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Original Article

### Factors Associated with Unmet Needs of Chronic Diseases in Kenya: Multilevel Analysis of Kenya Household Health Expenditure and Utilization Survey 2018

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**Keywords:**

*Unmet Healthcare Needs, Chronic Diseases, Household Characteristics, Gender Disparities, Health Insurance.*

This study investigates the factors that contribute to unmet healthcare demands among people with chronic illnesses. The 2018 Kenya Household Health Expenditure and Utilization Survey, conducted by the Kenya National Bureau of Statistics, provided the extensive national sample used in this study, which provides information about the state of the healthcare system. A two-stage sample approach was used in the survey to pick 1,500 clusters and then identify twenty-five households inside each cluster, producing a total coverage of 37,500 households. This cross-sectional study looks at how factors interact in Kenya's 47 counties, both at the household and communal levels. The results highlight the significant impact of household characteristics, which account for 81% of the explanation for unmet healthcare needs, while factors at the community or county level account for 19%. These findings are consistent with macroeconomists' and health experts' viewpoints that health is a shared family asset. Interesting gender discrepancies show that women are more vulnerable than men because of their complex healthcare needs. Contrary to popular belief, married people face more difficulties getting access to healthcare. Economic status highlights the differences even more, with the poorest households facing the biggest difficulties. In line with earlier studies, access to healthcare remains a major barrier for rural inhabitants. This emphasises how urgently needed specialised healthcare treatments are in rural areas, particularly for those suffering from chronic diseases. The study shows a decrease in the likelihood of unmet healthcare needs in households with health insurance. It is particularly important to economically and socially empower the household head to invest in and prioritise healthcare needs since chronic diseases are almost a sure bet in every household, especially in the later years of an individual's life.

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## INTRODUCTION

Chronic diseases such as cancer, diabetes, cardiovascular diseases, and obesity have been associated with old and rich people (Powell-Wiley et al., 2021). The recent epidemiological evidence indicates that these diseases are also affecting the poor and the young, and the graph keeps an upward trajectory (Onyango & Onyango, 2018). Increased infectious disease burden coexists with rising rates of morbidity and mortality from chronic diseases, which continue to be at least 69% of all fatalities in Africa (De-Graft Aikins et al., 2010).

Evidence shows that 19% of Kenyans have access to health insurance. This implies that the bigger pie of households without health insurance may miss receiving health care services due to their uninsured status and other related reasons. As of 2016, only 16% of Kenya's population was insured by the nation's national health insurance fund (Suchman et al., 2020).

(WHO & World Bank, 2017) underscores that households with chronically ill members face the risk of unmet needs due to financial burdens, among other factors. According to reports, at least half of the world's 7.3 billion people do not receive the necessary health treatments. This is especially true in underdeveloped nations where a large number of people lack access to healthcare, which would substantially benefit them (O'Donnell, 2007).

There is a gap in understanding the predictors of unmet needs for households that experience the presence of chronic diseases among their members. Evidence from the works of (Chen et al., 2011) reveals that suspending access to health services may have a retrogressive effect on the progress of chronic diseases among different members of the household.

In addition, delaying medical treatment may result in financial hardship down the road or even worsen health. This is especially true in poor nations where a large number of people lack access to quality healthcare (Jacobs et al., 2012). These barriers may limit the use of healthcare services and result in considerable disparities in access to healthcare among different population groups (Dawkins et al., 2021).

(OECD, 2011) alludes that by examining unmet medical requirements, one can measure the equality of access to services. Two methods are advised for determining unmet needs. One option is to employ a "clinical" evaluation based on pertinent clinical guidelines. As opposed to this, there is a "subjective" metric that is based on the individual's judgment that they were unable to acquire healthcare when they needed it due to factors outside of their control. Since many surveys ask people to self-report the times they needed treatment but did not receive it, the subjective approach is popular because it is practical. People may refrain from getting medical

attention when they need it to minimise financial stress due to poorly functioning health finance systems and the expense of medical treatments (Allin et al., 2010). This paper examines factors associated with unmet needs at the household and communal levels for a better understanding of the dynamics of unmet needs among households with chronic diseases.

**METHODS**

**Data Sources**

This study utilised a national sample that was derived from the 2018 Kenya Household Health Expenditure and Utilization Survey that was conducted by the Kenya National Bureau of Statistics. This national institution conducted a nationwide survey that achieved a representative sample of households within the 47 counties of Kenya. The survey utilised a two-stage sampling strategy. In the initial stage, 1,500 clusters were chosen, and in the second, twenty-five households were derived for each cluster. As a result, it covered 37500 households and is intended to be representative at both the national and county

levels. This is a large cross-sectional study that focused on households with chronic diseases and their associated factors (KeNADA, 2018).

