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Factors Influencing Treatment Choices among Patients with Chronic Illness in Tanzania: A Multinomial Logit Analysis

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ABSTRACT

Treatment-seeking behaviour among individuals with chronic illness plays a decisive role in shaping health outcomes and, ultimately, labour productivity in low- and middle-income countries. This study examined the factors influencing treatment choices among individuals with chronic illness in Tanzania. The study employed a non-experimental, cross-sectional research design using secondary data from the 2022 Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS). The analysis focused on 13,723 respondents who reported suffering from a chronic illness and who sought treatment from one of four mutually exclusive sources: health facilities, pharmacies, over-the-counter medicine shops (duka la dawa), and traditional healers. Grounded in the Random Utility Framework, a Multinomial Logit model was estimated to identify the demographic, socioeconomic, behavioural, and access-related determinants of each treatment choice relative to over-the-counter drug shops as the reference category. The results show that household wealth, marital status, sanitation conditions, mobile phone ownership, partner's education, and transportation access significantly predict the choice of formal health facilities, with poorer households significantly less likely to use them. Pharmacy use is shaped primarily by education, partner's occupation, mobile phone ownership, and mobility, while reliance on traditional healers remains significantly associated with urban residence, marital status, household water source, and lower wealth status. Mobility factors, including walking, private car use, and public bus access, significantly influence treatment choice across all three alternatives, underscoring the central role of transportation in shaping healthcare-seeking behaviour. The study concludes that treatment choices among chronically ill individuals in Tanzania are shaped jointly by economic capacity, household composition, physical accessibility, and prevailing sanitation conditions, and it recommends targeted interventions to reduce financial and mobility barriers to formal healthcare, strengthen pharmacy regulation, and integrate traditional healers into referral pathways for chronic disease management.

Keywords: *Treatment choice; chronic illness; Multinomial Logit model; Random Utility Framework; healthcare-seeking behaviour; Tanzania.*

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I. INTRODUCTION

Treatment-seeking behaviour is a central determinant of health outcomes among individuals living with chronic illness, particularly in low- and middle-income countries where healthcare systems remain fragmented and pluralistic (Shayo et al., 2023). In many Sub-Saharan African settings, individuals diagnosed with chronic conditions such as hypertension, diabetes, and chronic respiratory disease can choose from a range of treatment sources, including public and private health facilities, pharmacies, over-the-counter drug shops, and traditional healers, with the choice among these alternatives shaped by a complex interplay of affordability, accessibility, cultural beliefs, and perceived treatment effectiveness (Mburu et al., 2021). Understanding the determinants of these choices is essential, since treatment decisions directly influence disease management, health outcomes, and, ultimately, an individual's capacity to remain economically productive (Joseph & Issa, 2024).

In Tanzania, healthcare-seeking behaviour for chronic illness remains highly heterogeneous. While formal health facilities constitute the primary source of treatment for the majority of the population, a substantial share of individuals continue to rely on pharmacies, informal drug shops, or traditional healers, particularly in rural and low-income settings where formal healthcare services are costly, distant, or perceived as inaccessible (Massito & Hinju, 2025; Sirili et al., 2024). Evidence from Mwanza has shown that a majority of hypertensive patients initially sought treatment from traditional healers due to cultural trust and lower treatment costs (Sundararajan et al., 2023), while other studies show that pharmacies and drug shops often function as accessible, low-bureaucracy alternatives to hospitals for managing chronic conditions such as hypertension and diabetes (Lusasi & Makayula, 2026). This pluralistic treatment-seeking landscape has direct implications for national non-communicable disease (NCD) control strategies, since delayed or inconsistent formal treatment can accelerate disease progression and undermine labour force participation (Ebaidalla & Mustafa Ali, 2022).

Despite the policy relevance of these dynamics, empirical evidence identifying the specific determinants of treatment choice among Tanzanians with chronic illness remains limited, with most existing studies either focused on narrow geographic samples (Mburu et al., 2021; Shayo et al., 2023) or on the economic consequences of treatment delay rather than the determinants of treatment choice itself (Joseph & Issa, 2024; Verjans et al., 2024). Moreover, few studies have applied a nationally representative, multi-alternative discrete-choice framework capable of simultaneously modelling the full range of treatment options available to chronically ill Tanzanians. This study addresses this gap by examining the factors influencing treatment

choices among individuals with chronic illness in Tanzania, using nationally representative data from the 2022 Tanzania Demographic and Health Survey and Malaria Indicator Survey. By applying a Multinomial Logit model grounded in the Random Utility Framework, the study identifies the demographic, socioeconomic, behavioural, and accessibility factors that shape the choice between health facilities, pharmacies, and traditional healers, thereby generating empirical evidence to inform Tanzania's chronic disease management and Universal Health Coverage strategies.

Globally, the burden of chronic, non-communicable illness has shifted decisively toward low- and middle-income countries, where health systems historically organised around acute and infectious disease care are increasingly required to manage long-term conditions that demand sustained, repeated contact with a treatment source. This structural mismatch between health-system design and the chronic, recurring nature of conditions such as hypertension, diabetes, and chronic respiratory illness is particularly acute in Sub-Saharan Africa, where formal facility networks, pharmaceutical regulation, and health insurance coverage remain unevenly developed. Against this backdrop, the treatment source that a chronically ill individual selects at first contact is not a single, isolated decision but often sets the trajectory for how consistently that individual will manage their condition over time, making the determinants of first-source treatment choice a matter of both clinical and economic significance.

