



Economic Evaluation and Accessibility of Healthcare Services in the Beni Health Zone, Eastern Democratic Republic of the Congo

Kambale Kirere Justin^{1*}, Paluku Kamboyera Angelus¹, Kahambu Kagheni Elizabeth¹, Zawadi Kitambala Consolé², Kambale Kasemengo Alpha², Masika Kombi Immaculé², Kambale Bakalania Delvaux³, Mbusa Tsongo Fidèle⁴, Kambale Munyambete Jerome⁴, Mwira Musimbulwa Robert⁴, Byaruhanga Ngbape Olivier⁵ and Muhindo Kiyora Eric⁶

¹Auditors enrolled in Master, Public Health, Management of Systems, Health Policies and Services, Doctoral School of Health Sciences, Catholic University of Graben (UCG), Democratic Republic of the Congo

²Auditors enrolled in Master, Public Health, Maternal and Child Health, Doctoral School of Health Sciences, Catholic University of Graben (UCG), Democratic Republic of the Congo

³Auditor enrolled in Master, Public Health, Health, Environment, Doctoral School of Health Sciences, Catholic University of Graben (UCG), Democratic Republic of the Congo

⁴Auditors enrolled in Master, Public Health, Epidemiology, Doctoral School of Health Sciences, Catholic University of Graben (UCG), Democratic Republic of the Congo

⁵Professor and Doctor in Community Health and Development, specializing in Project Management; full-time faculty member at ULPGL Goma, Democratic Republic of the Congo

⁶Assistant at the Higher Institute of Medical Techniques in Mangin, Democratic Republic of the Congo

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Abstract

In the Democratic Republic of the Congo, the predominance of out-of-pocket household payments, weak financial protection mechanisms, and inadequacies in healthcare supply limit access to health services. In the Beni Health Zone, these constraints are further aggravated by structural poverty and security instability. This study aimed to assess the economic situation and the level of accessibility of healthcare services in the Beni Health Zone.

A cross-sectional analytical study with a quantitative approach, integrating an economic evaluation, was conducted among 398 households selected through stratified probabilistic sampling. Data were collected using a structured questionnaire and document review, and analyzed using SPSS version 20. Descriptive statistics and logistic regression analyses were performed to identify factors associated with non-utilization of healthcare services and self-medication.

The findings revealed that 71.8% of households had monthly incomes below USD 200, with a substantial share of income allocated to healthcare expenditures. The main coping strategies included borrowing, selling assets, and reducing food expenses. Healthcare supply was characterized by low health insurance coverage, shortages of healthcare personnel, and frequent stock-outs of essential medicines. Financial constraints were

significantly associated with non-utilization of healthcare services ($OR = 0.281$; $p < 0.001$), while self-medication was strongly associated with high healthcare costs and family practices.

The study highlights limited financial accessibility and a high economic burden of healthcare in the Beni Health Zone. Strengthening financial protection mechanisms, improving healthcare supply, and regulating self-medication are essential to enhance equity and efficiency within the local health system.

***Corresponding author:** Kambale Kirere Justin, Auditors enrolled in Master I, Public Health, Management of Systems, Health Policies and Services, Doctoral School of Health Sciences, Catholic University of Gabon (UCG), Democratic Republic of the Congo.

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Introduction

Equitable access to quality, affordable, and efficient health services is a central pillar of health systems and a major objective of Universal Health Coverage (UHC) promoted by the World Health Organization. However, in many low- and middle-income countries, healthcare financing remains largely dominated by out-of-pocket (OOP) payments, exposing populations to catastrophic health expenditures and an increased risk of impoverishment.

Globally, analysis by Wagstaff, Eozenou, and Smits in 146 countries shows that out-of-pocket (OOP) healthcare expenditures are strongly associated with impoverishing health spending, particularly among the most vulnerable socioeconomic groups, while systems based on insurance or public financing mechanisms offer significantly greater financial protection. In sub-Saharan Africa, over 70% of health expenditures are still borne directly by households, which encourages foregoing care, delaying access to services, and resorting to negative coping strategies such as debt or selling assets [1]. Empirical studies conducted in the region confirm the extent of these constraints. In Cameroon, Owoundi reports that 68% of households spend more than half of their income on healthcare, with marked inequalities according to socioeconomic status [2]. In Uganda, Ruhweza et al. (2009) show that direct payments persist despite the official abolition of user fees, revealing a significant gap between free healthcare policies and their actual implementation.

However, access to healthcare is not limited to financial considerations. It results from a complex interaction between the supply and demand for care. Supply depends in particular on the availability of healthcare infrastructure, qualified human resources, essential medicines, and the quality of services, while demand is influenced by income level, education, perceptions of the quality of care, and trust in the healthcare system. Research conducted in India, Africa, and Oceania shows that poor perceived quality of care, long waiting times, and geographical remoteness are major determinants of non-use of healthcare services, regardless of their formal availability Adewuyi et al., 2017; Maviso et al., 2025) [3].

In African contexts, these structural constraints foster the development of pluralistic healthcare practices, including the use of self-medication and traditional medicine. These practices are generally driven by the high cost of formal care, the proximity of informal alternatives, family habits, and low trust in modern healthcare systems [4,5]. They reflect persistent imbalances between the supply and demand for healthcare and contribute to widening inequalities in access.