**Description of Chronic Diseases/Conditions**

Several scholars and institutions gave different and similar definitions of chronic conditions (Bernell & Howard, 2016; CDC, 2022; Warsaw, 2006). This study adopts the classification of chronic conditions as per the Ministry of Health Government of Kenya and the definition (Bernell & Howard, 2016), which simply implies that chronic diseases are ones with the nature of continuing or occurring again and again for a long time and usually progresses more than three months. This study includes communicable and non-communicable diseases that are chronic in nature and in line with the inclusion criteria of the (WHO, 2002). which focuses on hypertension and other cardiovascular diseases, diabetes, asthma, TB and other respiratory diseases, HIV/AIDS, cancer, mental disorders, and other chronic diseases.

**Variables**

**Table 1: Description of Variables**

Variables		Descriptions
Level 1 (Household factors)	Gender	1= male; 0= Female
	Education status	0= Never went to school; 1= Primary School; 2= Secondary School; 3= Tertiary
	Marital status	0= Not Married; 1= Married;
	Employment status	1= Employed; 2= Not employed;
	Household size	1= 1-3; 2= 4 to 6; 3= More than 7;
	Perceived household health status	1= Very good; 2= Good; 3=Satisfactory; 4= Poor
	Age	1= Less than 25 Years; 2= 25-40 Years; 3=More than 40 Years
	Access to health insurance	0= No; 1= Yes
Level 2 (Communal factors)	Wealth index	1= Lowest; 2= Second; 3= Middle; 4= Fourth; 5= highest)
	Residence	0= Rural; 1= Urban
	Dependent variable	
	Unmet services	1= Yes; 0= No

**Multilevel Analysis of Unmet Needs**

The study also opted for a multilevel analysis to divide variance into household effects and communal effects. Level one effects are measured in the household context, and level two are

communal effects that are measured at the county level (OECD, 2009). In addition, multilevel modelling permits the investigation of both household-specific and shared communal setting effects at the same time. This is especially critical

for ensuring that the impacts of shared communal settings are not the product of underappreciated household-specific effects. The first thing in this study was to find household-specific characteristics that explain the unmet needs among individuals with chronic conditions using household head attributes such as age cohort, gender, education level, and employment status. Across the 47 counties, community influences such as type of residence (rural or urban) and wealth index were also explored.

As per the works of Fjær et al. (2017), unmet needs are the discrepancy between the services deemed necessary and the services received as a result of limitations to accessibility, availability, and acceptability. In another frontier, Unmet need has been termed as a measure of the discrepancies, if any, between the services deemed essential to adequately address specified health conditions and those actually provided. The lack of enough or the proper care and services is an unmet need (Allin et al., 2010).

This study was narrowed down to "Subjective, not-chosen unmet needs" as per the description of Allin et al. (2010), who argued that a person may believe he/she needs some kind of health intervention, but access restrictions outside of his/her control prevent her from getting the care she needs.

Unmet needs were the main outcome variable of this study. This is a binary variable expressing whether the household with chronic conditions reported unmet healthcare needs or not. The survey poses this question to a competent/credible household member: Does anyone in the household have any of the following chronic health conditions: hypertension, other cardiac disorders, diabetes, asthma, TB, other respiratory disorders, HIV/AIDS, cancer, mental disorders and other chronic health conditions.

If a household reported yes to any of the following conditions, it was coded 1, and those that reported none of the listed conditions were coded 0. Then the survey sought to inquire whether surveyed households reported a prevalent of unmet needs

by asking this question, "Did <name> visit/consult a health provider (hospital/ health centre/ clinic/ dispensary/community health volunteer Pharmacy/chemist /shop/ Traditional Birth Attendant (TBA) &Traditional Healers, Religious/cultural healers?" Those who answered yes were coded 1, and those who answered No were coded 0.

Households that reported yes to the presence of any chronic disease and did not manage to seek health care services were deemed to face unmet needs. In this study, the first hypothesis was to test whether household characteristics have no effect on unmet needs on the accessibility of healthcare services for chronic diseases. The second hypothesis was to test whether the communal environment does not affect the likelihood that needs will not be met for the accessibility of healthcare services for chronic diseases, even after controlling for household-specific effects. This was preceded by first testing whether there was evidence of multilevel variation among household and communal predictors, as elaborated herein.

If the relationship between home characteristics and chronic conditions prevalence was shown to vary among communities, our second goal was to see if there are community factors that explain such diversity. Our second objective was to explore whether living in a shared communal environment increases the likelihood that needs will not be met even after controlling for household-specific effects.

The estimation of the relationship between the likelihood of unmet needs and explanatory factors at both the household and community levels was done using fixed effects. Adjusted odds ratios and 95% confidence intervals with a p-value of 0.05 were used in the multivariable analysis to present the associations between the dependent and independent variables (Belay et al., 2022).