Against this background, the present study pursues three specific objectives. First, it seeks to quantify the relative importance of demographic and household characteristics, such as age, gender of household head, marital status, and household composition, in shaping the choice between health facilities, pharmacies, over-the-counter drug shops, and traditional healers among chronically ill Tanzanians. Second, it examines the extent to which socioeconomic and human-capital factors, including household wealth, education, and partner characteristics, condition this choice. Third, it assesses the role of physical accessibility, encompassing sanitation and water infrastructure, mobile phone ownership, distance to the nearest facility, and mode of transport, in either facilitating or constraining access to formal and informal treatment sources. In pursuing these objectives, the study is guided by the overarching research question of how economic capacity, household composition, and physical accessibility jointly shape the treatment-seeking behaviour of individuals living with chronic illness in a pluralistic health system such as Tanzania's.

This study makes three contributions to the literature on healthcare-seeking behaviour in Sub-Saharan Africa. First, whereas much of the existing Tanzanian evidence draws on small, regionally bounded samples (Mburu et al., 2021; Shayo et al., 2023; Sundararajan et al., 2023), this study uses a nationally representative sample of over thirteen thousand chronically ill respondents, allowing the findings to speak to national policy rather than a single district or region. Second, by modelling four mutually exclusive treatment alternatives simultaneously within a single Multinomial Logit framework, the study captures substitution patterns across formal and informal care that binary or two-alternative models cannot represent, since a change in a single covariate, such as household wealth, may simultaneously raise the probability of one alternative while lowering that of another. Third, the study extends the discussion beyond statistical significance to the policy implications of treatment-choice determinants for Tanzania's Universal Health Coverage agenda and its non-communicable disease control strategy, thereby linking individual-level treatment-seeking evidence to system-level policy design.

The remainder of the paper is organised as follows. Section II reviews the relevant literature. Section III presents the theoretical framework underpinning the empirical analysis. Section IV describes the data, sample, and empirical strategy. Section V reports the descriptive and multinomial logit findings. Section VI discusses these findings in relation to the existing literature, and Section VII concludes with policy recommendations and a discussion of the study's limitations.

II. LITERATURE REVIEW

The empirical literature on treatment-seeking behaviour for chronic illness in Sub-Saharan Africa converges on four broad clusters of determinants: economic capacity, health-system accessibility, household and social context, and cultural or behavioural factors. Studies grounded in the economic tradition consistently find that out-of-pocket costs and opportunity costs of time are central barriers to formal care. Massito and Hinju (2025) document that catastrophic and out-of-pocket health expenditure remains widespread in Tanzania, disproportionately affecting poorer households, while Verjans et al. (2024) show that non-medical costs, including transport and lost working time, weigh particularly heavily on rural chronic-disease patients. These findings are consistent with the Health Capital Theory prediction that individuals weigh expected health returns against financial and time costs when selecting a treatment source (Grossman, 1972).

A second strand of literature emphasises accessibility and health-system supply-side factors. Mosha et al. (2025) find that distance and transportation infrastructure are among the strongest predictors of healthcare facility utilisation in both rural and urban Dodoma, while Gething et al. (2021) situate this finding within a broader regional pattern in which geographic access to care remains one of the most binding constraints on healthcare utilisation across low- and middle-income countries. Sirili et al. (2024) similarly report that proximity is a dominant consideration for non-communicable disease patients in rural Tanzania, even when facility quality or range of services is limited. Miyashita et al. (2025) extend this line of enquiry by showing that health-insurance enrolment in rural Tanzania is associated with greater self-care engagement among non-communicable disease patients, suggesting that financial protection mechanisms interact with, rather than substitute for, physical accessibility.

A third strand focuses on household and social context. Hooley et al. (2024) demonstrate that personal social networks help chronically ill patients in Mbeya overcome transport and cost barriers to attend outpatient clinics, pointing to the role of household composition and social capital in sustaining formal treatment-seeking over time, a finding consistent with the positive association between marital status and facility use reported in several Tanzanian studies. Joseph and Issa (2024) and Ebaidalla and Mustafa Ali (2022) extend this household perspective to the labour-market domain, showing that untreated or poorly managed chronic illness reduces labour earnings and participation, thereby linking treatment-choice decisions to broader household economic welfare.

A fourth strand addresses the cultural and behavioural dimension of treatment choice, particularly the continued role of traditional medicine. Sundararajan et al. (2023), applying the Andersen behavioural model in Mwanza, find that a majority of hypertensive patients initially consult traditional healers because of cultural trust and lower cost, while Berhe et al. (2024), in a systematic review spanning Sub-Saharan Africa, conclude that traditional healing retains cultural legitimacy and is often used alongside, rather than instead of, biomedical care. Lusasi and Makayula (2026) reinforce this pattern in Iringa, documenting that non-communicable disease patients frequently combine traditional and modern medicine, while Poli et al. (2025), drawing on comparable evidence from Bangladesh, show that this pattern of medical pluralism in chronic disease management is not unique to the Tanzanian or East African context. Collectively, this literature underscores that the Theory of Planned Behavior's emphasis on attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991) is empirically salient in explaining why treatment choice cannot be reduced to cost and distance alone.

Despite this substantial body of evidence, three gaps remain. First, most Tanzanian studies examine a single treatment alternative in isolation, typically comparing formal facility use against one informal alternative, rather than modelling the full set of mutually exclusive options simultaneously. Second, the existing evidence is drawn predominantly from regionally bounded samples, such as Mwanza (Sundararajan et al., 2023), Mbeya (Hooley et al., 2024), Iringa (Lusasi & Makayula, 2026), and Dodoma (Mosha et al., 2025), limiting the extent to which findings can be generalised nationally. Third, few studies simultaneously incorporate economic, accessibility, household, and cultural determinants within a single econometric framework capable of capturing substitution patterns across all major treatment alternatives available to chronically ill individuals. This study addresses these three gaps directly by applying a nationally representative, four-alternative Multinomial Logit model that jointly incorporates economic, accessibility, household, and behavioural determinants of treatment choice.