In the Democratic Republic of Congo (DRC), the health system is characterized by limited coverage of financial protection mechanisms, an insufficient supply of care, and significant geographical disparities. Several studies highlight the decisive influence of the cost of care and the low coverage of health insurance schemes on the use

of formal services. In Lubumbashi, Tshimba (2016) shows that nearly 58% of households identify the high cost of care as the main reason for not using services. In Lukonga, Olombe et al. (2024) report limited financial access to curative care at 38.5%, while in Goma, Namegabe and Simweray et al. (2025) indicate that self-medication is the primary recourse for a large proportion of the population [6].

These difficulties are compounded by the limited availability of healthcare services. Studies conducted in Bukavu and Bamako highlight shortcomings in human resources, frequent stockouts of essential medicines, prolonged waiting times, and poor adherence of prescriptions to national standards, compromising the performance of healthcare services and discouraging their use (Traoré, 2007) [7]. These dysfunctions have major economic and social consequences for households. In this regard, Alamgir et al. (2010) showed that a single episode of pediatric hospitalization in Bangladesh can lead to lasting impoverishment, forcing households to adopt negative coping strategies.

Despite the abundance of studies on health expenditure and service utilization in the DRC, few adopt an integrated approach combining the economic evaluation of health services, the analysis of supply and demand imbalances, and the examination of disparities in access within the health zone. In the Beni Health Zone, characterized by persistent insecurity, structural poverty, and high pressure on the health system, empirical data on the cost-effectiveness of services, financing mechanisms, and inequalities in access remain limited.

In this context, the present study aims to assess the economic situation and the level of accessibility of health care services in the Beni Health Zone, in order to provide evidence that can guide public policies and health interventions towards improving the equity, efficiency and sustainability of the local health system.

Materials and Methods

Presentation of the Study Environment

This study was conducted in the Beni Urban Health Zone (HZ), located in North Kivu Province, Democratic Republic of Congo. Established in 1985 as part of the implementation of primary healthcare,

the Beni HZ covers an area of approximately 1,156 km² and includes the entire city of Beni as well as part of the surrounding territory. It is bordered by the Mutwanga HZ to the east, the Mabalako HZ to the west, the Oicha HZ to the north, and the Kalunguta HZ to the south.

In 2025, the Beni Health Zone had an estimated population of 612,882 inhabitants, distributed across 24 health areas, with a predominantly young demographic structure influenced by rural exodus due to insecurity. The healthcare system includes a general referral hospital, hospital centers, public and private primary care facilities, as well as a significant network of private healthcare establishments, elements analyzed in the tables relating to service provision and its spatial distribution.

The socioeconomic context is characterized by a predominance of informal activities, a reliance on agriculture and small-scale trade, and low household income levels, consistent with the results presented in the tables on income, healthcare financing, and health expenditures. Structural constraints, including limited access to safe drinking water and sanitation, as well as the high prevalence of preventable diseases, are key factors influencing the financial and geographical accessibility to health services analyzed in this study.

Type of Study

This was a cross-sectional, analytical observational study with a quantitative approach, incorporating an economic evaluation component of the direct and indirect healthcare costs borne by households. It is observational because no intervention is introduced by the researcher. The researcher observes and measures without altering the context. It is analytical because it analyzes statistical associations. It is cross-sectional because the results describe a snapshot of the households' situation at the time of the survey.

Study Population and Sample

The study population consisted of all households residing in the Beni health zone who had experienced at least one episode of healthcare need in the recent period preceding the survey. The statistical unit of the study was the household, and the interviewee was the head of household or another responsible adult able to provide reliable information on household income, healthcare expenditures, financing strategies, healthcare utilization, and self-medication.

The sample size was determined using Slovin's formula, which is used when the population size is known:

$$n = \frac{N}{1 + N(e)^2}$$

Legend

n = Sample size

N = Population size

e = margin of error, which is 0.05

Therefore, $n = 100504 / 1 + 100504(0.05)^2 = 398.5 \approx 399$ respondents. In practice, 398 households were actually surveyed.

Sampling Technique

Stratified probability sampling was used, with the 24 health areas of the Beni health zone constituting the strata. The sample size (n = 398 households) was distributed proportionally to the number of households in each health area, based on a uniform sampling rate of 0.396% applied to the 100,504 households in the zone. Within each health area, households were randomly selected from local lists or, failing that, after a rapid count. In each household, only one respondent was interviewed, preferably the head of household or, failing that, an adult knowledgeable about healthcare expenditures and usage. Absences or refusals were replaced according to the same selection principle.

Data Collection Techniques and Tools

For this study, two main techniques were used. The first was a structured interview using a questionnaire, administered face-to-face to the 398 households surveyed. This allowed for the collection of data on household income and its share allocated to health, the main contributors to healthcare financing, strategies adopted to cope with high expenses, use of health services, reliance on self-medication or traditional medicine, as well as the direct and opportunity costs of care. The second technique is the literature review, used to collect secondary data on the supply of health services. It made it possible to supplement and triangulate the information from the surveys. The tools used included a structured questionnaire for interviews and a document extraction grid for secondary data. The tools were pre-tested, and the interviewers were trained to ensure data clarity, consistency, and confidentiality.

Operational Definitions of Variables

In this study, variables were defined operationally to analyze the financing, accessibility, and use of health services in the Beni Health Zone.

