

## Does catastrophic health expenditure affect out-of-pocket health care spending in Tanzania?

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### ABSTRACT

The basic goal of a healthcare scheme is to confirm that everybody can get high-quality care. The study intended to determine the factors that donate to catastrophic out-of-pocket (OOP) health care costs in Tanzania. Behavioural model of health care guided this research. Time series (Longitudinal) research design adopted to this study. The targeted population from 2008/2009 to 2.5% in 2012/2013. The sampling and sample size is 1476 employed while sources of data are United Nations Children's Fund (UNICEF), Ministry of Finance and Planning, National Health Insurance Funds (NHIF) and National Bureau of Statistics (NBS)-Tanzania. The logit model was employed to analyse the reasons of disastrous expenditure, safeguarding that approximation issues include heteroscedasticity, endogeneity and multicollinearity are spoke. The data show that, assuming a 10% threshold for overall health spending, the calculated headcount of catastrophic expenditure is 13.9% in 2008/2009, 14.5% in 2010/2011, and 14.1% in 2012/2013. This measure indicates that, on average, among the interviewed households who stayed fitness upkeep services 4 weeks prior to the survey and paid for the services out of pocket, 13.9%, 14.5%, and 14.1% use extra than 10% of their feeding spending on health-care services crossways all rollers. The frequency and size of catastrophic health payments at the 40% level have certain commonalities. Furthermore, the findings demonstrate that the percentage of households impoverished by catastrophic out-of-pocket health care charges fell since 3.6% in 2008/2009 to 2.5% in 2010/2011, before rebounding to 3.3% in 2012/2013. Furthermore, the findings show that on average, 3.1% of the population has been destitute or rendered poor as a result of these catastrophic health-care payments. home size, age of the head of the home (65+), and experience were identified as drivers of catastrophic OOP expenditure. This study lends credence to the literature's notion that out-of-pocket health costs create financial disaster for low-income households, revealing them to additional pain and compelling them to employ hazardous managing techniques. Thus, new and stronger techniques for safeguarding weak families from out-of-pocket expenses and terrible fitness expenses are required. Catastrophic health expenditure ensuing from out-of-pocket (OOP) expenditures residues an important socioeconomic and public health problem, mostly in developing nations. The study recommends that the government should expand widespread health coverage, increase health financing, reduce user charges for important service, and easy to access the important medicine to the public hospitals.

