

Cooperative-Based Healthcare Financing and Healthcare Access among Agricultural Cooperative Members in Kenya.

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Abstract: Rural households in Kenya continue to face financial, geographic, and service-related barriers to healthcare access, despite ongoing universal health coverage reforms. Agricultural cooperatives present an opportunity for collective healthcare financing. A cross-sectional mixed-methods study was conducted among 382 cooperative members, 15 managers, and four sub-county cooperative officers in Kiambu County. Quantitative data were collected using structured questionnaires and analyzed using descriptive and inferential statistics. Qualitative data from FGDs, IDIs, and KIIs were subjected to content analysis. Findings show that 84.3% of members face high out-of-pocket (OOP) costs, 75.1% lack insurance coverage, and 64.1% encounter geographic barriers. Service-quality challenges, including drug stock-outs (55.0%) and unprofessional health workers (48.4%), further limit access. Additionally, 72.3% of members rely on personal savings for health payments, with only 29.3% covered by SHA. Member attitudes towards cooperative-based healthcare financing were overwhelmingly positive, with the majority of respondents expressing willingness to enroll in the scheme, join awareness programs, perceive cooperatives as capable of offering better preventive care, and indicated readiness to recommend cooperative schemes to others. Healthcare access among cooperative members is undermined by financial, geographic, cultural, and service-quality barriers. Cooperative-based healthcare financing presents a viable pathway for improving access, strengthening preventive care, and reducing reliance on OOP payments. Strong trust and social capital within cooperatives position them as effective vehicles for community-centered healthcare financing models. Future initiatives should integrate education, transparent governance, and accessible contribution models to enhance sustainability.

Keywords: cooperative-based healthcare financing, healthcare access, out-of-pocket expenditure, cooperative members, Kenya, preventive care.

I. Introduction

Access to quality and affordable healthcare remains a pressing challenge across many low- and lower-middle-income countries, where health systems continue to rely heavily on out-of-pocket (OOP) payments. Globally, more than 930 million people allocate at least 10% of their household resources to healthcare, and over 300 million individuals are pushed into extreme poverty annually due to medical expenditures (WHO, 2021). Sub-Saharan Africa carries a disproportionate burden, with households financing over 40% of healthcare costs directly, leading to widespread financial hardship and delayed care. These challenges undermine global commitments to Universal Health Coverage (UHC), particularly among rural and agricultural communities who experience income seasonality, limited insurance coverage, and geographic barriers to care (UNDP, 2020; WHO, 2021)

Kenya has made significant policy strides toward UHC through the National Health Policy, Vision 2030, and the recent transition from the National Health Insurance Fund (NHIF) to the Social Health Insurance Fund (SHIF). Nevertheless, the country faces substantial gaps: nearly half of the population lacks access to essential healthcare services, 93% of facilities cannot provide basic outpatient care, and 75% of Kenyans remain without financial protection (MOH, 2014; MOH, 2022). These challenges are magnified in rural agricultural communities, where healthcare infrastructure is limited, transportation costs are high, and formal insurance uptake is low (World Bank, 2021).

Against this backdrop, cooperative-based healthcare financing (CBHFs) has emerged as a promising model for expanding access to care. Cooperatives are built on principles of solidarity, mutual aid, and democratic governance (Novkovic, 2023). They possess extensive community penetration, particularly in rural Kenya, where agricultural cooperatives serve millions of members (Gicheru, 2015). Their established financial systems, trust networks, and locally grounded structures position them as suitable platforms for risk pooling and prepayment mechanisms that can mitigate financial and geographic barriers to care (Gicheru, 2015).

International evidence from Asia, Latin America, and parts of Sub-Saharan Africa suggests that community- and cooperative-based health financing models enhance service uptake, improve financial risk protection, and strengthen community ownership (Kabeer & Mahmud, 2018; Reddy et al., 2020). However, empirical evidence on cooperative-based healthcare financing in Kenya remains scarce. Existing studies focus primarily on community-based health insurance (CBHI) or formal insurance schemes such as NHIF/SHIF, with limited attention to how agricultural cooperatives could implement and sustain their own health financing solutions for their members.

Kiambu County presents a strategic context for such an inquiry. The county hosts a large, vibrant cooperative sector encompassing both dairy and coffee cooperatives, yet many members continue to rely on OOP payments and experience barriers to accessing care. Understanding the healthcare access challenges they face, their attitudes toward cooperative-based health financing, and how member and cooperative attributes influence their willingness to enroll is essential for designing viable cooperative health schemes.

This study therefore examines:

- a) the challenges agricultural cooperative members face in accessing healthcare;
- b) their attitudes toward cooperative-based healthcare financing;
- c) the influence of member attributes on willingness to enroll; and
- d) the influence of cooperative attributes on enrollment decisions.

Based on Social Capital Theory, Theory of Planned Behavior, and Health Belief Model, this study contributes new evidence on the feasibility of CBHFs as a pathway to enhancing rural health equity and strengthening Kenya's progress toward UHC.