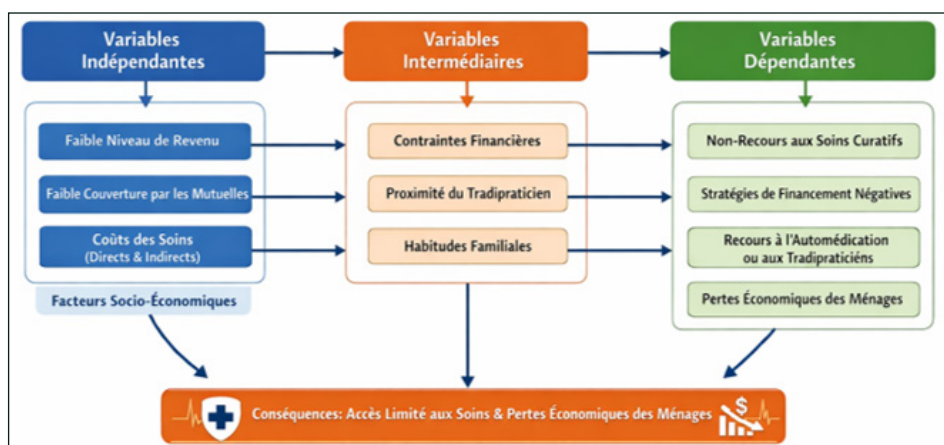


Figure 1: Conceptual and Operational Framework of the Study

Socioeconomic variables included monthly household income, expressed in US dollars (USD) and categorized into five brackets (<100, 100–199, 200–299, 300–399, and ≥400 USD), as well as the proportion of income spent on healthcare over the past 30 days, categorized into brackets (0–9, 10–29, 30–49, 50–99, and ≥100

USD). The main contributors to healthcare costs were identified (head of household, spouse, children, extended family). Coping strategies for high healthcare expenses included borrowing from relatives, selling assets, reducing food expenditures, using savings, postponing or foregoing care, and delaying other essential expenses.

The variables relating to the supply of health services included coverage by health insurance funds (<20%), the proportion of cost reduction of care offered by these funds (10–30%), the number of beds per 1,000 inhabitants (1–3), the ratio of doctors and nurses per 10,000 inhabitants (<1 doctor and <5 nurses), the availability of essential medicines (50–80%), the number of days of stock shortage (>15 days) and the rate of attendance at health services (0.5–1%).

Variables related to healthcare demand and practices included the use of curative care, measured as a binary variable (yes/no). Reasons for non-use were grouped into financial, geographic, cultural, and organizational factors. The use of self-medication or traditional medicine was assessed based on various practices, including the use of medications stored at home, advice from a friend or neighbor, purchasing medications from a pharmacy without a prescription, purchasing from informal vendors, or using traditional remedies. Associated reasons included the high cost of care, distance from healthcare facilities, family or personal habits, previous negative experiences, proximity to traditional healers, cultural beliefs, and perceived effectiveness of treatments.

The economic variables included the direct costs of care, such as consultation fees, medications, tests, transportation, hospitalization, access to care card fees, and food for the accompanying person. The indirect or opportunity cost corresponded to the time spent seeking care (travel to the facility, waiting and receiving care, and return journey). Missed activities and lost income were documented according to the type of activity interrupted, including agriculture, trade, day labor, wage employment, and transportation.

Potential Sources of Bias and Control Strategies

Data on household income, healthcare spending, and financing strategies were based on self-reported data, making the study susceptible to recall bias,

particularly for spending over the past 30 days, as well as social desirability bias. To mitigate these biases, the questionnaire was structured around predefined income and spending brackets, and interviewers were trained to rephrase and clarify questions while ensuring the confidentiality of responses.

Information regarding the use of curative care and self-medication could be influenced by individual perceptions of the effectiveness of care, recollection of recent events, and cultural or familial norms. To reduce these biases, specific questions focusing on recent practices and clearly defined motives were used.

Data relating to the provision of health services (health insurance coverage, staff availability, number of beds, medication availability, and attendance rates) may have contained inaccuracies due to discrepancies in record updates. This information was systematically verified and cross-checked using several sources, including health zone records and field surveys.

To limit confounding biases in the analysis of factors associated with the use of self-medication and traditional medicine, a multivariate logistic regression was performed. This approach made it possible to estimate the individual effect of each factor (cost of care, distance to healthcare facilities, family habits, cultural beliefs, perceived effectiveness), while controlling for the simultaneous influence of other variables.

Finally, a selection bias linked to the absence of certain households, particularly the most isolated, was mitigated by carrying out repeated visits and, if this was not possible, by replacing them with a neighboring household according to standardized procedures.

Statistical Analysis and Processing of Data

The collected data were coded, entered and analyzed using SPSS version 20 software. Quantitative variables, such as household income, direct care costs and time spent seeking care, were summarized using means and standard deviations, while qualitative variables were presented as frequencies and percentages.

This descriptive analysis allowed us to characterize the socio-economic profile of households, healthcare financing mechanisms, the supply and demand for health services in the Beni Health Zone, as well as the practices

of self-medication and traditional medicine. Binary logistic regressions were then performed to identify factors associated with self-medication, estimating odds ratios, their 95% confidence intervals, and levels of statistical significance.

Furthermore, the economic analysis incorporated both the direct costs of care and the opportunity cost, estimated from the time spent seeking care and the losses in economic activity. This combined approach provided a comprehensive understanding of the financing, accessibility, and economic impact of healthcare on households.