**Keywords:** Catastrophic Health Expenditure, Health Care, Out-of-Pocket Expenditure, Tanzania.

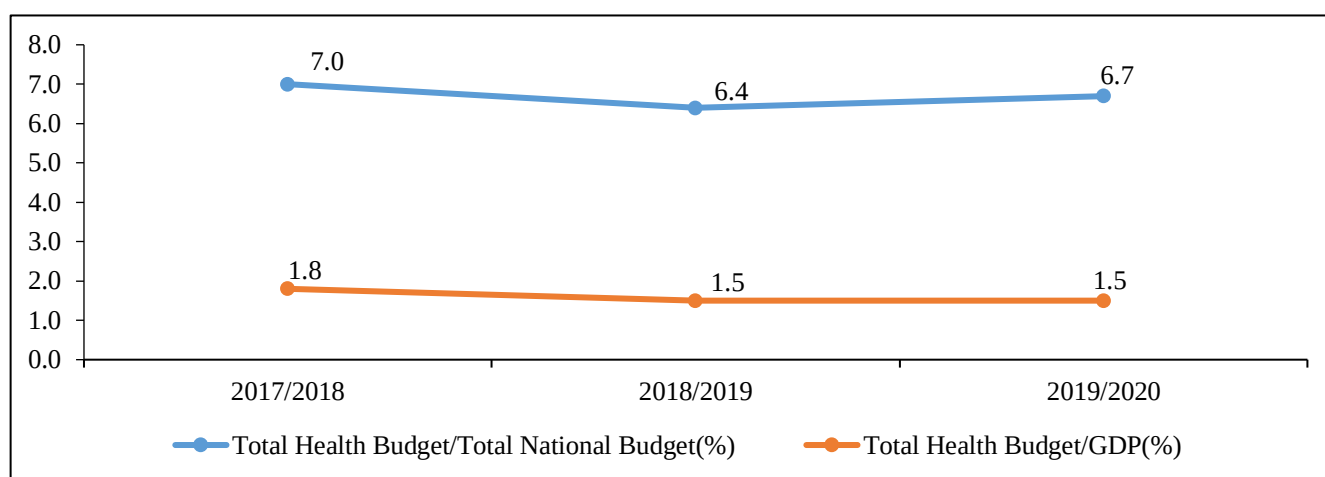
### I. INTRODUCTION

The important area of a healthcare system is to safeguard that everyone can get high-quality care. At the same time, households should not be forced to pay for health care that is so expensive in relation to their income that it harms their financial well-being. Out-of-pocket (OOP) expenditures are the most common way of fitness funding in developing countries, but their influence on domestic rank, mostly amongst the poor, can be plain (Ahid, 2022). Direct payment at the point of treatment is an unjust system of funding health care since it penalises certain socioeconomic groups, notably the elderly and impoverished (Kim & Jacobson, 2022). In this type of health-care system, families bear the greatest financial responsibilities, and if the cost of healthcare exceeds their ability to pay at the time of treatment, they are more likely to avoid or postpone obtaining critical medical care. Families may be forced to choose between providing healthcare to members and meeting other basic needs like as food, education, and shelter (Ahid, 2022).

As a result, health-care spending, particularly calamitous expenditure, may develop a substantial fresh cause of scarcity (Tadiwos et al., 2025). According to published estimates, OOP expenditures version for approximately 33% of the nation's fitness spending, while 110 million persons are forced into shortage every year and 165 million people face monetary ruin as a consequence of OOP expenditures when seeking health care (Yap et al., 2023). Health expenditure is deemed disastrous if direct expenses for fitness facilities top the household's resources, leading the households' living standards to fall. As a result, in nations include Tanzania, anywhere payment systems including taxation and health insurance show little part in health finance, families face enormous health-care costs once one of their memberships falls hostile. Primary, OOP payment for fitness care may force families into deficiency or profounder hardship. Additional, owing to great healthcare charges, families are obliged to reduce other critical spending. For homes whose

budgets have been strained to the breaking point, even a modest amount of expenditure can result in financial disaster, forcing a household to decrease other vital expenses such as housing, food, and clothes, or money that might be spent on youngsters' teaching. Unnecessary healthcare costs container causes monetary adversity and destitution, level in rich families (Ismail & Arfa, 2022). Third, households might forego required healthcare treatments rather than face the financial repercussions of paying for them, resulting in a vicious cycle of incapacity, illness, and deficiency.

Tanzania's health expenditure as a proportion of total health spending decreased from 45 to 36 percent between 2002 and 2013. Tanzania's per capita health spending increased moderately to USD 49 in 2013, which is advantageous in comparison to other nations in the area. In financial period 2013/14, international contributors provided for 53% of Tanzania's THE, with OOP spending accounting for 33%, rather than long-term sources such as general government revenue or healthcare coverage. Excluding consolidated fund services, the overall health budget climbed somewhat from the previous year, from 9.1 to 11.3%, however this was due to a significant rise in a component of the foreign budget.



