0.293903	0.07206	4.08	0.000	0.152665	0.435141	0.272
Premium affordability	0.1166629	0.06477	1.8	0.072	-0.010281	0.243606	0.430
Primary education	0.248727	0.14211	1.75	0.080	-0.029811	0.527265	0.205
Second education	0.2988338	0.12662	2.36	0.018	0.050661	0.547006	0.4025

Tertiary education	0.3232222	0.15277	2.12	0.034	0.023799	0.622645	0.267
Number of dependents	0.044636	0.01617	2.76	0.006	0.012952	0.07632	2.260

Although premium affordability shows a positive effect (0.117) on health insurance uptake, it is not statistically significant at the 5% level ( $p=0.072$ ), indicating that while cost influences decisions, it may not be the decisive factor for everyone. This suggests that even affordable premiums might still be out of reach for some, or other considerations may play more critical roles in the decision-making process. Additionally, the impact of education on health insurance uptake is noteworthy. While primary education alone shows a minimal impact, secondary and tertiary education levels are associated with significantly stronger positive effects (0.299 and 0.323, respectively). This correlation likely reflects better financial literacy and a deeper understanding of insurance benefits among the educated. On the other hand, the presence of dependents also positively influences health insurance coverage, with a marginal effect of 0.045. This pattern implies that individuals with more dependents tend to secure health insurance more frequently, driven by an increased awareness of health risks and financial vulnerabilities associated with larger families.

These findings have multifaceted implications as they highlight the necessity for targeted health insurance campaigns that consider demographic and socioeconomic factors. The significant roles of employment and education suggest that integrating health insurance with employment benefits and educational programs could enhance coverage. Moreover, understanding the specific needs and barriers faced by different demographic groups, such as unmarried individuals or those with fewer dependents, could aid in designing more inclusive health insurance schemes. These insights are essential for policymakers aiming to improve health insurance penetration among the underserved populations in slum areas, thereby enhancing their access to healthcare and reducing health disparities.

#### 4.3 Effects of health insurance among slum dwellers on the Out-of-pocket expenditure

The coefficient for the ownership of health insurance indicates a significant reduction in OOP expenditures, with values of -0.4978 in the first stage and -0.5502 in the second stage, both at highly significant levels ( $p<0.000$ ). This strong negative association underlines the effectiveness of health insurance in lowering the financial burden of medical expenses. This finding underscores the potential benefits of expanding health insurance coverage as a policy measure to alleviate the economic strain on residents of slum areas, who often face financial instability.

Hospital visits, another significant determinant, show a nuanced impact. In the first stage, the coefficient is 0.0917, which is not statistically significant ( $p=0.127$ ), suggesting that initial assessments might overlook some complexities. However, in the second stage, the effect becomes markedly significant with a coefficient of 0.8647 ( $p=0.002$ ), indicating that hospital visits lead to considerably higher OOP expenditures. This shift to significance in the second stage highlights the critical need for insurance policies that provide more comprehensive coverage for hospital-based care, aiming to shield patients from the high costs associated with such visits.

**Table 4: Out of pocket expenditure of individuals with health insurance in slum areas**

	First Stage	Second Stage
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Ln out of pocket expenditure	Coefficient	Std. Err.	t	P>t	Coefficien t	St. Err.	t	P>t
Ownership of insurance	-0.4978	0.0627	-7.93	0.000	-0.5502	0.0635	-8.66	0.000
Hospital visit	0.0917	0.0598	1.53	0.127	0.8647	0.2772	3.12	0.002
Health Insurance provider	0.0930	0.1206	0.77	0.441	-0.1202	0.0915	-1.31	0.19
age	0.0031	0.1128	0.03	0.978	-0.4066	0.1563	-2.6	0.010
Presence of chronic illness	0.6195	0.0676	9.16	0.000	0.6092	0.0671	9.07	0.000
Ln income	0.0439	0.0072	6.07	0.000	0.0181	0.0116	1.56	0.120
Constant	0.7089	0.0892	2.27	0.000	0.8893	0.1055	3.7	0.000

Moreover, type of health insurance provider shows less clear effects, with a first-stage coefficient of 0.0930 ( $p = 0.441$ ) and a second-stage coefficient of -0.1202 ( $p = 0.19$ ). The inconsistency and lack of statistical significance suggest that the influence of provider type on OOP costs may be overshadowed by other factors, or it varies widely depending on the context. This indicates a potential area for further investigation into how different provider attributes affect healthcare expenditures. Furthermore, results on age of the slum dweller shows an almost negligible effect in the first stage with a coefficient of 0.0031 ( $p = 0.978$ ) but turns significantly negative in the second stage with a coefficient of -0.4066 ( $p = 0.010$ ). This pattern may reflect that older individuals often opt for insurance plans with more extensive coverage or benefit from age-related policies that reduce their OOP expenses. Policies aimed at enhancing insurance offerings for older populations could further mitigate their healthcare costs.

Additionally, chronic illness presents a significant predictor of increased OOP expenses, with strong positive coefficients in both stages (0.6195 in the first stage, and 0.6092 in the second stage, both  $p < 0.000$ ). This consistent finding emphasizes the need for health insurance policies that better cover the ongoing costs associated with chronic conditions, potentially through specialized plans or increased limits on coverage. Finally, income's role is highlighted by a first-stage coefficient of 0.0439 ( $p < 0.000$ ) that indicates higher income increases the capacity to manage OOP expenditures. However, this significance fades in the second stage ( $\beta = 0.0181$ ,  $p = 0.120$ ), suggesting that while income is a factor, the comprehensive effects of insurance coverage and medical needs are more pivotal. This indicates the importance of structuring insurance schemes that are effective and accessible for individuals across various income levels, ensuring that financial capability does not dictate healthcare quality.