Results

Financing and Cost of Healthcare in the Household Average Monthly Household Income

Table 1 shows that the majority of households fall into the lower income brackets, with 43.2% having a monthly income between USD 100 and USD 199 and 28.6% below USD 100. Middle-income households represent 17.6% in the USD 200–299 bracket and 7.5% in the USD 300–399 bracket, while only 3.0% report a monthly income of USD 400 or more.

Table 1: Average Monthly Household Income

Average monthly income	Staff	Percentage
Less than 100 USD	114	28.6
100 – 199 USD	172	43.2
200 – 299 USD	70	17.6
300 – 399 USD	30	7.5
\$400 USD and up	12	3
Total	398	100

Household Income Allocated to Health in the 30 Days Prior to the Survey

Table 2 shows that the share of household income spent on health over the past 30 days varies considerably. The \$30–\$49 range accounts for the majority of households (31.2%), while 24.9% allocate between \$10 and \$29 and another 24.9% between \$50 and \$99. A minority of households spend very little (\$0–\$9, 9.0%) or more than \$100 (\$100–\$9, 9.8%).

Table 2: Household Income Allocated to Health in the 30 Days Prior to the Survey

Household income allocated to health	Staff	Percentage
30 – 49 USD	124	31
0 – 9 USD	36	9
10 – 29 USD	99	25
50 – 99 USD	99	25
\$100 USD and up	40	9.8
Total	398	100

People Contributing the Most to Household Healthcare Funding

Table 3 shows that the financing of care within households is mainly provided by the head of household, representing 70.9% of contributions, while children and the extended family contribute less, respectively 8.0% and 3.8%.

Table 3: Individuals Contributing the most to Healthcare Funding in the Households

Contributors	Staff	Percentage
Head of household	282	70.9
Children	32	8
Extended family	15	3.8
Total	398	100

Financing Strategies in the Face of High Healthcare Spending

Table 4 highlights the strategies adopted by households in response to high healthcare expenses. Borrowing from relatives is the most frequent strategy (62.3%), followed by selling assets (45.7%) and reducing food spending (43.7%). Using savings is employed by 41.5% of households, while 27.1% report having postponed or abandoned medical care. Conversely, a small proportion of households (5.5%) employ no strategy.

Table 4: Financing Strategies in the Face of High Health Expenditures

Funding strategies	Number of employees (n=398)	Percentage
Borrowing from relatives	248	62.3
Sale of goods	182	45.7
Reduction in food spending	174	43.7
Postponement or abandonment of care	108	27.1
Use of savings	165	41.5
Delay other major expenses	145	36.4
No strategy	22	5.5

Health Service Offerings

Table 5 presents the overall supply of health services in the Beni area, which is insufficient. The rate of health insurance coverage is low (<20 %), while the reduction in the cost of care by mutual insurance is average (10–30 %). Infrastructure is limited : 1-3 beds per 1 000 inhabitants and availability of essential medicines between 50 and 80 %, with stock shortages lasting more than 15 days. The staffing shortage is critical, with fewer than 1 doctor and fewer than 5 nurses for every 10 000 inhabitants, and the service utilization rate remains average (0.5 – 1 %).

Table 5: Health Service Supply

Indicators	Results	Performance level
Health insurance coverage rates	<20%	Weak
Reducing healthcare costs through health insurance	10–30%	AVERAGE
Number of beds / 1,000 inhabitants	1–3	AVERAGE
Doctors per 10,000 inhabitants ratio	<1	Weak
Nurses per 10,000 inhabitants ratio	<5	Weak
Availability of essential medicines	50–80%	AVERAGE
Number of days out of stock	>15	Weak
Health service utilization rates	0.5–1%	AVERAGE

Interpretation Criterion:

- Health insurance coverage rate: Low (<20%); Medium (20–50%); Satisfactory (>50%)
- Reduction in healthcare costs: Low (<10%); Medium (10–30%); Satisfactory (>30%)
- Number of beds per 1,000 inhabitants : Low (<1); Medium (1–3); Satisfactory (>3)
- Doctors per 10,000 inhabitants ratio: Low (<1); Medium (1–5); Satisfactory (>5)
- Nurses per 10,000 inhabitants: Low (<5); Medium (5–15); Satisfactory (>15)
- Availability of essential medicines: Low (<50%); Medium (50–80%); Satisfactory (>80%)
- Number of days out of stock: Low (>15); Medium (5–15); Satisfactory (<5)
- Health service utilization rates: Low (<0.5); Medium (0.5–1); Satisfactory (>1)

Request for Health Services

Reasons for not Seeking Curative Care

Table 6 shows that financial constraints are the main reason for not seeking curative care. Among households facing financial difficulties, 46.2% did not seek care compared to 53.8% who did, with a statistically significant association (OR = 0.281; 95% CI [0.158–0.499]; p = 0.000). Regarding geographical, cultural, and organizational factors, no statistically significant association was observed with healthcare utilization. The proportions of utilization and non-utilization remained relatively similar, with p-values of 0.694, 0.246, and 0.952, respectively.