The study employed random effects to evaluate variance between the household and community levels by use of the interclass correlation coefficient (ICC), a proportional change in

variance (PCV), and the Median Odds Ratio (MOR) as per different authors (Belay et al., 2022; Liyew & Teshale, 2020; Merlo et al., 2006).

$$ICC = \frac{VC}{VC+3.29} * 100 \quad (1)$$

Where ICC is the Interclass correlation coefficient, VC is the variance at the communal level, and 3.29 is the constant variance at the household level, as used in binary regression in multilevel regression that follows a logistic distribution (Rodríguez & Elo, 2003).

Proportional change in variance and median odds ratio was also calculated to measure variation between household and communal effects as per the below formulae.

$$PCV = \frac{Va-Vb}{Va} * 100 \quad (2)$$

Where PCV is the proportional change in variance, Va represents the variance of the initial model, and Vb is the variance of the model with added terms (Merlo et al., 2006).

Median Odds Ratio (MOR) was calculated as per the below equation (Merlo et al., 2006).

$$MOR = \exp[\sqrt{2 * Va} * 0.6745]; \approx \exp(0.95\sqrt{Va}), \quad (3)$$

where Va denotes the communal level variance (Merlo et al., 2006).

Mixed effect analysis was employed by fitting in four different models. To start, a null model containing the outcome variable and the cluster variable's predictor was fitted to test for variability. Household predictors were added in the second model, and their fixed effect coefficients and variability in relation to the null model were examined; the third model contained the outcome and county predictors only, and the fourth model contained household and county predictors. The likelihood ratio and deviation test were used to compare models, and the model with

the highest likelihood and lowest deviance was chosen as the best-fit model.

## RESULTS

### Demographic Descriptions

In Table 2, a total of 331,622 family members were counted, with 55.5% of them being female and 77.2% of them being married. 3.5% of the population was under 25, while 24.1% of the population was between 25 and 40 years old. Those over 40 had the highest percentage, at 72.4%. In terms of economic position, the lowest quintile scored 12.6%, followed by the second quintile at 12.6%, the middle quintile at 19.4%, the fourth quintile at 25.5%, and the highest quintile at 30.0%. 70.4% of the family members were employed, and 55% of the households were headed by women. Self-health perception was judged as very good by 11.8% of families, good by 41.0%, satisfactory by 25.4%, and poor by 21.8%. In terms of unmet needs, 37.33% had to do with inpatient care, 7.8% with outpatient care, and 9.2% with a combination of the two. 30.3% of people had access to health insurance of some kind, compared to 23.4% who had no education, 44.9% who had completed elementary school, 17.0% who had completed secondary school, and 14.7% who had completed tertiary education. Rural areas were home to the vast majority (51.4%). The prevalence of chronic diseases was as follows: hypertension 46.8%, other heart disorders 7.2%, diabetes 15.5%, asthma 14.5%, TB 5.3%, other respiratory disorders 20.2%, HIV/AIDS 10.2%, cancer 1.3%, and mental disorders 6.0%. Lack of money (5.7%), the absence of prescribed medication (0%), self-medication (5.2%), subpar service (0%), affordability problems (1.4%), religious or cultural considerations (0.3%), fear of serious illness (0.4%), travel distances (0.4%), perception of non-serious illness (1.8%), lack of information (0.5%), pre-authorisation requirements from insurers (0%), and other factors (0.8%) were among the causes of unmet needs.



**Table 2: Descriptive statistics**

	Variables	Frequency	Percent	N
Sex	Male	147628	44.5	331622
	Female	183995	55.5	
Current Marital Status	Married	256241	77.3	331622
	Not Married	75382	22.7	
Age Category	Less than 25 Years	11662	3.5	331622
	More than 25 to 40 Years	79922	24.1	
	More than 40 Years	240038	72.4	
Wealth Quintiles	Lowest	41699	12.6	331622
	Second	41717	12.6	
	Middle	64213	19.4	
	Fourth	84666	25.5	
	Highest	99326	30.0	
Main employment status	Employed	233525	70.4	331622
	Not Employed	98097	29.6	
Sex of the Household Head	Male headed	147628	44.5	331622
	Female-headed	183995	55.5	
Health status compared to other households	Very good	39253	11.8	331622
	Good	135900	41.0	
	Satisfactory	84162	25.4	
	Poor	72307	21.8	
Inpatient Unmet Needs	Yes	123785	37.3	331622
	No	207837	62.6	
Outpatient Unmet Needs	Yes	25818	7.8	331622
	No	305805	92.2	
Combined unmet needs	Yes	30472	9.2	331622
	No	301150.3015	90.8	
Access to health insurance	Yes	100586	30.3	331622
	No	231036	69.7	
The highest level of education reached	No Education	77466	23.4	331622
	Primary School	148903	44.9	
	Secondary School	56340	17.0	
	Tertiary	48913	14.7	
Residence	Rural	170532	51.4	331622
	Urban	161090	48.6	
Chronic Diseases	Yes	331622	100.0	331622
	No	0	0	
Hypertension	Yes	155141	46.8	331622
	No	176481	53.2	
Other Cardiac disorders	Yes	23943	7.2	331622
	No	302994	92.8	
Diabetes	Yes	51283	15.5	331622
	No	274188	84.5	
Asthma	Yes	47953	14.5	331622
	No	283669	85.5	
TB	Yes	17460	5.3	331622
	No	314162	94.7	
Other respiratory disorders	Yes	67139	20.2	331622
	No	264483	79.8	
HIV/AIDS	Yes	33701	10.2	331622
	No	297921	89.8	