## 5. Discussion

The discussion of out-of-pocket (OOP) expenditures for individuals with health insurance in slum areas reveals intricate dynamics influenced by a variety of factors. The significant reduction in OOP expenses among those with insurance underscores the protective financial role of health insurance, confirming existing research which highlights how health insurance can shield individuals from the steep costs associated with medical care. For instance, Wagstaff et al. (2018) have demonstrated that health insurance considerably lowers OOP spending by absorbing a substantial portion of direct medical costs. This effect is particularly crucial in slum areas, where economic vulnerabilities make residents especially sensitive to health-related financial shocks.

However, it's important to recognize that the reduction in OOP expenses doesn't universally prevent high medical spending, particularly when insured individuals increase their utilization of healthcare services. This scenario is noted in studies like those by Aegbeshola and Khan (2018), which point out that insurance may lead to higher OOP expenses due to increased access to and utilization of healthcare services that are not fully covered by insurance plans. This suggests that while insurance reduces the cost per service, overall spending might rise with increased healthcare use, emphasizing the need for comprehensive coverage within insurance policies.

The analysis also highlighted that hospital visits significantly increase OOP expenditures, a relationship that becomes notably pronounced after adjusting for various factors in the second stage of the model. This result is aligned with the understanding that hospital-based care generally incurs higher costs due to the intensive nature of treatments and the advanced technology employed. According to Carter (2016), hospitalizations and intensive medical procedures are major contributors to increased healthcare spending. Yet, an alternative perspective suggests that regular hospital visits can potentially decrease long-term healthcare costs by preventing disease progression, a viewpoint supported by Ebaidalla and Mohammed (2017) who argue that preventative care and early intervention can offset future expensive medical interventions.

The role of the health insurance provider in influencing OOP costs was found to be inconsistent, suggesting a complex interplay between provider types and the associated expenditures. This aligns with the mixed findings in the literature, where some studies highlight the influence of provider types on healthcare costs and service quality (Nundoochan et al., 2019) whereas others argue that the impact is minimal when demographic and health status are controlled (Dorjdagva et al., 2017). This indicates that while the choice of provider can have an impact, it is often mediated by a range of other factors including plan specifics and individual health needs.

Furthermore, age and chronic conditions also play significant roles in shaping OOP expenditures. Older individuals often face lower incremental costs, likely due to choosing more comprehensive insurance plans or benefiting from age-related health policies. This is consistent with research by Kitole et al. (2022), which suggests that anticipation of higher healthcare needs drives older adults to opt for broader coverage. Conversely, the presence of chronic illnesses was associated with higher OOP costs, reflecting the ongoing and often intensive nature of managing long-term health conditions. This finding echoes Dorjdagva et al., (2017) observation that chronic diseases typically lead to increased medical spending due to the continuous care required.

Therefore, these insights highlight the complex factors that influence OOP expenditures among the insured in slum areas. They suggest that while health insurance provides a crucial buffer against high medical costs, its effectiveness is contingent upon the specifics of the coverage, the nature of healthcare utilization, and individual characteristics such as age and health status. This discussion emphasizes the need for carefully designed insurance products and targeted policy interventions that address the nuanced healthcare needs and financial capabilities of slum dwellers.

## **6. Conclusion and policy recommendation**

The analysis of out-of-pocket (OOP) expenditures among slum dwellers with health insurance offers important insights into the financial dynamics of healthcare accessibility in underprivileged areas. The significant reduction in OOP expenses for insured individuals underscores the crucial role of health insurance in mitigating the financial impact of healthcare. However, the relationship between insurance coverage and healthcare utilization suggests that the benefits of insurance can

be complex, varying widely based on the specifics of the insurance plan and the healthcare behaviors of the insured.

Firstly, the protective effect of insurance against high medical costs is a critical takeaway, highlighting the necessity of expanding health insurance coverage. Policies aimed at increasing insurance penetration in slum areas should focus on reducing the direct costs associated with obtaining insurance and improving the understanding of insurance benefits. Moreover, the government and other stakeholders should consider subsidizing premiums or offering tax incentives to make health insurance more affordable and attractive to low-income populations.

Secondly, the findings reveal that while hospital visits increase OOP expenditures, they are essential for addressing more serious health conditions. This necessitates policies that ensure hospital care is more affordable under insurance schemes. Strengthening the coverage of hospital-based care within health insurance plans can prevent scenarios where individuals forego necessary treatments due to cost concerns. Additionally, encouraging regular preventative care and early intervention strategies could reduce the need for expensive, extensive medical procedures later on.

The variability in OOP expenditures based on the type of insurance provider suggests that regulatory frameworks need to ensure that all types of health insurance plans provide a baseline level of coverage. Standardizing key aspects of health insurance policies, such as coverage limits, claim processes, and out-of-pocket maximums, could help make the benefits of health insurance more consistent and predictable for all policyholders.

The influence of demographic factors, such as age and the presence of chronic illnesses, on OOP expenditures highlights the need for differentiated insurance products tailored to specific population segments. Older adults and individuals with chronic conditions should have access to specialized plans that cater to their unique healthcare needs, offering broader coverage and lower copayments for regular treatments. Furthermore, this analysis not only provides a deeper understanding of the factors influencing OOP expenditures among insured slum dwellers but also frames a series of policy recommendations aimed at enhancing the effectiveness of health insurance as a tool for financial protection against health-related expenses. By addressing the identified gaps in insurance coverage and tailoring policies to meet the diverse needs of the urban poor, stakeholders can improve health outcomes and economic stability for vulnerable populations in slum areas.

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