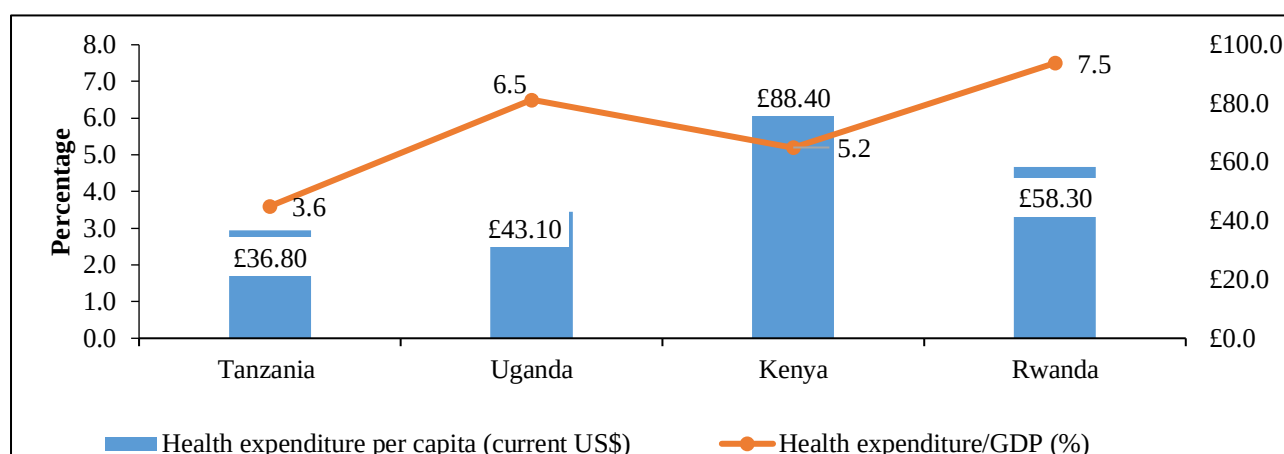
**Figure 1**

*Ratio between Health Budget over Total National Budget*

*Source: UNICEF and Ministry of Finance 2026*

According to international fitness objectives, overall health expenditures should equal 15% of sum government spending, as outlined by the declaration of Abuja. The Government of Tanzania now drops well short of its aim. Between fiscal years 2017/18 and 2019/20, the health budget's percentage of GDP fell from 1.8% to 1.5%. Tanzania's health industry is one of the largest, accounting for 6.7% of the entire national budget in fiscal year 2019-20. Substructure is the main subdivision, accounting for 18.3% of the GDP, shadowed by teaching (21.1%), health (8.8%), energy (7.7%), water (4.6%), and agriculture (2.7%). However, the study excludes a number of key budget categories, such as administrative services (including debt servicing) (23%), and minerals (4.5%) (Chindengwike, 2026).

The percentage of the health sector should increase in light of population growth, financial resources, constraints, and the impact of the COVID-19. To better understand the budgetary gaps and mobilise resources, it is critical to enhance the execution of existing costed projects to address present blocks in the fitness scheme. Also, the excellence of health-care expenses may be enhanced by improving cheap implementation presentation and nursing community spending. Tanzania has a low per capita health spending relative to its neighbours, at US\$41.1 vs US\$92.2 in Kenya and US\$44.7 in Rwanda (see figure 2). According to World Bank estimates from 2018, Tanzania has lower health-care expenditure as a proportion of Gross Domestic Product than Kenya, Rwanda, and Uganda.



**Figure 2**  
*Health spending Total for nominated East African nations 2026*  
 Source: World Bank, 2026

On the other hand, despite a pledge to extend assurance attention in the nation, assurance systems are significantly disjointed (Chindengwike, 2026). According to current Tanzania Insurance Regulatory Authority (TIRA) figures, there were roughly 7 private businesses that provided health insurance separately, though a few additional general assurance companies integrated health insurance benefits with life insurance. There is some confusing or subjective information about the influence of assistance on OOP health expenses. "If you don't have cash now and your sick, the illness will take you to the serious," a lady in Ghana was reported as saying in the poor's voice (Chindengwike, 2025). In the same study, another respondent in Ghana was cited as stating, "We guard our broods die since we can't afford the high cost." Empirical research on the belongings of OOP costs owing to health shocks is limited, particularly in poor countries like Tanzania (Söyük, 2023). Few studies on out-of-pocket expenses for healthcare have been conducted in Tanzania. Söyük (2023) investigated the relationship between social, poor health, and economic characteristics and out-of-pocket health expenses among Tanzania's adult and older population. The study looked on the prevalence and causes of catastrophic healthcare costs on households. Bashir et al. (2024) investigate the factors influencing variation in child healthcare out-of-pocket payments in Tanzania's southern region. These mentioned studies investigated the impact of OOP payments for child healthcare on rural family welfare, as well as the issues prompting OOP health care costs among Tanzanian adults and the elderly. Despite the fact that the education did not examine the impact of OOP for health care on household wellbeing in various income levels in pastoral and town areas, the data is useful for planning reasons (Chindengwike, 2022).

According to the 2017/18 HBS results, Tanzanians living below the poverty line accounted for 26.4 percent of the population, with the occurrence of shortage being advanced in country areas (31.3 percent) than city areas (15.8 percent), and only 9% of Tanzania's population is covered by NHIF, implying that the majority of people use OOP health payments to fund their services when a member of a household becomes ill. In this case, it makes little difference whether the household is poor or wealthy, because even a tiny amount of money spent on health care for a low-income family might push it into poverty (Chindengwike, 2023).

Traditional poverty estimates do not include out of pocket Health expenditures as one of the causes of poverty in families, despite the fact that out of pocket health bills can create financial ruin for households, potentially driving them into poverty (Chindengwike, 2025). The crucial role of households in healthcare finance in Tanzania emphasises the necessity of understanding the incidence and intensity of catastrophic health expenditure in Tanzania, as well as the causes and consequences of disastrous out of pocket health for health care in Tanzania. Furthermore, gendered analyses were only partially included in previous research Okunogbe et al. (2022), hence the current study included gender analysis to add value to the comparisons. This information is crucial for the government, non-governmental organisations (NGOs), and other stakeholders as they design appropriate healthcare finance arrangements that promote access and equity across socioeconomic categories. The aim of this research is to look into the impact of catastrophe on out-of-pocket health care spending in Tanzania.