Variables		Frequency	Percent	N
Cancer	Yes	4417	1.3	331622
	No	327205	98.7	
Mental disorders	Yes	19880	6.0	331622
	No	311743	94.0	
Lack money	No	312581	94.3	331622
	Yes	19042	5.7	
Prescribed medicine not available	No	331622	100.0	331622
Self-medication	No	314535	94.8	331622
	Yes	17088	5.2	
Poor quality service	No	331493	100.0	331622
	Yes	129	0.0	
Cannot afford	No	326935	98.6	331622
	Yes	4687	1.4	
Religious/Cultural reasons	No	330689	99.7	331622
	Yes	933	0.3	
Fear of discovering serious illness	No	330425	99.6	331622
	Yes	1197	0.4	
Long distance	No	330314	99.6	331622
	Yes	1308	0.4	
Illness not serious	No	325498	98.2	331622
	Yes	6124	1.8	
Lack of information	No	329801	99.5	331622
	Yes	1821	0.5	
Pre-authorisation by insurer	No	331622	100.0	331622
Other	No	328826	99.2	331622
	Yes	2796	0.8	

### Regression Results

Following the methodology used by Doğan & Doğan (2015), the interclass correlation coefficient (ICC) of our analysis was more than 0.19 indicating that approximately 19 % of the variance in unmet needs among individuals with chronic conditions is at Level 2, or between counties and 81 % is at Level 1, or within households as per the works of (Jenkins et al., 2003) and as per the expression of equation four.

$$\frac{\text{Level 2 variance}}{\text{level 2 Variance}+3.29} = \frac{0.755}{0.755+3.29} \quad (4)$$

In our investigation, the Median Odds Ratio (MOR) in the empty model was equal to 2.28 and had a 95% confidence interval of 2.24 to 2.29, which clearly excluded the value 1. In other words, there would not be any regional variations in the likelihood of having unmet demands for health care related to chronic illnesses if the MOR was equal to one. Our findings suggest that there is considerable evidence of heterogeneity in the

likelihood of unmet demands in the household at the county level. Models 2, 3, and 4 all show instances of the same kind (Merlo et al., 2006).

Using the loglik and deviance tests for model comparison, model 4 was determined to be the best-fit model because it had the highest loglik and lowest deviation (Belay et al., 2022). Proportional change in variance (PCV) is 27.15% in model two in relation to model one, and a bit of variation increased in model three since it accounted for level two predictors alone and reduced to 21.2% in model four since all predictors in our models are accounted for. The PCV in model four indicated that about 21.2% of the variability of facing unmet needs among those suffering from chronic conditions was explained by household and county factors (Seyoum et al., 2023).

Model 1, as illustrated in *Table 3*, indicates a null model. This model has no predictors and simply illustrates the magnitude of variance at level one

and level two, which are within the household and between communal (county) levels, respectively. Multilevel analysis is employed when there is a significant variation at levels one and two.

This study employed a multilevel analysis to explain the variance at level one and level two. The intercept in the null model under the fixed effects indicates that the log odds of facing unmet needs for chronic diseases across the whole sample is 1.89 when other predictors are at zero. As seen in *Table 3*, household-based predictors were included in model two to explain variation at level one. It is possible to interpret the fixed effects as multiple regression coefficients since they show the average link between the predictors and the dependent variable.

The results of model 2 respond to hypothesis one, which sought to test whether household characteristics have no effect on unmet needs on the accessibility of healthcare services for chronic diseases. Model two illustrates household factors that predict unmet needs among individuals who are suffering from chronic diseases. This is illustrated by coefficients and standard errors. When the coefficient is roughly double the magnitude of the standard error, it is considered significant households (Jenkins et al., 2003).

Significant results indicate at the household level, individuals who are predicated on facing unmet needs from obtaining chronic condition health care services are females who had log-odds of 0.48702, married individuals with log-odds of 0.43702 more points, self-perceived poorest household at log-odds 0.65743 more vulnerability. Households with insurance had log odds of 0.3341 fewer chances of suffering from unmet needs at level one. From model one to model two, variance decreases by 26.5%, from 0.755 to 0.550.