III. THEORETICAL MODELLING

This study is grounded in the Random Utility Framework (RUF), which provides the standard microeconomic foundation for modelling discrete choices among mutually exclusive alternatives (Train, 2009). The framework assumes that when faced with a health problem, an individual i selects the treatment alternative that maximises their expected utility among J mutually exclusive options: health facility, pharmacy, over-the-counter drug shop, and traditional healer. The latent utility that individual i derives from treatment alternative j is expressed as:

$$y_{ij}^{*} = X_i'\beta_j + \varepsilon_{ij} \quad \text{..... (1)}$$

where X_i is a vector of individual and household characteristics, including age, gender, wealth status, marital status, education, health insurance coverage, sanitation conditions, mobility, and distance to health facilities; β_j is a vector of alternative-specific parameters; and ε_{ij} is a random disturbance term assumed to follow an independent and identically distributed (i.i.d.) Type I Extreme Value (Gumbel) distribution. The individual is assumed to choose the alternative that provides the highest utility, such that the observed choice y_i corresponds to the alternative j for which y_{ij}^{*} exceeds the utility of all other alternatives.

This choice-theoretic framework is complemented by the Health Capital Theory (Grossman, 1972) and the Theory of Planned Behavior (Ajzen, 1991), which jointly explain why treatment choice is not purely a function of price and distance but also reflects households' health-capital

investment incentives and behavioural predispositions. Health Capital Theory implies that individuals weigh the expected health returns of a treatment option against its financial and time costs, favouring formal healthcare when the marginal benefit to health capital, and therefore future productivity, outweighs the cost of access. The Theory of Planned Behavior adds that this economic calculation is filtered through attitudes toward modern versus traditional medicine, subjective social norms regarding appropriate treatment sources, and perceived behavioural control over access to formal care, factors that are particularly salient in the Tanzanian context where cultural trust in traditional healing coexists with expanding formal healthcare infrastructure (Mburu et al., 2021).

Formally, the evolution of an individual's health capital stock can be represented by the standard Grossman-type accumulation identity:

$$H_{t+1} = (1 - \delta_t)H_t + \mathrm{I_t} \quad \text{..... (2)}$$

where H_t denotes the stock of health capital at time t, δ_t is the biological depreciation rate of that stock, and I_t is the health investment, including formal or informal treatment, undertaken by the individual in period t. Equation (2) formalises the intuition that the treatment source chosen today contributes directly to the health capital available in future periods, so that the treatment-choice decision analysed in this study has consequences that extend beyond the immediate treatment episode.

Similarly, the behavioural dimension introduced by the Theory of Planned Behavior can be represented by the standard behavioural-intention equation:

$$BI_i = w_1 A_i + w_2 SN_i + w_3 PBC_i \quad \text{..... (3)}$$

where BI_i is individual i's behavioural intention to use a given treatment source, A_i captures the individual's attitude toward that source, SN_i represents subjective social norms regarding its appropriateness, and PBC_i denotes perceived behavioural control over accessing it, with w1, w2, and w3 as their relative weights (Ajzen, 1991). Equations (2) and (3) together formalise the economic and behavioural channels through which the covariates in X_i are expected to shift the latent utility defined in equation (1).

Given *J* mutually exclusive treatment alternatives, the probability that individual *i* chooses alternative *j*, conditional on their observed characteristics X_i, is expressed as:

$$P(y_i = j \mid X_i) = \frac{\exp(X_i' \beta_j)}{\sum_{k=1}^{J} \exp(X_i' \beta_k)},\ j = 1, 2, \ldots, J \quad \text{..... (4)}$$

This formulation, which underlies the Multinomial Logit model estimated below, relies on the Independence of Irrelevant Alternatives (IIA) assumption, under which the relative odds of choosing between any two alternatives are independent of the availability or characteristics of other alternatives (Ben-Akiva & Lerman, 1985). The theoretical framework therefore predicts that treatment choice among Tanzanians with chronic illness is jointly determined by economic capacity (wealth, insurance), health-capital investment incentives (education, health status), behavioural and cultural factors (marital status, urban residence), and physical accessibility (distance to facilities, mobility, and sanitation infrastructure as a proxy for living standards).

This IIA property can be stated formally as the ratio of choice probabilities between any two alternatives j and k, which depends only on the attributes and coefficients of those two alternatives:

$$\frac{P(y_i=j|X_i)}{P(y_i=k|X_i)} = exp[X_i'(\beta_j - \beta_k)] \quad (5)$$

Because the right-hand side of equation (5) contains only the coefficients associated with alternatives j and k, the relative odds of choosing a health facility over a pharmacy, for example, do not depend on the characteristics of over-the-counter drug shops or traditional healers, illustrating precisely why the IIA assumption is both a convenient simplification and a testable restriction on the data (Ben-Akiva & Lerman, 1985).

Beyond its role in defining the IIA property, the MNL specification also implies a specific functional form for the marginal effect of a covariate on the predicted probability of alternative j:

$$\frac{\partial P_{ij}}{\partial X_i} = P_{ij}(\beta_j - \beta_R) \quad (6)$$

where β_R denotes a choice-probability-weighted average of the coefficient vectors across all J alternatives. Because this weighted-average term enters equation (6) with a negative sign, the marginal effect of a given covariate on the probability of choosing alternative j can differ in both sign and magnitude from its estimated coefficient β_R reported in Table 2, so that the raw MNL coefficients presented below should be interpreted as relative-risk parameters rather than as direct marginal probability effects.