### 1.1 Research Objective

To examinethe relationship between Catastrophic and Out of Pocket Health Care Spending in Tanzania



## II. LITERATURE REVIEW

### 2.1 Theoretical Review

This study pinnedby behavioural model of health care.

#### 2.1.1 Behavioural model of health care

The behavioural model of health care, developed by Ahmed et al. (2022), aims to explain the variables that influence the use of health services. The model identifies three types of characteristics that influence a person's use of health-care services. Predisposing qualities, enabling situations, and need are the factors that increase people's likelihood of requiring health-care services (Ahmed et al., 2022). They are founded on the idea that a people's tendency to utilise medical facilities may be anticipated using a range of individual variables, including social issues, demographic factors, and pre-disease health behaviours (Mulaga et al., 2022).

### 2.2 Empirical Review

Age and gender are biological characteristics that influence the likelihood that people may seek medical assistance. Education, job, ethnicity, social networks, interpersonal interactions, and culture all have an impact on social structure (Reddy, 2024). They reflect an extensive variety of elements that influence a being's social status, volume to detect obstacles, and command of resources to address these concerns. According to Serván et al. (2023), fitness politics are "attitudes, values, and information that persons have around fitness and health facilities that might inspiration grassroots following rulings of the need and use of health services" (Chindengwike, 2026). Even if individuals are predisposed to seek medical attention, sure capitals must be complete obtainable to them (Chindengwike, 2025). Public/administrative and individual/domestic allowing capitals necessity both be accessible for utilisation. Community resources comprise the structure and circulation of health-care services and professionals.

Most economic theories of healthcare demand are based on Grossman's notion of health (Voto et al., 2025). Health aids are necessary in the paradigm because they enhance health status, implying that the need for healthcare arises from a desire for health. The concept suggests that each human is born with a health supply that depletes with age but may be replenished via investment. The decision to seek medical assistance helps to mitigate the health stock's natural depreciation. Exercise, education, diet, and lifestyle choices are some of the additional influences. Grossman contends that medical care differs from other services and products because what a person buys is excellent health.

Grossman included a home production function to emphasise the distinction among health care as idea and health as production. He presented a function of products, services, and consumer time by distinguishing them from commodities. Individuals purchase health facilities and additional properties to generate product health, which is an input to the utility function, as opposed to medical treatment, which is a direct input. Voto et al. (2025) investigate the differences in the prevalence of CHE and impoverishment caused by OOP healthcare charges in the Mekong Delta compared to the rest of Vietnam. It was discovered that in the Mekong Delta area, as opposed to the rest of Vietnam, both the amount of OOP household healthcare expenditure and the percentage of families facing impoverishment as a result of such payments were greater. Despite the fact that families in the Mekong Delta region were far less likely to have CHE, the multiple regression analysis revealed that they stood meaningfully additional probable to be poor due to OOP healthcare cost. While having health insurance had no discernible impact on either outcome, households that had experienced an economic or environmental shock within the previous five years were significantly more likely to have CHE and fiscal adversity due to OOP medical expenses, health insurance coverage, employed household heads, and female-headed households.

## III. METHODOLOGY

The study focused on Tanzanians who lived in private houses. The study made use of secondary data employed, the The panel data from National Survey waves 1 to 3 provided by NBS. The National Survey sample design specifically recognises 4 logical levels: Mainland metropolitan centers, Dar es Salaam, Mainland rural areas, and Zanzibar. The study is founded on families that described taking at least 1 associate see a healthcare professional over the previous 12 months and four weeks before to the survey.

**Table 1***Healthcare Worker, Number of Households Described to Stay a and Handling Financed from their Own Portable*

| Year         | Nominated Sample Size | Percent      |
|--------------|-----------------------|--------------|
| 2008/2009    | 734                   | 49.7         |
| 2009/2010    | 265                   | 18           |
| 2010/2011    | 477                   | 32.3         |
| <b>Total</b> | <b>1,476</b>          | <b>100.0</b> |

**3.1 Measuring the Factors Influencing Catastrophic Medical Expenses**

The binary logistic regression model is used to calculate the influence of catastrophic health cost, as has been done in previous studies. The home is the item of investigation. The response variable is catastrophic out-of-pocket spending (CHE=y), which is defined as y=1 if the household incurs catastrophic health-care expenses and y=0 otherwise. The parameters of a regression model are set up so that the chance of having CHE equals: -

$$y = \Pr(y=1 | x) = F(x'\beta) = \frac{e^{x'\beta}}{1 + e^{x'\beta}}, \dots\dots\dots (i)$$

F(.) is a cumulative distribution function that ensures that  $0 < p < 1$ . The logistic distribution is employed in this example to model CHE using the logit model. The logit model's coefficients are defined as the alteration in logit for each unit alteration in the explanatory adjustable. Specifically, they are the log-odds, which equate to;

$$X'\beta = \ln \frac{p}{1-p} \dots\dots\dots (ii)$$

The reported odd ratio indicates the likelihood of one event occurring in comparison to another. These are derived using the stated coefficient's exponential.;

$$E(x'\beta) = \frac{p}{1-p} \dots\dots\dots (iii)$$

and it ranges from one to positive infinity. A value of one shows that both regressors are equally likely to produce y. When the odds ratio is less than one, a regressor x is less likely to cause y than the comparator; when it is greater than one, the regressor is more likely to drive y than the baseline.