Table 6: Reasons for not Seeking Care

Main reasons		Access to curative healthcare		GOLD	IC [95%]	p-value
		No	Yes			
Financial	Yes	150 (46.2%)	175 (53.8%)	0.281	[.158 .499]	0
	No	55 (75.3%)	18 (24.7%)			
Geographical	Yes	179 (51.1%)	171 (48.9%)	0.886	[.484 1.622]	0.694
	No	26 (54.2%)	22 (45.8%)			
Cultural	Yes	164 (50.2%)	163 (49.8%)	0.736	[.438 1.236]	0.246
	No	41 (57.7%)	30 (42.3%)			
Organizational	Yes	203 (51.5%)	191 (48.5%)	1.063	[.148 7.620]	0.952
	No	2 (50.0%)	2 (50.0%)			

Use of Self-Medication or Traditional Medicine

Table 7 highlights a strong association between the use of self-medication or traditional medicine and the different types of practices studied. The use of leftover medications at home is largely associated with self-medication, with 93.6% of respondents reporting using them versus 6.4% not doing so (OR = 17.698; 95% CI [9.436–33.192]; $p = 0.000$).

Similarly, seeking advice from a friend or neighbor was reported by 84.5% of respondents, with a statistically significant association (OR = 3.504; 95% CI [2.113–5.810]; $p = 0.000$). Purchasing medication from a pharmacy without a prescription was also strongly associated with self-medication (92.2% vs. 7.8%; OR = 15.190; 95% CI [8.541–27.014]; $p = 0.000$).

Furthermore, the acquisition of medications from informal vendors (street or market) shows a very high proportion of self-medication (95.2%), with a significant association (OR = 14.214; 95% CI [6.047–33.410]; $p = 0.000$). Finally, the use of homemade remedies concerns 92.9% of respondents and remains significantly associated with self-medication (OR = 7.439; 95% CI [3.143–17.605]; $p = 0.000$).

Table 7: Use of Self-Medication and Types of Self-Medication

Types self - medication		Use of self-medication		GOLD	IC[95%]	p
		Yes	No			
Medications left at home	Yes	191 (93.6%)	13 (6.4%)	17,698	[9.436 33.192]	0
	No	88 (45.4%)	106 (54.6%)			
Advice from a friend/neighbor	Yes	131 (84.5%)	24 (15.5%)	3.504	[2.113 5.810]	0
	No	148 (60.9%)	95 (39.1%)			
Medications purchased at a pharmacy without a prescription	Yes	200 (92.2%)	17 (7.8%)	15,190	[8.541 27.014]	0
	No	79 (43.6%)	102 (56.4%)			
Medications purchased from an informal pharmacy (street, market)	Yes	120 (95.2%)	6 (4.8%)	14,214	{6.047 33.410}	0
	No	159 (58.5%)	113 (41.5%)			
Homemade remedies	Yes	79 (92.9%)	6 (7.1%)	7.439	[3.143 17.605]	0
	No	200 (63.9%)	113 (36.1%)			

Reasons for Resorting to Self-Medication

The results in Table 8 highlight the main reasons associated with self-medication. The results show that all the factors studied are significantly associated with self-medication ($p < 0.05$). The strongest associations were high cost of care (OR = 15.24), a negative prior experience at the health center (OR = 15.08), and family or

personal habit (OR = 6.43). Distance or difficulty of access to health facilities (OR = 4.15), cultural or spiritual beliefs (OR = 3.52), perception of effectiveness (OR = 2.72) and proximity of the traditional healer (OR = 1.91) are also significantly associated with the use of self-medication.

Table 8 : Reasons for Resorting to Self-Medication

Types self - medication		Use of self-medication		GOLD	IC[95%]	p
		Yes	No			
Medications left at home	Yes	191 (93.6%)	13 (6.4%)	17,698	[9.436 33.192]	0
	No	88 (45.4%)	106 (54.6%)			
Advice from a friend/neighbor	Yes	131 (84.5%)	24 (15.5%)	3.504	[2.113 5.810]	0
	No	148 (60.9%)	95 (39.1%)			
Medications purchased at a pharmacy without a prescription	Yes	200 (92.2%)	17 (7.8%)	15,190	[8.541 27.014]	0
	No	79 (43.6%)	102 (56.4%)			
Medications purchased from an informal pharmacy (street, market)	Yes	120 (95.2%)	6 (4.8%)	14,214	{6.047 33.410}	0
	No	159 (58.5%)	113 (41.5%)			
Homemade remedies	Yes	79 (92.9%)	6 (7.1%)	7.439	[3.143 17.605]	0
	No	200 (63.9%)	113 (36.1%)			

Best Reasons for Resorting to Self-Medication or Traditional Medicine

Table 9 presents the results of the logistic regression identifying factors associated with the use of self-medication or traditional medicine. Coefficients (B), odds ratios (OR), and significance values (p) allow us to assess the strength and direction of each association.

The high cost of care is the main factor influencing the use of traditional medicine (B = 2.393; OR = 10.942; $p < 0.001$). Proximity to the traditional healer (B = 1.193; OR = 3.296; $p = 0.001$) and family or personal habit (B = 1.143; OR = 3.137; $p = 0.027$) are also significantly associated with these practices. In contrast, distance or difficulty of access to the health center ($p = 0.094$) and a negative prior experience ($p = 0.282$) are not statistically significant.

In addition, certain perceptions reduce the likelihood of recourse: cultural or spiritual beliefs (B = -1.045; OR = 0.352; $p = 0.020$) and the perception of the effectiveness of modern care (B = -1.396; OR = 0.248; $p = 0.001$).