The three theoretical strands invoked in this study are complementary rather than competing. The Random Utility Framework provides the formal econometric structure linking observed covariates to the probability of each treatment choice; Health Capital Theory (Grossman, 1972)

supplies the underlying economic logic for why individuals invest in one treatment source over another, namely the comparison of expected health returns against financial and time costs; and the Theory of Planned Behavior (Ajzen, 1991) accounts for the non-economic, socially and culturally mediated dimension of treatment choice that a purely cost-based model would not capture. Taken together, these three perspectives justify the inclusion in the empirical model of variables capturing economic capacity (wealth, insurance), health-capital investment incentives (education), behavioural and cultural context (marital status, urban residence), and physical accessibility (distance, mobility, and sanitation), each of which is expected, on theoretical grounds, to shift the relative utility individuals attach to formal facilities, pharmacies, over-the-counter drug shops, and traditional healers.

IV. MATERIALS AND METHODOLOGY

This study employed a non-experimental, cross-sectional research design using secondary data from the 2022 Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS), implemented by the National Bureau of Statistics (NBS) in collaboration with ICF International. The survey used a stratified two-stage cluster sampling design to ensure national representativeness across Tanzania Mainland and Zanzibar. The analysis for this study focused on the sub-sample of 13,723 respondents who reported suffering from a chronic illness and who identified their first source of treatment, drawn from the individual, household, and men's recode files of the survey.

The study employs the Multinomial Logit (MNL) model because individuals with chronic conditions often face distinct and mutually exclusive treatment choices, including 1 = health facility, 2 = pharmacy, 3 = over-the-counter (OTC)/duka la dawa, and 4 = traditional healer. These options represent the first source of treatment sought by respondents and are influenced by a combination of socio-economic, demographic, and access-related characteristics such as income, education, residence, and health insurance coverage. The model is grounded in the Random Utility Framework (RUF), where each individual iii faces J mutually exclusive choices and selects the option that yields the highest expected utility (Train, 2009). The latent utility y_{ij}^{*} associated with treatment option j for individual i is expressed as:

$$y_{ij}^{*} = X`_{i}\beta_{j} + \varepsilon_{ij} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

Where:

- y_{ij}^{*} = latent utility from treatment option j;

- X_i= vector of explanatory variables (e.g., age, education, income, insurance status);
- β_j =vector of parameters to be estimated with treatment option *j*;
- ε_{ij} =random error term assumed to follow an independent and identically distributed (i.i.d.) Type I Extreme Value (Gumbel) distribution.

The observed binary outcome y_i takes the value corresponding to the treatment option that provides the highest utility:

$$y_i = \begin{cases} 1, if\ y_{i1}^* > max\ (y_{i2,}^* y_{i3,}^* y_{i4,}^* y_{i5,}^* \\ 2, if\ y_{i2}^* > max\ (y_{i1,}^* y_{i3,}^* y_{i4,}^* y_{i5,}^* \\ \vdots \\ 4, if\ y_{i4}^* > max\ (y_{i1,}^* y_{i2,}^* y_{i3,}^* \end{cases} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

The probability that individual *i* selects treatment option *j*, conditional on explanatory variables X_i, is specified

$$P(y_i = j \mid X_i) = \frac{\exp(X_i'\beta_j)}{\sum_{k=1}^{J} \exp(X_i'\beta_k)}, j = 1,2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

The random components $\varepsilon_i = (\varepsilon_{i1}, \varepsilon_{i2}, \ldots\ldots, \varepsilon_{iJ})$ are assumed to follow an independent extreme-value distribution with zero mean and constant variance. This implies that the covariance matrix of the error terms is given by:

$$\varepsilon_i \sim IEV(0, \Sigma)\ where\ \Sigma = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (10)$$

The covariance structure indicates that unobserved components of utility across treatment alternatives are independent, consistent with the Independence of Irrelevant Alternatives (IIA) assumption of the Multinomial Logit model. The log-likelihood function (LLF) for the MNL model is expressed as:

$$\ln L(\beta) = \sum_{i=1}^{N} \sum_{j=1}^{J} y_{ij} \ln \left[\frac{\exp(X_i'\beta_j)}{\sum_{k=1}^{J} \exp(X_i'\beta_k)} \right] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (11)$$

where y_i= 1 if individual i chooses alternative j, and 0 otherwise. The parameters β_j are estimated through Maximum Likelihood Estimation (MLE). The Multinomial Logit model is suitable for this study because it efficiently captures the determinants of distinct and non-overlapping treatment choices among individuals with chronic illnesses. It assumes the Independence of Irrelevant Alternatives (IIA), implying that the relative odds of choosing one treatment option over another are independent of the inclusion or characteristics of other alternatives (Ben-Akiva & Lerman, 1985).

The explanatory variables X_i included age and gender of the household head, urban/rural residence, household wealth index, marital status, alcohol consumption, body mass index, health insurance coverage, drinking water source, type of toilet facility, mobile phone ownership, distance to the nearest health facility, partner's education and occupation, number of children under five years, mode of transportation (walking, private car, public bus), and years of education. Estimated coefficients were interpreted relative to the reference treatment category, with positive coefficients indicating a higher relative likelihood of choosing a given alternative over the reference category, and negative coefficients indicating a lower relative likelihood. All estimations were implemented in Stata statistical software.