**3.2 Definition and Measurement of Variables**

This section defines the variables utilised in the various models. The dependent variable is the CHE, which has a worth of unique if a domestic experiences shattering health expenditure and zip then. Table 2 describes the variables and how they were measured.

**Table 2***Variables Definitions and measurements for Household datasets*

| Variable                     | Description                                     | Measurement                                                                   |
|------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------|
| Catastrophic Expenditure @10 | Catastrophic Expenditure at 10% verge           | If a domestic has a calamitous fitness cost of 10%, the worth is 1; 0 if not. |
| Catastrophic Expenditure @40 | Catastrophic Spending (CHE) at 40% threshold    | 1 if f a household has a health cost at 40%, the value is 1; 0 if not.        |
| Domestic size                | Total number of people living in the household  | Incessant mutable                                                             |
| Educ_Status                  | Level of education of the head of the household | 1 if Main or minor; 0 if not.                                                 |
|                              |                                                 | 1 if subordinate; 0 if not                                                    |
|                              |                                                 | 1 if Tertiary Teaching; 0 if not                                              |
| Sex                          | Gender of the household head                    | 1 if male; 2 if female                                                        |
| Site                         | Is domestic in urban or rural area?             | 1 if rural; 2 if urban                                                        |
| Agehd                        | Age group of the clan's skull                   |                                                                               |
| 15-24                        |                                                 | 1 If the head of the household is between the ages of 15 and 24; 0 if not.    |
| 25-34                        |                                                 | 1 If the head of the household is between the ages of 55 and 34; 0 if not.    |
| 35-44                        |                                                 | 1 If the head of the household is between the ages of 35 and 44; 0 if not.    |
| 45-54                        |                                                 | 1 If the head of the household is between the ages of 45 and 54; 0 if not.    |



|                                     |                                                  |                                                                                |
|-------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------|
| 55-64                               |                                                  | 1 If the head of the household is between the ages of 55 and 64; 0 if not.     |
| 65+                                 |                                                  | 1 If the skull of the household is over the age of 65; 0 if not.               |
| Marital status                      | Domestic head married status                     |                                                                                |
|                                     |                                                  | Never married=1                                                                |
|                                     |                                                  | Married =2                                                                     |
|                                     |                                                  | Separated/Divorced/Widow=3                                                     |
| ExpR                                | Domestic real ingesting spending                 | A continuous variable that signifies the household's income.                   |
| <b>Materials of the Wall</b>        |                                                  |                                                                                |
| Non_Morden                          | The type of wall in the family's primary house   | 1 If the house has non-modern wall resources; 0 if not.                        |
| Modern                              |                                                  | 1 If the house has modern wall resources; 0 if not                             |
| <b>Type of floor</b>                |                                                  |                                                                                |
| Non_Morden                          | The type of ground in the family's primary house | 1 If the house has non-modern floor resources; 0 if not.                       |
| Modern                              |                                                  | 1 If the house has modern floor resources; 0 if not                            |
| <b>Type of Roof</b>                 |                                                  |                                                                                |
| Non_Morden                          | The type of roof in the family's primary house   | 1 If the house has non-modern roof resources; 0 if not.                        |
| Modern                              |                                                  | 1 If the house has modern roof resources; 0 if not.                            |
| <b>Source of Water_Rainy season</b> |                                                  |                                                                                |
| Improved Source                     | Main source of water during the rainy season     | 1 if drinking water is from the improved source during rainy season; 0 if not. |
| Non-Improved Source                 |                                                  | 1 if eating water is from the non-improved source during rainy; 0 if not       |
| <b>Source Water Dry season</b>      |                                                  |                                                                                |
| Improved Source                     | Chief source of water during the dry period      | 1 if eating water is from the improved source during dry season; 0 if not.     |
| Non-Improved Source                 |                                                  | 1 if eating water is from the non-improved basis during dry; 0 if not.         |

## IV. FINDINGS & DISCUSSION

### 4.3 Measuring the Catastrophic Health Care Spending

#### 4.3.1 Summary Statistics

This section includes the regression model's findings and commentary, as well as summary statistics for the variables and diagnostic tests. Table 4.8 lists the variables used for regression estimates. According to the data in the table, 13.9% of families in all waves of the survey had catastrophic health expenses at the 10% criterion, while 7.1% had catastrophic health expenditures at the 40% level.