The second hypothesis was to test whether the communal environment does not affect the likelihood of the accessibility of healthcare services for chronic diseases through Model 3, which illustrates the effect of level two predictors void of the level one factor. The model illustrates

that rural residents are more likely to face unmet needs for chronic health care services. The second wealth quintile indicates that they are less vulnerable to the poorest quintile at log odds of 0.29. Surprisingly, the wealth index of other quintiles did not have a significant effect on unmet needs among those who suffering from chronic diseases. Urban residents with chronic diseases are less likely to be susceptible to facing the challenge of unmet needs, with log odds of -0.2318. Variance drops by 6.9% between Models 1 and 3, from 0.755 to 0.703.

Model 4 shows how combined level 1 and level 2 factors predict unmet needs for health care services among individuals with chronic conditions. The effect of household characteristics on unmet needs on the accessibility of healthcare services for chronic diseases can be clearly inferred from model 4. Predictors show that those who faced unmet needs were females at log odds of 0.469632, those with primary school status had log odds of 0.1547, and married individuals had log odds of 0.4043.

The effects of the communal environment on the likelihood that needs will not be met for the accessibility of healthcare services for chronic diseases, even after controlling for household-specific effects, can also be seen in model 4. The second wealth quintile households had fewer chances of incurring unmet needs compared to the poorest households by the log-odds of -0.277939. Our model indicates households from the third through the richest quintiles have a minimum effect on the explanation of unmet needs among individuals with chronic diseases among their kin. The log odds of urban residents not incurring unmet needs were -0.128447 as opposed to their rural counterparts. Evidence of multilevel effects can be seen in model 4. Variance decreased by 26.4% between Models 1 and 4, from 0.755 to 0.491.



**Table 3: Multilevel Regression Results**

Parameter	Model 1	Model 2	Model 3	Model 4
Intercept	1.88323 (0.08986) ***	1.49473 (0.35344) ***	1.8271 (0.1659) ***	1.508076 (0.390586) **
Female		0.48702 (0.13953) ***		0.469632 (0.141355) ***
Primary School		0.22550 (0.17651)		0.154723 (0.181937) **
Secondary School		0.38846 (0.21874).		0.313862 (0.231677)
Tertiary School		0.45233 (0.24821).		0.364655 (0.270210)
Married		0.43702 (0.17738) *		0.404263 (0.180246) *
Employed		-0.00525 (0.15151)		0.002059 (0.152010)
25-40 years		-0.23416 (0.226290)		0.24372(0.39884)
More than 40 years		-0.003528 (0.226191)		-0.01165(0.38474)
<b>Very Good Health status compared to other households</b>				
Good Health status compared to other households		0.16964 (0.18540)		0.181175(0.186179)
Satisfactory Health status compared to other households		0.29901 (0.22003)		0.296315(0.221044)
Poor Health status compared to other households		0.65743 (0.25333) **		0.666350(0.255087) **
Access to Health Insurance		-0.33417(0.10543) *		-0.309913(0.069596) *
Employed		0.00525(0.15151)		0.002059(0.152010)
<b>Level 2</b>				
(Intercept)			-2.133(0.001) ***	
Wealth index 2			-0.2922 (0.0216) **	-0.277939 (0.0219) **
Wealth index 3			0.2975 (0.2125)	0.256985 (0.220477)
Wealth index 4			0.2137 (0.2040)	0.119779 (0.227505)
Wealth index 5			0.4258 (0.2277)	0.163300 (0.277886)
Residence			-0.2318(0.0492) **	-0.128447 (0.052701) **
<b>Random Effects</b>				
Intercept/intercept	0.1755	0.49473	0.1703	1.368
Level 1	1.744	0.155	1.437	1.688
VA	0.755	0.550	0.703	0.491
AIC	1644.0183	1624.3	1642.0	1631.0
BIC	1654.4429	1697.2	1678.5	1724.8
ICC	0.19	0.14	0.18	0.13
PCV	Reff	-27.15%	15.3%	-21.2%
MOR	2.28	2.02	2.22	1.95
LogLik	-820.0	-798.1	-814.0	-794.9

*Note. Standard errors are in parentheses; Significance codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1*