Variable operationalisation followed standard DHS coding conventions. Household wealth was derived from the DHS wealth index, a composite asset-based measure constructed through principal components analysis of household assets and housing characteristics, and was recoded into wealth quintiles with the poorest and richer categories entered relative to the middle quintile. Marital status was coded as a binary indicator distinguishing currently married or cohabiting respondents from all others. Sanitation was captured through the standard DHS/JMP toilet-facility classification, distinguishing improved flush or sewer connections, improved pit-based facilities such as ventilated improved pit latrines, and unimproved facilities, with the improved flush/sewer category serving as the omitted reference. Drinking-water source was similarly dichotomised into improved and unimproved sources following the WHO/UNICEF Joint Monitoring Programme definitions. Mode of transport was constructed from the reported primary means of reaching a health facility, coded as separate binary indicators for walking, private car use, and public bus use, with other or unspecified means of transport as the omitted category. Years of education entered the model in natural-log form to accommodate its right-skewed distribution and to allow for diminishing marginal effects of additional years of schooling on treatment choice, and body mass index was similarly log-transformed. All continuous and categorical explanatory variables were checked for outliers

and missing values prior to estimation, and cases with missing values on any covariate were excluded from the estimation sample through listwise deletion.

Because household members within the same DHS cluster share unobserved contextual characteristics, such as local facility availability and community norms around treatment-seeking, standard errors were clustered at the primary sampling unit to obtain valid inference in the presence of within-cluster correlation. The validity of the Multinomial Logit specification rests on the Independence of Irrelevant Alternatives assumption discussed in Section III; accordingly, the plausibility of this assumption was assessed qualitatively by examining whether the pattern of coefficients across the health-facility, pharmacy, and traditional-healer equations was consistent with theoretically distinct utility functions for each alternative rather than a single underlying preference dimension. Model fit was evaluated using the likelihood-ratio chi-square test of the full model against the intercept-only model and McFadden's pseudo-R-squared, both of which are standard diagnostics for discrete-choice models estimated by maximum likelihood (Train, 2009).

V. FINDINGS

The finding in Table 1 highlight that from the surveyed households, among the 13,723 respondents who reported a chronic illness, the overwhelming majority sought treatment first at a health facility (94.1%, n = 38,022 across the full illness-treatment distribution reported in the wider survey), while 4.12 percent visited a pharmacy, 1.08 percent relied on over-the-counter drug shops, and 0.67 percent consulted a traditional healer, confirming that formal health facilities remain the dominant treatment source in Tanzania even though a meaningful minority of chronically ill individuals rely on informal or traditional alternatives.

Table 1. Distribution of Treatment Choices among Respondents with Chronic Illness

Treatment Source	Frequency	Percentage
Health facility	38,022	94.10%
Pharmacy	1,665	4.12%
OTC / Duka la dawa (reference)	436	1.08%
Traditional healer	271	0.67%

Source: TDHS-MIS, 2022.

Table 2 presents the Multinomial Logit estimates for the determinants of treatment choice, with over-the-counter drug shops as the reference category. For the choice of visiting a health facility, household wealth is a significant determinant: individuals from the poorest households

are significantly less likely to seek treatment at health facilities (β = -0.3024, p = 0.000), while marital status (β = 0.0561, p = 0.000) and alcohol consumption (β = 0.2123, p = 0.000) are positively associated with health-facility use. Sanitation conditions matter considerably: access to an improved flush or sewer toilet increases the likelihood of visiting a health facility (β = 0.3155, p = 0.017), while improved pit-based (β = -0.3801, p = 0.000) and unimproved toilets (β = -0.4857, p = 0.000) reduce it. Mobile phone ownership (β = 0.1431, p = 0.001) and partner's education, particularly secondary education (β = 0.4753, p = 0.000), also significantly increase the likelihood of formal healthcare use, while partner's occupation (β = -0.1512, p = 0.006) and the presence of children under five years (β = -0.1512, p = 0.006) reduce it.

Table 2. Multinomial Logit Results on the Determinants of Treatment Choice (Reference: OTC/Duka la Dawa)

Variable	(1) Health Facility	(2) Pharmacy	(3) Traditional Healer
Age of household head	0.0002	-0.0016	-0.0066**
Gender of head (Male)	-0.0882	0.0323	-0.2077*
Urban	-0.0703	0.1729	0.1949*
Wealth (Poorest)	-0.3024***	0.1111	-0.2507**
Wealth (Richer)	0.0011	-0.0667	-0.2989***
Marital status (Married)	0.0561***	-0.1093***	0.1014***
Drinking alcohol	0.2123***	-0.0478	-0.1182
Ln(Body mass index)	-0.5784***	-0.5262**	0.3486
Health insurance coverage	-0.0423	0.2027	0.0812
Water source (Improved)	0.0905	-0.1064	0.1787**
Improved flush/sewer toilet	0.3155**	-0.0564	-0.2475
Improved pit-based toilet	-0.3801***	-0.2932	-0.4948***
Unimproved toilet	-0.4857***	-0.2927**	-0.4948***
Owns mobile phone	0.1431***	0.2012***	0.0843
Distance to health facility	-0.0635	-0.1185*	0.0065
Partner – Primary education	0.3443***	0.4602***	0.3528***
Partner – Secondary education	0.4753***	0.4924***	0.3879
Partner – Higher education	0.3773*	0.2687	0.1868
Partner's occupation	-0.1512**	0.7306***	0.5459***
No. of children under 5	-0.1512**	-0.7231***	-0.6596
Walking (transport)	-0.5383***	0.6566***	0.5197***
Private car	0.5776***	0.7461***	0.6656***
Public bus	0.5102***	0.7888***	0.1269
Ln (Years of education)	0.1836***	0.1802***	0.1388***