**Table 3**

*Summary Statistics for the Sample (N=1,476)*

| Items      | N     | Mean   | Standard deviation | Minimum | Maximum   |
|------------|-------|--------|--------------------|---------|-----------|
| CHE @10    | 1,476 | 0.1389 | 0.3459             | 0       | 1         |
| CHE@ 40    | 1,476 | 0.0711 | 0.2571             | 0       | 1         |
| hhszise    | 1,476 | 4.8360 | 3.0015             | 1       | 21        |
| OOP        | 1,476 | 89,469 | 88,985             | 8,002   | 1,266,777 |
| Gender     |       |        |                    |         |           |
| Male       | 1,476 | 0.6531 | 0.4761             | 0       | 1         |
| Age_hd     |       |        |                    |         |           |
| 26 to < 35 | 1,476 | 1.2378 | 1.4259             | 0       | 1         |
| 36to < 45  | 1,476 | 1.2202 | 1.4145             | 0       | 1         |

|                              |       |        |        |   |   |
|------------------------------|-------|--------|--------|---|---|
| 46 to < 55                   | 1,476 | 1.2060 | 1.4045 | 0 | 1 |
| 56 to < 65                   | 1,476 | 1.1457 | 1.3529 | 0 | 1 |
| 66+                          | 1,476 | 1.1416 | 1.3488 | 0 | 1 |
| <b>Marital Status</b>        |       |        |        |   |   |
| living together/ Married     | 1,476 | 1.6247 | 1.4844 | 0 | 1 |
| Separated/ divorced          | 1,476 | 1.1436 | 0.3508 | 0 | 1 |
| Widowed                      | 1,476 | 1.1463 | 0.3536 | 0 | 1 |
| <b>Education Level</b>       |       |        |        |   |   |
| O-level                      | 1,146 | 0.2225 | 1.4161 | 0 | 1 |
| Certificate                  | 1,146 | 0.0323 | 1.1768 | 0 | 1 |
| <b>Materials of the wall</b> |       |        |        |   |   |
| Modern                       | 1,476 | 0.5576 | 0.4968 | 0 | 1 |
| <b>Type floor</b>            |       |        |        |   |   |
| Modern                       | 1,476 | 0.5508 | 0.4976 | 0 | 1 |
| <b>Type Roof</b>             |       |        |        |   |   |
| Modern                       | 1,476 | 0.0047 | 0.0687 | 0 | 1 |
| <b>Locality</b>              |       |        |        |   |   |
| Urban                        | 1,476 | 1.4329 | 0.4956 | 0 | 1 |
| <b>Water Rains Season</b>    |       |        |        |   |   |
| Non- Better foundation       | 1,475 | 1.2983 | 0.4577 | 0 | 1 |
| <b>Water Dry season</b>      |       |        |        |   |   |
| Non- Better foundation       | 1,475 | 0.3803 | 0.4856 | 0 | 1 |

In terms of household composition, 62.5% of head of households were married or living together, 14.4% were divorced or separated, and 14.6% reported being widowed, compared to never married as the baseline. The average age of a household skull was 46 ages, whereas those between 25 and <34 years old accounted for 23.8%. 14.2% of the population is old, defined as those over the age of 60. In terms of household characteristics, 43.3% of households resided in urban regions, as opposed to non-urban areas. Male-headed families accounted for 65.3%, with 22.3% consuming a domestic head who had completed secondary and 3.2% having completed higher education, compared to the household head who had completed primary. The normal domestic size was 4.8 peoples. On regular, a household paid TZS 89,469 per month on household expenses. This finding supported by Yap et al., (2023), who explained that catastrophic affect OOP health care expenditure in Tanzania. The study done by Chindengwike (2022), revealed that there is direct relationship between government spending and growth of economy of any nations. This finding support this study since catastrophic health expenditure influence the OOP health care spending. The study conducted by Söyük (2023), basing empirical research on the belongings of OOP costs owing to health shocks is limited, particularly in poor countries like Tanzania. This study contradicts with this study since no OOP costs owing to health shocks. The study done by Kim and Jacobson (2022), observed that direct payment at the point of treatment is an unjust system of funding health care since it penalises certain socioeconomic groups, notably the elderly and impoverished. This finding supports with result of this study who observed that direct payment at the point of treatment is an unjust system of funding health care.