Table 9 : Best Reasons for Resorting to Self-Medication or Traditional Medicine

Best patterns	B	SE	Wald	df	Sign.	Exp(B)
High cost of care in healthcare facilities	2.393	0.377	40,360	1	0	10,942
Distance or difficulty of access to the health center	0.767	0.458	2.808	1	0.09	2.154
Family or personal habit	1.143	0.518	4.871	1	0.03	3.137
Previous bad experience at the health center	0.735	0.683	1.158	1	0.28	2.086
Proximity to the traditional healer	1.193	0.374	10.173	1	0	3.296
Cultural, customary, or spiritual beliefs	-1.05	0.449	5.402	1	0.02	0.352
Perception of effectiveness	-1.4	0.403	11,977	1	0	0.248

Economic Evaluation

Direct Cost of Care for Households

Table 10 indicates that households incurred high and variable direct healthcare costs during the three months

preceding the survey. The average cost of hospitalization was the highest (53,804.44 FC $\pm$ 37,387.77), followed by food and caregiver expenses (22,642.86 FC $\pm$ 22,002.12). Prescribed medications (11,380.33 FC $\pm$ 16,785.06) and the purchase of medications outside of healthcare facilities (10,850.23 FC $\pm$ 9,324.76) also represented a significant portion of expenditures.

Table 10 : Direct Cost of Care for Households in the Three Months Preceding the Survey (n=398)

Types of expenses	Average (HR)	Standard deviation (SF)
Consultation cost	2422.95	40,22,076
Cost of prescribed medications	11380.33	1,67,85,060
Purchasing medication outside of the healthcare facility	10850.23	93,24,756
Payment for medical examinations	66,12,089	7,67,74,029
Payment for transportation related to care	2826.77	37,46,896
Cost of hospitalization	53804.44	3,73,87,770
Cost of the healthcare access booklet or card	4782	42,55,393
Food and companion expenses	22642.86	2,20,02,123

Opportunity Cost of Care for Households

Average Time Spent Searching for Care

The results in Table 11 show that the time spent seeking care is dominated by the time spent at the healthcare facility, with an average of **160.20 minutes**, reflecting relatively long waiting and/or treatment times. In contrast, the travel times to (**21.18 minutes**) and back (**21.57 minutes**) are generally comparable and relatively moderate, although they exhibit significant variability.

Table 11 : Average Time Spent Searching for Care

Time allocated to seeking care	Average (minutes)	Standard deviations (minutes)
Travel time to the healthcare facility (in minutes)	21.18	15,565
Time spent in the healthcare facility (in minutes)	160.2	17.126
Return travel time home (in minutes)	21.57	14,633

Missed Opportunities and Loss of Income

Table 12 presents the missed activities and loss of income among the respondents. The results indicate that trade is the most frequently missed activity (66.1%), followed by agriculture (65.1%). Daily work affects nearly half of the respondents (49.5%), while public service or salaried employment (42.7%) and transportation (34.9%) are also affected.

Table 12 : Missed Activities and Loss of Income (n=398)

Types of missed activities	Effective	Percentage
Agriculture	259	65.1
Trade	263	66.1
Daily work	197	49.5
Salaried work	170	42.7
Transportation	139	34.9

Discussion of Results

Financing and Cost of Healthcare in the Household

Average Monthly Household Income.

The distribution of monthly income reveals that more than seven out of ten households (71.8%) live on less than USD 200 per month, including 28.6% with an income below USD 100 and 43.2% with an income

between USD 100 and USD 199. Conversely, only 3.0% of households have a monthly income of USD 400 or more. This income structure reflects marked monetary poverty and a limited ability of households to contribute to healthcare expenses. In a context where healthcare financing relies heavily on out-of-pocket payments, these income levels expose households to a high risk of foregoing care, falling into debt, or experiencing catastrophic expenditures.

This situation reflects the socio-economic context of the Beni health zone, characterized by the predominance of informal activities, insecurity, and low regular incomes. These findings align with those of Wagstaff, Eozenou, and Smits, who demonstrated that in low-income countries, low income levels are strongly associated with a disproportionate burden of out-of-pocket (OOP) health expenditures [1]. Similar results were reported in the DRC in the studies by Lomamba et al., and Bukasa et al., where a monthly income $\leq$ USD 100 was significantly associated with the use of self-medication [8,9].

Household Income Allocated to Health in the 30 Days Prior to the Survey

The proportion of income spent on healthcare in the past 30 days appears particularly high relative to household income levels. Indeed, 31.2% of households spent between USD 30 and 49 on healthcare, while 24.9% spent between USD 50 and 99, and 9.8% spent more than USD 100. Given that most households have monthly incomes below USD 200, these expenditures represent a substantial financial burden. This suggests that healthcare spending can quickly exceed the 10% of monthly income threshold recommended in international literature.

These results align with the analyses of Wagstaff et al., which demonstrate that the share of the budget allocated to direct health expenditures is strongly correlated with the incidence of frightening expenses, particularly when the 10% income threshold is exceeded [1]. In the context of Beni, an expenditure of USD 30 to 49 represents between 15% and 49% of monthly income for a large proportion of households, suggesting a high risk of impoverishment due to illness.

The lack of effective prepayment mechanisms and low health insurance coverage force households to finance

healthcare through out-of-pocket payments. These findings are consistent with those of Taiwo et al., in Nigeria, where 67.9% of households faced catastrophic out-of-pocket expenses financed exclusively by out-of-pocket payments [10]. They are also consistent with the observations of Alamgir et al., in Bangladesh, showing that a single illness can consume more than half of the monthly income of poor households.