Variable	(1) Health Facility	(2) Pharmacy	(3) Traditional Healer
Marital status × Children under 5	0.1200***	-0.0610	-0.0036
Constant	6.9158***	2.7999	-3.3857

*Note: Standard errors clustered; reference category = OTC/Duka la dawa. *p<0.10, **p<0.05, ***p<0.01. Observations = 13,723 in each equation. Source: TDHS-MIS, 2022.*

Mobility factors show a consistent and strong influence across all three treatment alternatives. Walking as the primary mode of transport significantly reduces the likelihood of visiting a health facility (β = -0.5383, p = 0.000) but significantly increases the likelihood of visiting a pharmacy (β = 0.6566, p = 0.000) or a traditional healer (β = 0.5197, p = 0.000) relative to over-the-counter drug shops, while access to a private car substantially increases the likelihood of choosing any of the three alternatives over drug shops (health facility β = 0.5776; pharmacy β = 0.7461; traditional healer β = 0.6656; all p < 0.01). Years of education is positively and significantly associated with all three treatment categories relative to drug shops (health facility β = 0.1836; pharmacy β = 0.1802; traditional healer β = 0.1388; all p < 0.01), indicating that more educated individuals are less likely to rely on unregulated over-the-counter medicine as their sole treatment source, regardless of which alternative they ultimately prefer.

For the choice of consulting a traditional healer, age is negatively associated with this alternative (β = -0.0066, p = 0.046), suggesting that younger individuals are relatively more likely to consult traditional healers than older individuals, while urban residence is positively associated with this choice (β = 0.1949, p = 0.061), indicating that traditional healing persists as a treatment option even where formal healthcare infrastructure is more available. Both the poorest (β = -0.2507, p = 0.014) and richer (β = -0.2989, p = 0.009) wealth categories are significantly less likely to consult traditional healers relative to the drug-shop reference category, while marital status increases this likelihood (β = 0.1014, p = 0.000). Improved water source access is positively associated with consulting a traditional healer (β = 0.1787, p = 0.045), while improved pit-based and unimproved toilets are both negatively associated with this choice (both p < 0.01).

With respect to pharmacy use, the pattern of coefficients in column (2) of Table 2 indicates that pharmacies attract a distinct profile of users relative to both health facilities and drug shops. Partner's primary and secondary education are both positively associated with pharmacy use (β = 0.4602 and β = 0.4924 respectively, both p < 0.01), as is partner's occupation (β = 0.7306, p < 0.01) and mobile phone ownership (β = 0.2012, p < 0.01), suggesting that pharmacy

use is concentrated among households with greater economic activity and connectivity. Distance to the nearest health facility is negatively associated with pharmacy use (β = -0.1185, p = 0.078), a counter-intuitive result at first glance given that pharmacies are often assumed to substitute for distant facilities; however, this pattern is consistent with pharmacies clustering geographically alongside formal health infrastructure rather than filling gaps in the most remote areas, so that greater distance from a facility also implies reduced proximity to a pharmacy. The number of children under five is strongly negatively associated with pharmacy use (β = -0.7231, p < 0.01), the largest such effect observed in the pharmacy equation, reinforcing the earlier observation that households with young children appear to favour the closer clinical supervision associated with formal facilities over self-directed pharmacy purchases. Health insurance coverage, by contrast, was not a statistically significant predictor of treatment choice in any of the three equations, suggesting that, within this sample, insurance status alone does not strongly differentiate where chronically ill Tanzanians first seek treatment, net of wealth and other covariates.

Taken jointly across the three equations, the overall model performed as expected for a discrete-choice specification of this size and complexity: with thirteen thousand seven hundred and twenty-three observations and the large number of covariates found to be statistically significant at conventional levels across all three alternatives, the model was jointly significant relative to the null, intercept-only model on a likelihood-ratio basis, indicating that the included demographic, socioeconomic, behavioural, and access-related covariates collectively explain a meaningful share of the variation in treatment choice among chronically ill respondents beyond what would be expected from the unconditional distribution of choices reported in Table 1.

VI. DISCUSSION

Determinants of Choosing a Health Facility

The finding that poorer households are significantly less likely to seek treatment at formal health facilities confirms the persistent role of economic barriers in shaping healthcare utilisation among chronically ill Tanzanians. This is consistent with Verjans et al. (2024), who found that patients with chronic illness in rural Tanzania face substantial non-medical and opportunity costs, including transportation expenses and lost working time, when accessing formal healthcare, discouraging frequent facility visits among low-income households. The positive effect of marital status on health-facility use aligns with the view that spousal support provides financial, emotional, and informational resources that facilitate formal healthcare

utilisation, while the role of continuous facility-based interaction in chronic disease management is reinforced by Hooley et al. (2024), who demonstrated that personal social networks help patients in Mbeya overcome transportation and cost barriers to attend outpatient clinics regularly. The strong positive effect of transportation access, evidenced by the large coefficients on private car and public bus use, corroborates Mosha et al. (2025), who found that distance and transportation access remain among the strongest predictors of healthcare facility utilisation in both rural and urban Dodoma, and Sirili et al. (2024), who reported that a majority of NCD patients in rural Tanzania rely on nearby facilities primarily because of proximity.

Taken together, these findings suggest that the barriers to formal health-facility use among chronically ill Tanzanians are only partly financial. Even after accounting for household wealth, sanitation and transportation continue to exert large, independent effects, implying that physical and infrastructural access, rather than affordability alone, constitutes a distinct and policy-actionable barrier to formal care. This has direct implications for chronic disease management specifically, since conditions such as hypertension and diabetes require repeated, ongoing contact with a treatment source rather than a single episodic visit, so that any structural barrier to facility access is likely to compound over the course of an individual's illness trajectory.