#### 4.3.2 Estimation Issues

The Breusch-Pagan Lagrange multiplier (LM) test was conducted. The LM test aids determine whether to employ a random effect regression or a plain ordinary least squares regression. The LM test's null hypothesis is that all variances between objects are zero. That is, there are no significant variations crossways components (i.e., no panel effect).

#### 4.3.3 Regression Model Results-coefficients

The studied homes were submitted to logistic regression to investigate which characteristics impact catastrophic health cost at 10% and 40% thresholds. In relation to a specific criterion, the regresand is defined as 1 when a household experiences catastrophic costs and 0 otherwise.

**Table 4***Regression Results of the Logit Model*

| Items                     | 10 % Standards |        |   | 40 % Standards |        |   |
|---------------------------|----------------|--------|---|----------------|--------|---|
|                           | B              | P>     | z | B              | P>     | z |
| Hh scope                  | -1.666         | 0.000  |   | -0.111         | 0.045  |   |
| exp                       | 1.222          | 0.000  |   | 0.0001         | 0.056  |   |
| Sex                       |                |        |   |                |        |   |
| Women                     | -1.200         | 0.801  |   | -0.890         | 0.555  |   |
| <b>Age_hd</b>             |                |        |   |                |        |   |
| 26 to < 35                | 1.011          | 0.456  |   | 0.908          | 0.666  |   |
| 36 to < 45                | 1.111          | 0.566  |   | 0.906          | 0.656  |   |
| 46 to < 55                | 1.111          | 0.677  |   | 0.397          | 0.366  |   |
| 56to < 65                 | 1.222          | 0.653  |   | 0.890          | 0.356  |   |
| 66+                       | -1.444         | 0.001  |   | 0.987          | 0.0234 |   |
| <b>Marital Status</b>     |                |        |   |                |        |   |
| living together/ Married  | -1.222         | 0.345  |   | 0.567          | 0.446  |   |
| Separated/ divorced       | -0.122         | 0.345  |   | 1.435          | 0.335  |   |
| Widowed                   | -1.234         | 0.335  |   | 1.222          | 0.355  |   |
| <b>Education level</b>    |                |        |   |                |        |   |
| O-level                   | -1.600         | 0.003  |   | -0.124         | 0.233  |   |
| Certificate               | -3.063         | 0.002  |   | 0.0234         | 0.111  |   |
| <b>Material Partition</b> |                |        |   |                |        |   |
| Contemporary              | 1.223          | 0.543  |   | -0.111         | 0.111  |   |
| <b>Type base</b>          |                |        |   |                |        |   |
| Contemporary              | -1.222         | 0.001  |   | -2.011         | 0.0135 |   |
| <b>Type Ridge</b>         |                |        |   |                |        |   |
| Contemporary              | 1.121          |        |   | 0.001          |        |   |
| <b>Area</b>               |                |        |   |                |        |   |
| City                      | -1.555         | 0.011  |   | -0.780         | 0.241  |   |
| <b>Water_Rainseason</b>   |                |        |   |                |        |   |
| Non-Improved Source       | 1.011          | 0.114  |   | 1.567          | 0.124  |   |
| <b>Water_Dryseason</b>    |                |        |   |                |        |   |
| Non-Improved Source       | 1.549          | 0.111  |   | -1.890         | 0.233  |   |
| _cons                     | -1555          | 0.0223 |   | -4678          | 0.0222 |   |
| /lnsig2u                  | -2.33          |        |   | 1.789          |        |   |
| sigma_u                   | 1.222          |        |   | 2.678          |        |   |
| rho                       | 1.123          |        |   | 0.568          |        |   |

The findings indicate that just a few factors are connected with disastrous healthcare cost, at 40% or 10%. Table 4 shows the consequences of logistic regression for threshold values of 40% or 10%, regardless is general consumption expenditure or non-food expenditure. The findings indicate that domestic scope is statistically important at 5% for both the 10% and 40% criteria. This suggests that household size is connected to the chance of incurring catastrophic healthcare costs. The undesirable constant of household scope indicates that households with less persons are fewer probable to experience catastrophic health expenditures. A bigger household increases the chances of someone being ill. Furthermore, if the illness is contagious, a bigger family size increases the likelihood of more individuals being ill. As a result, we expect higher-income households to devote additional on health care. Household size is projected to raise the chance of catastrophic health-care spending, as increased healthcare spending is additional probable to result in catastrophic healthcare expenses. This finding supported by Chindengwike (2026), who explained that catastrophic affect OOP health care expenditure in Tanzania