## DISCUSSIONS

The results show that factors associated with unmet needs for individuals suffering from chronic diseases are partly explained at the household level at 81% and at the communal/county level at 19%. This clearly illustrates that household characteristics play a great pie in determining access to health care. A study done by (Hughes & Waite, 2002) corroborates this fact by comprehensively illustrating how household characteristics influence the health of its members. This coincides with health and macroeconomists, who view health as a commodity that is procured by a family as one unit (Adeniji et al., 2022; Goodman et al., 1999). This may mean that factors that hinder chronically ill individuals can be addressed at the household level (Adeniji et al., 2022; Park et al., 2023; Zarei et al., 2022). The study revealed that females were more susceptible to facing unmet needs. This may be partly explained by the gender factor in the accessibility of health care services. Most studies indicate that women have multiple healthcare needs compared to men, and they may opt for the most urgent service and forgo others, albeit as important as they may seem (Azad et al., 2020; Tadiriri et al., 2021). Moreover, gender studies in relation to healthcare accessibility done by Vlassoff (2007) revealed that women were more likely to accept their disease as a natural part of who they were rather than viewing it as a hardship to overcome, as their male colleagues tended to do.

The results also showed that individuals who were married had higher chances of incurring challenges of unmet needs. This is contrary to the findings of (Otieno et al., 2021), who found that households headed by unmarried individuals were more likely to face unmet needs of accessing primary health care in Kenya. Maybe the scenario can be explained by the fact that chronic illness attacks people in the years that are higher than the youth brackets who are not yet married.

While the study of Njagi et al. (2020) and other scholars prove that the wealth index has a great correlation with healthcare accessibility, our study

reveals that the poorest and second poorest households don't access healthcare due to their wealth status. The third quintile, through the richest household, did not register a significant correlation with unmet needs among individuals suffering from chronic conditions.

Individuals who are suffering from chronic conditions and hail from rural areas still face more difficulties in accessing health care. This result adds voice to previous studies that exposed how rural residents forgo healthcare access due to various reasons. For example, a study done by (Too et al., 2023) indicates a need to equip rural areas with palliative care needs for most chronic diseases since most people live there and face challenges in receiving health care needs since most of them cannot reach the capital city in Nairobi Kenya. Similar findings by (Dotse-Gborgbortsi et al., 2023) elaborate how women in rural areas are facing difficulties in accessing healthcare services in Ghana due to the further proximity of healthcare centres, among other factors.

Health care insurance reduces the chances of unmet needs by the log-odds of -0.309913 when modelled at household and communal levels. This adds to the evidence that health insurance plays a significant role in averting unmet needs among chronically ill individuals. The results concur with the studies of (Too et al., 2023), who found that the odds of suffering unmet needs for primary health care among households without health insurance in Kenya were 68% higher compared to those who did. This coincides with other studies that evidenced that the likelihood of unmet demands due to cost would be reduced by health insurance (Chen et al., 2011; Njagi et al., 2020).

## CONCLUSION

This study highlights the unmet healthcare requirements of people with chronic illnesses, particularly in rural areas. The idea that health is a shared family asset is supported by the important household factors that go into determining these requirements. Gender disparities and unanticipated challenges for married people put

the conventional wisdom to the test. For economically underprivileged households, economic inequality makes problems worse. In line with recent studies, health insurance is essential for meeting unmet medical demands. The study promotes comprehensive strategies to address the complex nature of unmet healthcare requirements, considering household dynamics, gender disparities, economic imbalances, and health insurance. A more equitable healthcare system for people with chronic illnesses may be possible with the help of personalised treatments, particularly in rural areas.

### Recommendations

To encourage healthcare-seeking behaviour and provide household heads more influence, recommendations call for concentrating interventions at the household level. Given the distinct biological, social, and economic aspects that affect healthcare-seeking behaviours, gender-specific considerations should be incorporated into healthcare delivery. It is recommended to make systemic reforms to lower community-level barriers to healthcare access, particularly for people with chronic diseases. Accessibility issues can be reduced by enhancing healthcare interventions in remote areas through techniques like workforce development, better transportation, and health literacy promotion. The National Health Insurance Fund's demand must be increased, and the expense of treating chronic diseases must be subsidised to move toward universal healthcare coverage more quickly and with greater justice.

### Limitations

Data used in this study was derived from a self-reported national survey; hence, the results may be subjected to underreporting due to recall bias. There are different definitions and descriptions of chronic conditions, and this study used a definition of chronic condition to refer to those communicable and noncommunicable diseases that last for more than three months; hence, comparability of the results with some studies may be challenging.