Determinants of Choosing a Pharmacy

Pharmacies emerge as an accessible and convenient intermediate treatment option, particularly for individuals seeking medication without the administrative procedures associated with formal facilities. This pattern is consistent with Mburu et al. (2021), who found that pharmacies frequently function as a first point of healthcare contact in Tanzania due to their convenience and reduced bureaucratic burden, and with Sundararajan et al. (2023), who identified pharmacies and drug shops as a common alternative source of hypertension treatment in Mwanza. The positive and significant effect of education on pharmacy use aligns with Kankeu et al. (2013), who found that better-educated individuals are more likely to use pharmacies and private providers because of greater awareness of treatment alternatives, while the strong positive effect of partner's occupation suggests that economically active households may prioritise the speed and convenience pharmacies offer over the longer waiting times associated with formal facilities. The negative association between the presence of young children and pharmacy use, by contrast, suggests that households with infants may favour the greater clinical

oversight of formal health facilities, a pattern consistent with the safety-conscious healthcare behaviour typically observed among caregivers of young children.

An additional implication of these results concerns pharmacy regulation. Because pharmacies operate with considerably less clinical oversight than formal health facilities, their growing role as a first-contact treatment source for chronic illness, particularly among economically active and better-connected households, raises the possibility that chronic conditions requiring ongoing monitoring, such as hypertension and diabetes, may be managed through repeated self-directed pharmacy purchases without formal diagnosis, follow-up, or referral. This risk underscores the importance of strengthening linkages between community pharmacies and the formal referral system, consistent with recommendations elsewhere in the regional literature on pharmacy-based chronic disease management (Kankeu et al., 2013).

Determinants of Consulting a Traditional Healer

The persistence of traditional healing as a treatment option, even among urban residents, reflects the deep cultural legitimacy of traditional medicine within Tanzanian and broader Sub-Saharan African healthcare-seeking behaviour. This finding is strongly supported by Sundararajan et al. (2023), who found that more than seventy percent of hypertensive patients in Mwanza initially sought treatment from traditional healers due to cultural trust, accessibility, and lower costs, and by Berhe et al. (2024), whose systematic review across Sub-Saharan Africa concluded that traditional healing practices remain widely used because of their cultural legitimacy and perceived complementarity with biomedical care. The finding that both the poorest and richer wealth categories are less likely than the reference group to consult traditional healers, combined with the positive effect of marital status, suggests that traditional healing in Tanzania functions less as a last-resort option for the poor and more as a culturally embedded practice shaped by household and family belief systems, a pattern also identified by Lusasi and Makayula (2026) in Iringa, where non-communicable disease patients frequently combine traditional medicine with biomedical treatment rather than substituting one for the other. Similarly, Poli et al. (2025) found that many chronic disease patients integrate traditional and modern medicine when managing long-term conditions, reinforcing the pluralistic nature of healthcare-seeking behaviour documented in this study.

These results also carry implications for how policymakers conceptualise the relationship between traditional and formal medicine in Tanzania. Rather than treating traditional healing purely as a barrier to be displaced by expanding formal healthcare access, the evidence

presented here, echoing Lusasi and Makayula (2026) and Poli et al. (2025), points toward a model of medical pluralism in which formal and traditional care coexist and are, in many households, used in combination. This suggests that policy interventions seeking to improve chronic disease outcomes may achieve more by formally engaging traditional healers as referral partners than by attempting to discourage their use outright, particularly given the continued cultural legitimacy traditional medicine retains even among urban and married respondents in this sample.

The Central Role of Mobility and Human Capital

Across all three treatment alternatives, mobility and education emerge as consistently significant determinants, underscoring their centrality to treatment-seeking behaviour among chronically ill Tanzanians regardless of which formal or informal option is ultimately chosen. The strong effects of private car and public bus access are consistent with Mosha et al. (2025) and Gething et al. (2021), both of whom emphasise that transportation infrastructure remains one of the most binding constraints on healthcare access in low- and middle-income settings. The consistently positive effect of education across all alternatives relative to unregulated over-the-counter drug shops supports the view that education improves health literacy and reduces reliance on unsupervised self-medication, consistent with Hou et al. (2024), who found that patient awareness and health knowledge significantly shape treatment decision-making. Taken together, these findings suggest that improving physical accessibility and educational attainment would shift treatment-seeking behaviour away from unregulated self-medication toward more clinically supervised alternatives, whether formal or traditional.

An important nuance in these mobility findings is that walking operates in the opposite direction to private car and public bus access: walking reduces the likelihood of choosing a health facility while increasing the likelihood of choosing a pharmacy or traditional healer, relative to drug shops. This asymmetry is consistent with walking serving as a proxy for both physical proximity to informal treatment sources, which are typically more evenly distributed within communities than formal facilities, and for lower household resources more generally, reinforcing the broader pattern whereby resource-constrained households gravitate toward the treatment sources that are most immediately accessible on foot rather than those requiring motorised transport.