Individuals Contributing the Most to Household Healthcare Financing

Healthcare financing falls primarily on the head of household, who provides 70.9% of the financial contributions, while the participation of children (8.0%) and extended family (3.8%) remains marginal. This concentration of the financial burden on the head of household reflects a low level of risk pooling within households and an absence of formal social protection mechanisms.

These results are comparable to those reported by Many et al., where self-financing by the head of household was the primary method of covering health expenses [11]. These results are consistent with those reported by Ruhweza et al. (2009) in Uganda, where direct payments were mainly borne by the working adults in the household, particularly exposing families to financial hardship in the event of serious or recurring illness.

They also confirm the observations of Taiwo et al., in Nigeria, according to which uninsured households, often low-income, bear the entire cost of healthcare through direct payments [10]. This near-exclusive dependence on the head of household can exacerbate the household's vulnerability in the event of income loss or the latter's temporary incapacity.

Financing Strategies in the Face of High Healthcare Expenditures

Households are developing various coping strategies in response to high healthcare costs. Borrowing from relatives is the most common strategy (62.3%), followed by selling assets (45.7%), reducing food spending (43.7%), and using savings (41.5%). More than a quarter of households (27.1%) report having postponed or abandoned healthcare.

The lack of formal financial protection forces households to resort to informal, often unsustainable, solutions. This

also confirms the observations of Wagstaff et al., on the central role of out-of-pocket expenses (OOPs) in the impoverishment of poor households [1]. These so-called "negative coping" strategies are widely documented in the literature. Tshimbadi (2016) and Simaga (2017) emphasize that resorting to debt and selling assets is a common response to the inability to pay for healthcare, but contributes to a cycle of impoverishment.

These strategies reflect significant economic vulnerability and a risk of progressive impoverishment. They are consistent with the findings of Alamgir et al. (2010), which show that 76% of families facing high healthcare expenses resort to borrowing or selling assets, and that reduced food spending is a frequent consequence.

In an African context, Taiwo et al., also observed that catastrophic spending was associated with adverse clinical outcomes, including discharges against medical advice and mortality, highlighting the direct health implications of these financial strategies [10].

Provision of Health Services

The provision of health services in the Beni area is characterized by low coverage by health insurance funds (< 20%), a critical shortage of personnel (less than 1 doctor and less than 5 nurses per 10,000 inhabitants) and frequent drug shortages exceeding 15 days, compromising the continuity of quality care. Most of the literature suggests that the low availability of essential medicines (50–80%) and the high frequency of stockouts are contributing factors to the use of self-medication, as also highlighted by Traoré (2007) in Mali and Bukasa et al., in the DRC [9]. These findings corroborate the observations of Tshimbadi (2016), which highlight a persistent gap between the existence of health facilities and their actual functional capacity. However, chronic underfunding of the health system, dependence on external funding, and the unstable security situation largely explain these shortcomings.

These results corroborate the findings of Mulinganya et al. in Bukavu, which highlighted the organizational and human consequences of understaffing on healthcare utilization [7]. They also align with the conclusions of Wagstaff et al., which found that healthcare systems with low insurance coverage are associated with a

higher incidence of direct and catastrophic expenditures [1].

Request for Health Services

Reasons for not Seeking Curative Care

The analysis shows that financial constraints are the main reason for not accessing curative care, with a statistically significant association (OR = 0.281; 95% CI [0.158–0.499]; $p = 0.000$). Households facing financial difficulties access formal care significantly less often than those not experiencing these constraints. These results indicate that not accessing care is primarily an economic phenomenon rather than a geographical or cultural one.

These results are similar to those of Many et al., who show that low-income households in Lubumbashi are particularly vulnerable to self-medication due to insufficient financial resources to access formal healthcare [11]. These findings align with those of Tshimbadi (2016), who identified the cost of care as the primary barrier to accessing curative services in Lubumbashi. Similarly, Kumar and Sohal (2018) emphasize that out-of-pocket payments remain a major driver of disease-related impoverishment in low- and middle-income countries.

The results of this study are consistent with those of Lomamba et al., who identified the high cost of care as the main barrier to affordability in the Lukonga health zone [8]. They also confirm the observations of Wagstaff et al., on the central role of out-of-pocket payments in foregoing healthcare in low-income countries [1].

From a comparative perspective, although conducted in a different context, the study by Emanuel et al., also highlights that when healthcare expenditures represent a significant portion of household income, affordability becomes a central determinant of whether or not healthcare is used [12]. Thus, even in more economically favorable contexts, financial pressure remains a key factor, reinforcing the relevance of these findings in a low-resource environment such as the Beni health zone.

On the other hand, the lack of significant association with geographical, cultural and organizational factors suggests that, in this specific context, the physical availability of services is not the main obstacle, unlike

what is observed in other rural or landlocked contexts, such as in Mali or Papua New Guinea (Maviso et al., 2025).

Use of Self-Medication or Traditional Medicine

The use of self-medication is strongly associated with several specific practices. The use of leftover medications at home (93.6%; OR = 17.698), the purchase of over-the-counter medications from pharmacies (92.2%; OR = 15.190), and the acquisition of medications from informal pharmacies (95.2%; OR = 14.214) show particularly strong associations. Self-medication appears to be a widely adopted strategy as a substitute for formal healthcare in the face of financial barriers.