### REFERENCES

- Adeniji, F. I. P., Lawanson, A. O., & Osungbade, K. O. (2022). The microeconomic impact of out-of-pocket medical expenditure on the households of cardiovascular disease patients in general and specialised heart hospitals in Ibadan, Nigeria. *PLoS One*, *17*(7), e0271568. <https://doi.org/10.1371/journal.pone.0271568>
- Allin, S., Grignon, M., & Le Grand, J. (2010). Subjective unmet need and utilisation of health care services in Canada: what are the equity implications? *Soc Sci Med*, *70*(3), 465-472. <https://doi.org/10.1016/j.socscimed.2009.10.027>
- Azad, A. D., Charles, A. G., Ding, Q., Trickey, A. W., & Wren, S. M. (2020). The gender gap and healthcare: Associations between gender roles and factors affecting healthcare access in Central Malawi, June-August 2017. *Arch Public Health*, *78*(1), 119. <https://doi.org/10.1186/s13690-020-00497-w>
- Belay, D. G., Asratie, M. H., Aragaw, F. M., Tsega, N. T., Endalew, M., & Gashaw, M. (2022). Open defecation practice and its determinants among households in sub-Saharan Africa: pooled prevalence and multilevel analysis of 33 sub-Saharan Africa countries demographic and health survey. *Trop Med Health*, *50*(1), 28. <https://doi.org/10.1186/s41182-022-00416-5>
- Bernell, S., & Howard, S. W. (2016). Use Your Words Carefully: What Is a Chronic Disease? *Front Public Health*, *4*, 159. <https://doi.org/10.3389/fpubh.2016.00159>
- CDC. (2022). *About Chronic Diseases*. Centers for Disease Control and Prevention. <https://www.cdc.gov/chronicdisease/about/index.htm>
- Chen, J., Rizzo, J. A., & Rodriguez, H. P. (2011). The health effects of cost-related treatment delays. *Am J Med Qual*, *26*(4), 261-271. <https://doi.org/10.1177/1062860610390352>
- Dawkins, B., Renwick, C., Ensor, T., Shinkins, B., Jayne, D. G., & Meads, D. M. (2021).

- What factors affect patients' ability to access healthcare? An overview of systematic reviews. *Tropical Medicine & International Health*, 26, 1177 - 1188.
- De-Graft Aikins, A., Unwin, N., Agyemang, C., Allotey, P., Campbell, C., & Arhinful, D. (2010). Tackling Africa's chronic disease burden: from the local to the global. *Globalisation and Health*, 6(1), 5. <https://doi.org/10.1186/1744-8603-6-5>
- Doğan, İ., & Doğan, N. (2015). Usage of the Intraclass Correlation Coefficient As a Measure of Dependence in Dyadic Data: Review. *Turkiye Klinikleri Journal of Biostatistics*, 7, 119-125.
- Dotse-Gborgbortsi, W., Tatem, A. J., Matthews, Z., Alegana, V. A., Ofosu, A., & Wright, J. A. (2023). Quality of maternal healthcare and travel time influence birthing service utilisation in Ghanaian health facilities: a geographical analysis of routine health data. *BMJ Open*, 13(1), e066792. <https://doi.org/10.1136/bmjopen-2022-066792>
- Fjær, E. L., Stornes, P., Borisova, L. V., McNamara, C. L., & Eikemo, T. A. (2017). Subjective perceptions of unmet need for health care in Europe among social groups: Findings from the European social survey (2014) special module on the social determinants of health. *European Journal of Public Health*, 27, 82–89.
- Goodman, A. C., Stano, M., & Tilford, J. M. (1999). Household Production of Health Investment: Analysis and Applications. *Southern Economic Journal*, 65(4), 791-806. <https://doi.org/https://doi.org/10.1002/j.2325-8012.1999.tb00200.x>
- Hughes, M. E., & Waite, L. J. (2002). Health in household context: living arrangements and health in late middle age. *J Health Soc Behav*, 43(1), 1-21.
- Jacobs, B., Ir, P., Bigdeli, M., Annear, P. L., & Van Damme, W. (2012). Addressing access barriers to health services: an analytical framework for selecting appropriate interventions in low-income Asian countries. *Health Policy Plan*, 27(4), 288-300. <https://doi.org/10.1093/heapol/czr038>
- Jenkins, J. M., Rasbash, J., & O'Connor, T. G. (2003). The role of the shared family context in differential parenting. *Developmental psychology*, 39 1, 99-113.
- KeNADA, K. N. D. A. (2018). *Kenya household and health expenditure and utilization survey (khheus) 2018*. Department of policy planning and health financing. Retrieved 27 June from <https://statistics.knbs.or.ke/nada/index.php/catalog/95>
- Liyew, A. M., & Teshale, A. B. (2020). Individual and community level factors associated with anemia among lactating mothers in Ethiopia using data from Ethiopian demographic and health survey, 2016; a multilevel analysis. *BMC Public Health*, 20.
- Merlo, J., Chaix, B., Ohlsson, H., Beckman, A., Johnell, K., Hjerpe, P., Råstam, L., & Larsen, K. (2006). A brief conceptual tutorial of multilevel analysis in social epidemiology: using measures of clustering in multilevel logistic regression to investigate contextual phenomena. *J Epidemiol Community Health*, 60(4), 290-297. <https://doi.org/10.1136/jech.2004.029454>
- Njagi, P., Arsenijevic, J., & Groot, W. (2020). Cost-related unmet need for healthcare services in Kenya. *BMC Health Serv Res*, 20(1), 322. <https://doi.org/10.1186/s12913-020-05189-3>
- O'Donnell, O. (2007). Access to health care in developing countries: breaking down demand side barriers. *Cad Saude Publica*, 23(12), 2820-2834. <https://doi.org/10.1590/s0102-311x2007001200003>
- OECD. (2009). *Multilevel Analyses, in PISA Data Analysis Manual: SPSS, Second Edition*. OECD Publishing. <https://doi.org/https://doi.org/10.1787/9789264056275-16-en>