Limitations of the Study

This study has several limitations that should be considered when interpreting its findings. First, the TDHS-MIS is a cross-sectional survey, so the associations reported here should be interpreted as correlational rather than causal; longitudinal or panel data would be required to establish the temporal ordering between, for example, household wealth accumulation and treatment-seeking behaviour. Second, the chronic-illness and treatment-choice variables are based on respondent self-report, which may be subject to recall bias, differential reporting of illness across socioeconomic groups, or under-reporting of conditions that carry social stigma. Third, the Multinomial Logit specification relies on the Independence of Irrelevant Alternatives assumption, and while the pattern of coefficients across equations is broadly consistent with theoretically distinct utility functions for each alternative, the study did not implement a formal Hausman-McFadden test of this assumption, and future work using nested or mixed logit specifications could relax this restriction directly. Fourth, the analysis is limited to the first reported source of treatment and does not capture subsequent treatment-seeking episodes, including switching between formal and informal sources over the course of managing a chronic illness, a dynamic that Lusasi and Makayula (2026) suggest is common in the Tanzanian context. Finally, while the model controls for a wide range of demographic, socioeconomic, behavioural, and access-related covariates, unobserved factors such as individual health beliefs, prior experiences with specific treatment sources, and local availability of specific providers could not be directly measured with the available survey data and may contribute to residual variation in treatment choice not captured by the model. These limitations notwithstanding, the use of a large, nationally representative sample and a theoretically grounded discrete-choice framework provides a robust basis for the policy conclusions drawn in Section VII.

VII. CONCLUSION AND RECOMMENDATIONS

This study examined the factors influencing treatment choices among individuals with chronic illness in Tanzania using a Multinomial Logit model applied to nationally representative data from the 2022 Tanzania Demographic and Health Survey and Malaria Indicator Survey. The findings show that treatment-seeking behaviour among chronically ill Tanzanians is shaped by a combination of economic capacity, household composition, sanitation conditions, mobility, and education. Poorer households are significantly less likely to access formal health facilities, while pharmacies serve as an accessible intermediate option favoured by more educated and economically active households. Traditional healers continue to play a culturally embedded

role in treatment-seeking behaviour, particularly among married individuals and urban residents, rather than functioning purely as a last-resort option for the poorest households. Mobility and education consistently shape treatment choice across all alternatives, highlighting their foundational role in determining how chronically ill individuals navigate Tanzania's pluralistic healthcare system.

Based on these findings, the study offers five policy recommendations. First, the Ministry of Health should strengthen financial protection mechanisms, including the continued expansion of the improved Community Health Fund (iCHF) and progress toward Universal Health Insurance, to reduce the financial barriers that currently prevent poorer households from accessing formal health facilities. Because wealth remained a significant predictor of facility use even after controlling for insurance coverage, financial protection measures should be designed to reduce both direct treatment costs and the indirect, non-medical costs of accessing care, such as transport, identified by Verjans et al. (2024) as a major barrier facing rural chronic-disease patients.

Second, given the strong and consistent effect of transportation access on treatment choice across all three alternatives, investment in rural road networks and public transportation should be prioritised alongside the expansion of health-facility infrastructure. Because walking was associated with lower health-facility use but higher reliance on pharmacies and traditional healers, closing this accessibility gap is likely to shift treatment-seeking behaviour toward more clinically supervised formal care, particularly in the rural and peri-urban areas where mobility constraints are most binding.

Third, pharmacy regulation should be strengthened to ensure that the growing reliance on pharmacies as an intermediate treatment source, particularly among economically active and better-connected households, is accompanied by appropriate clinical oversight and clear referral mechanisms to formal care when a chronic condition requires ongoing monitoring rather than one-off symptomatic treatment.

Fourth, given the continued cultural relevance of traditional healing documented in this and prior studies (Sundararajan et al., 2023; Berhe et al., 2024; Lusasi & Makayula, 2026), policymakers should consider formally integrating traditional healers into community-based referral pathways for chronic disease management. Structured referral training for traditional healers, focused on recognising danger signs and facilitating timely referral to formal facilities,

would allow the health system to engage constructively with existing patterns of medical pluralism rather than treating traditional healing purely as a competing or last-resort option.

Finally, continued investment in education and health literacy programmes would support more informed treatment-seeking behaviour and reduce reliance on unsupervised self-medication through over-the-counter drug shops, consistent with the consistently positive association between years of education and the use of all three alternatives relative to unregulated drug shops observed in this study. Such programmes should be targeted particularly at households with lower educational attainment and limited mobile-phone connectivity, both of which were independently associated with reduced use of formal and semi-formal treatment sources.

Future research building on this study could usefully explore two directions. First, panel or longitudinal data tracking chronically ill individuals across multiple treatment episodes would allow researchers to examine whether the determinants identified here also predict switching between treatment sources over the course of an illness, rather than only the initial choice captured in this cross-sectional analysis. Second, qualitative research exploring the specific mechanisms underlying the persistence of traditional healing among married and urban respondents, net of wealth, would help clarify whether this reflects household decision-making dynamics, perceived treatment efficacy, or social norms, and would thereby sharpen the design of referral-pathway interventions proposed above. Overall, this study underscores that improving treatment outcomes for chronic illness in Tanzania requires a multi-pronged policy response that addresses financial protection, physical accessibility, pharmacy oversight, and the formal integration of traditional healers, rather than any single intervention in isolation.

Statement and Declarations
Funding: No funds were received to undertake this study.
Declarations
Ethical Approval
This study utilized secondary data from the 2022 Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS). The original survey was conducted in accordance with national ethical and research standards governing data collection involving human participants. Since the study relied exclusively on anonymized secondary data with no direct interaction with respondents, additional ethical approval was not required for the present analysis.
Consent to Participate
Informed consent was obtained from all participants by the 2022 Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS) survey implementing team prior to data collection.

Consent to Publish
Not applicable. The manuscript does not contain any individual person's data, images, or identifiable information requiring consent for publication.
Data Availability Statement: The primary data used in this study are publicly available the 2022 Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS). The final processed dataset generated and analyzed during the current study is available from the corresponding author upon reasonable request.
Conflicts of Interest: The authors have no conflicts of interest to declare.

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