These results are consistent with those of Simweray et al. (2025) in Goma, who reported a prevalence of self-medication of 82.8%, strongly associated with low income and the availability of over-the-counter medications. Comparable results were also observed by Bukasa et al., in Kinshasa and by Banza Mitonga et al. (2025) in Kamina, confirming the widespread nature of this practice in the DRC [9].

Reasons for Resorting to Self-Medication

The main reasons associated with self-medication are dominated by the high cost of care (OR = 15.235), a negative prior experience at the health center (OR = 15.082), and family or personal habit (OR = 6.429). Distance, cultural beliefs, and perceived efficacy also play a significant role.

These results are consistent with the work of Hailu et al. in Ethiopia, which highlights the influence of low income and cultural beliefs on the use of traditional medicine [13]. They also confirm the findings of Simweray et al. (2025) regarding the importance of economic and sociocultural factors in therapeutic choices.

Multivariate analysis shows that the high cost of care remains the factor most strongly associated with self-medication (OR = 10.942), followed by proximity to a traditional healer (OR = 3.296) and family or personal habit (OR = 3.137). Conversely, cultural beliefs and perceived efficacy appear to be associated with a reduced likelihood of self-medication, suggesting complex and contextual effects. Even after adjustment,

economic and structural factors remain predominant, confirming the central role of financial constraints in therapeutic choices.

These results confirm that, in the Beni context, economic and structural determinants carry more weight than cultural factors alone, thus aligning with the conclusions of Wagstaff et al., and Bukasa et al [1,9]. The findings of the present study are consistent with those of Okate Akpo Gnandi, who demonstrates that perceived efficacy and affordability are key motivators for resorting to traditional medicine [4]. Similarly, Ndiaye emphasizes that perceived risk and perceived disease severity strongly influence the choice of treatment [5].

Economic Evaluation

Direct Cost of Care for Households

The direct costs of healthcare borne by households are high and highly variable. The average cost of hospitalization (53,804.44 FC $\pm$ 37,387.77) is the largest expense, followed by food and caregiver costs (22,642.86 FC $\pm$ 22,002.12). Prescribed medications purchased outside of healthcare facilities also represent a substantial portion of expenses.

These costs represent a significant financial burden, likely to lead to detrimental coping strategies. The high allocation of income to healthcare observed in this study therefore confirms the regressive nature of healthcare financing in the context studied.

These results are comparable to those of Alamgir et al. (2010) and Taiwo et al., who showed that non-medical costs associated with hospitalization contribute significantly to the financial burden on households [10]. They also confirm the observations of Traoré (2007), according to which the actual cost of care far exceeds the financial capacity of poor households in sub-Saharan Africa.

Opportunity Cost of Care for Households

Average Time Spent Searching for Care

The significant time spent in healthcare facilities reflects organizational inefficiencies that may discourage people from seeking care. These delays, combined with financial costs, reinforce the perception of a healthcare system that is neither accessible nor responsive, as also observed by Bagchi et al., in India [3,14-27].

Missed Opportunities and Loss of Income

The high frequency of missed activities, particularly in the trade and agriculture sectors, highlights the indirect economic impact of the disease on household livelihoods. This loss of income contributes to a vicious cycle between illness and poverty, exacerbating household economic vulnerability—a phenomenon widely documented in low-income settings.

Conclusion

This study on the economic evaluation and accessibility of health services in the Beni Health Zone reveals limited access to formal care, primarily due to low household economic power, insufficient supply, and the absence of effective financial protection mechanisms. These findings illustrate a structural imbalance between the supply and demand for care and the limitations of a system largely based on direct payments.

They emphasize the urgent need to strengthen financial protection, particularly through the expansion of health insurance schemes with targeted subsidies for the most vulnerable households. Improving healthcare provision requires increased investment in healthcare personnel, equitable resource allocation, and ensuring the availability of essential medicines.

In the short and medium term, regulating the sale of medicines, providing health education on the risks associated with self-medication, and involving community relays and health committees can promote adherence to prepayment mechanisms and the appropriate use of services.

In short, ensuring sustainable financial accessibility and improved efficiency of health services in the Beni health zone requires a systemic approach that integrates financial protection, strengthens service provision, improves quality of care, and adapts to the socio-economic realities of households. Without these measures, inequalities and the reliance on alternative practices will continue to hinder universal health coverage and public health in this fragile context.

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Ethical Considerations

This study was conducted in accordance with ethical principles. Prior to data collection, prior authorization was obtained from the competent authorities at the Catholic University of Graben (UCG) (see ref. no. CUTCM/UCG/KAC/AR/KL/No. 026/2024-2025, authorizing data collection for a survey in the Beni Health Zone). Participants were then informed of the study's objectives. Informed consent was obtained orally from household heads after a detailed explanation of the process and their right to withdraw from the survey at any time without penalty. The confidentiality and anonymity of the collected information were strictly maintained.

Authors' Contribution

KKJ designed the study, performed the statistical analysis, and wrote the main manuscript.

PKA, KKE, KKA, KMJ & MMR participated in the data collection in the Beni health zone.

MKI, KBD & MTF contributed to the interpretation of the results and the critical review of the manuscript. MKIZKC and MMR conducted the literature review, participated in the formatting of the manuscript, validated the data, and contributed to the discussion of the results.

Professor Dr. BAO supervised the study and validated the final version of the manuscript and the final approval of the version to be submitted.

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