- OECD. (2011). "Introduction", in *Health at a Glance 2011: OECD Indicators*. OECD Publishing. [https://www.oecd-ilibrary.org/content/component/health\\_glance-2011-3-en](https://www.oecd-ilibrary.org/content/component/health_glance-2011-3-en)
- Onyango, E. M., & Onyango, B. M. (2018). The Rise of Noncommunicable Diseases in Kenya: An Examination of the Time Trends and Contribution of the Changes in Diet and Physical Inactivity. *J Epidemiol Glob Health*, 8(1-2), 1-7. <https://doi.org/10.2991/j.jegh.2017.11.004>
- Otieno, P. O., Kiroro, F., Runyenje, C., & Kamau, P. (2021). Unmet need for primary healthcare and associated individual and household-level factors in Kenya: results from a national survey. *BMJ Open*, 11(5), e041032. <https://doi.org/10.1136/bmjopen-2020-041032>
- Park, Y. S., Kim, H., Yun, I., Park, E. C., & Jang, S. Y. (2023). Association between caregiver type and catastrophic health expenditure among households using inpatient medical services: using Korean health panel. *BMC Health Serv Res*, 23(1), 721. <https://doi.org/10.1186/s12913-023-09703-1>
- Powell-Wiley, T. M., Poirier, P., Burke, L. E., Després, J. P., Gordon-Larsen, P., Lavie, C. J., Lear, S. A., Ndumele, C. E., Neeland, I. J., Sanders, P., & St-Onge, M. P. (2021). Obesity and Cardiovascular Disease: A Scientific Statement From the American Heart Association. *Circulation*, 143(21), e984-e1010. <https://doi.org/10.1161/cir.00000000000000973>
- Rodríguez, G., & Elo, I. (2003). Intra-class Correlation in Random-effects Models for Binary Data. *The Stata Journal*, 3(1), 32-46.
- Seyoum, T. F., Andualem, Z., & Yalew, H. F. (2023). Insecticide-treated bed net use and associated factors among households having under-five children in East Africa: a multilevel binary logistic regression analysis. *Malar J*, 22(1), 10. <https://doi.org/10.1186/s12936-022-04416-y>
- Suchman, L., Hashim, C. V., Adu, J., & Mwachandi, R. (2020). Seeking care in the context of social health insurance in Kenya and Ghana. *BMC Public Health*, 20(1), 614. <https://doi.org/10.1186/s12889-020-08742-1>
- Tadiri, C. P., Gisinger, T., Kautzky-Willer, A., Kublickiene, K., Herrero, M. T., Norris, C. M., Raparelli, V., & Pilote, L. (2021). Determinants of perceived health and unmet healthcare needs in universal healthcare systems with high gender equality. *BMC Public Health*, 21(1), 1488. <https://doi.org/10.1186/s12889-021-11531-z>
- Too, W., Lelei, F., Adam, M., & Halestrap, P. (2023). Preparedness, resilience and unmet needs of informal caregivers of advanced cancer patients in a Regional Mission Hospital in Kenya: Qualitative Study. *BMC Palliat Care*, 22(1), 16. <https://doi.org/10.1186/s12904-022-01048-6>
- Vlassoff, C. (2007). Gender differences in determinants and consequences of health and illness. *J Health Popul Nutr*, 25(1), 47-61.
- Warshaw, G. A. (2006). Introduction: Advances and Challenges in Care of Older People with Chronic Illness.
- WHO. (2002). Innovative care for chronic conditions : building blocks for actions : global report. In. Geneva: World Health Organization.
- WHO, & World Bank. (2017). *Tracking universal health coverage: 2017 global monitoring report*. World Health Organization. <https://apps.who.int/iris/handle/10665/259817>
- Zarei, L., Moradi, N., Peiravian, F., Hatami-Mazinani, N., Mahi-Birjand, M., Arabloo, J., & Babar, Z. U. (2022). Catastrophic pharmaceutical expenditure in patients with type 2 diabetes in Iran. *Int J Equity Health*, 21(1), 188. <https://doi.org/10.1186/s12939-022-01791-5>