Age group 65+ is important at 5% for both the 40% or 10% standards, implying that the chance of incurring catastrophic spending is greater for heads of households aged 65+ compared to the lower age group, all other things being equal. Although the coefficients are nearly zero in size, households with higher incomes (a substitution for real consumer spending) are more likely than families with lower incomes to experience catastrophic spending at the 10% and 40% thresholds, respectively. Better-off households have more resources to dedicate to health care than their poorer



counterparts. This finding supported by Chindengwike (2025), who explained that catastrophic affect out of pocket health care spending in Tanzania

Furthermore, families living below the poverty line are unable to satisfy even their most basic necessities. The same household does not have the financial resources to cover any type of health-care expense. Wealthy households, on the other hand, frequently spend a lesser percentage of their income on health care than poor households. Education, particularly the level of education of the household's head, is another important factor in determining the volume of catastrophic spending. In principle, households with a head who has finished secondary school or higher education spend less on health care than households without one. As a result, educational achievement may lower the share of out-of-pocket spending in a household's budget. According to Chindengwike's (2024) research, the schooling level of the family head may influence catastrophic health cost. However, when we define the head of household's education as 1 if he or she has completed primary school or fewer and 0 then, the outcomes show that, when compared to the primary and below categories of education, household heads who completed secondary and tertiary education were statistically important at the 5% level of significance at the 10% threshold. Other items, such as the availability of safe eating water throughout the thirsty and wet seasons, did not appear to have a significant impact on the risk that CHE would surpass the threshold levels.

## V. CONCLUSION & RECOMMENDATIONS

### 5.1 Conclusion

This study decided that OOP costs cause financial disaster for low-income households, leading them to additional hardship and forcing them to turn to unsafe coping techniques. Catastrophic health expenditure ensuing from out-of-pocket (OOP) expenditures residues an important socioeconomic and public health problem, mostly in developing nations.

### 5.2 Recommendations

The study indicated that new and stronger measures for safeguarding poor households from OOP expenses and catastrophic medical expenses are required. The study recommends that the government should expand widespread health coverage, increase health financing, reduce user charges for important service, and easy to access the important medicine to the public hospitals.

### Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## APPENDECES

Appendix1: Correlation Table

| Variables             | (1)           | (2)           | (3)           | (4)           | (5)          | (6)           | (7)          | (8)           | (9)           | (10)         | (11)      |
|-----------------------|---------------|---------------|---------------|---------------|--------------|---------------|--------------|---------------|---------------|--------------|-----------|
| (1) hhsize            | 1.000         |               |               |               |              |               |              |               |               |              |           |
| (2) OOP               | -0.335*<br>** | 1.000         |               |               |              |               |              |               |               |              |           |
| (3) Agehd             | 0.266*<br>**  | -0.243*<br>** | 1.000         |               |              |               |              |               |               |              |           |
| (4) Education_level   | -0.009        | 0.353*<br>**  | -0.070*<br>*  | 1.000         |              |               |              |               |               |              |           |
| (5) Marital status    | -0.236*<br>** | 0.099*<br>**  | -0.052*<br>*  | -0.121*<br>** | 1.000        |               |              |               |               |              |           |
| (6) Locality          | -0.184*<br>** | 0.326*<br>**  | -0.227*<br>** | 0.184*<br>**  | 0.057<br>**  | 1.000         |              |               |               |              |           |
| (7) Gender            | -0.159*<br>** | -0.042*       | 0.084*<br>**  | -0.114*<br>** | 0.418<br>*** | -0.016        | 1.000        |               |               |              |           |
| (8) Wall              | -0.090*<br>** | 0.315*<br>**  | -0.179*<br>** | 0.259*<br>**  | 0.023        | 0.426*<br>**  | -0.053<br>** | 1.000         |               |              |           |
| (9) floor             | -0.115*<br>** | 0.371*<br>**  | -0.193*<br>** | 0.336*<br>**  | -0.006       | 0.520*<br>**  | -0.046<br>*  | 0.559*<br>**  | 1.000         |              |           |
| (10) Water_Rainseason | 0.058*<br>*   | -0.063*<br>*  | 0.057*<br>*   | -0.110*<br>** | 0.011        | -0.246*<br>** | -0.030       | -0.215*<br>** | -0.307*<br>** | 1.000        |           |
| (11) Water_Dryseason  | 0.073*<br>**  | -0.095*<br>** | 0.060*<br>*   | -0.149*<br>** | 0.005        | -0.287*<br>** | -0.011       | -0.246*<br>** | -0.320*<br>** | 0.762<br>*** | 1.00<br>0 |

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ 

Stata Output, 2022