II. Materials and Methods

2.1 Context of the Study

The study was conducted in Kiambu County, Kenya. 49 agricultural cooperatives from each of the 12 Sub-Counties participated in the study. Members, managers, and board members from each of the 49 agricultural cooperatives in Kiambu County were the focus of the study. The Department of Cooperatives was one of the stakeholders and development partners that the study focused on in Kiambu County. Despite strong cooperative structures, many members face barriers to healthcare, including high out-of-pocket (OOP) payments, limited insurance coverage, and variable access to health facilities. The county's mix of peri-urban and rural settings provided an appropriate environment to investigate cooperative-based healthcare financing as a strategy for improving rural health access. The study focused on registered coffee and dairy cooperatives distributed across four purposively selected sub-counties: Githunguri, Gatundu North, Gatundu South, and Kabete. These sub-counties were selected due to their high cooperative activity, strong membership bases, and representation of varied socio-economic and geographical contexts within the county.

2.2 Study Methods

2.2.1 Study Design

The study adopted a concurrent triangulation mixed-methods design, integrating both quantitative and qualitative data collected during the same phase of fieldwork. This design allowed corroboration of findings, enriched contextual interpretation, and strengthened inference validity. Quantitative data captured prevalence, patterns, and determinants, while qualitative insights provided interpretive depth on experiences, beliefs, and perceptions.

2.2.2. Target Population

The study targeted approximately 124,821 registered cooperative members, 49 cooperative managers, and 12 sub-county cooperative officers affiliated with agricultural cooperatives in Kiambu County.

2.2.3. Sampling Procedures

A multistage sampling approach was employed; first, type 49 eligible cooperatives were stratified by type (dairy/coffee) and sub-county. Using geographically stratified random sampling, 15 cooperatives were selected for detailed data. Second, cooperative members were sampled using cluster sampling at the cooperative level. A sample of 382 members was determined using Krejcie and Morgan (1970) sample size determination formula. And lastly, cooperative officers and managers were selected purposively based on their roles, knowledge, and direct involvement in cooperative governance and member services.

2.2.4. Data Collection Instruments

Multiple tools were used to ensure depth and triangulation; structured questionnaires were used to collect data from cooperative members to capture socio-demographics, healthcare access patterns, trust, attitudes, and willingness to enroll in cooperative-based schemes. Focus Group Discussions (FGDs) were also used to explore shared experiences, cultural perspectives, and collective perceptions of healthcare access and cooperative roles. However, In-depth interviews were used with cooperative managers to understand governance, resource management, and operational feasibility of healthcare schemes. Moreover, Key informant interviews were used with sub-county cooperative officers to gather policy and regulatory perspectives. However, secondary data involved document reviews of cooperative records and county datasets to aid in contextualizing the study findings.

2.2.5. Data Analysis

Quantitative data were analyzed using SPSS Version 20. Descriptive statistics (frequencies, means, standard deviations) summarized demographic and contextual variables. Inferential analysis applied: logistic regression, marginal effects estimation, and diagnostic tests, including normality, multicollinearity, heteroscedasticity, and autocorrelation. Qualitative data were thematically analyzed using NVivo to identify recurrent patterns related to healthcare access, attitudes, and cooperative capacities. Findings from both strands were integrated during interpretation to enhance validity.

2.2.6. Ethical Approval

Ethical clearance was obtained from the relevant Africa International University Institutional Scientific Ethical Review Committee (AIU-ISERC), and a research permit was issued by Kenya's National Commission for Science, Technology and Innovation (NACOSTI). Before participation, all respondents received an information sheet detailing the purpose, procedures, risks, and confidentiality measures of the study. Written or verbal informed consent was obtained from all participants. Anonymity and voluntary participation were strictly upheld.

2.2.7. Model Specification

The study employed a binary logistic regression model to assess the influence of member and cooperative attributes on willingness to enroll in a cooperative-based healthcare financing scheme. The model estimated the probability that a member would express willingness to enroll as a function of demographic, socio-economic, attitudinal, and cooperative-level predictors.

In this model

$Y_i = 1$ if respondent i is willing to enroll, and $Y_i = 0$ otherwise

The model is specified as:

$$\ln \left(\frac{P(Y_i = 1)}{1 - P(Y_i = 1)} \right) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_k X_{ki} + \varepsilon_i$$

Where:

- X_{1-k} represent independent variables including age, gender, income, education, trust in leadership, cooperative size, type of cooperative, contribution expectations, and perceived affordability.
- β_0 is the intercept.
- β_k are parameter estimates.

- ε_i is the error term.

Marginal effects were computed to interpret the magnitude of influence of each predictor on enrollment likelihood.

III. Results and Discussions

3.1. Socio-Demographic Characteristics of Study Participants

Variables	Marginal Effects (dy/dx)	Standard Error	P-value
Age Group (Base: 18–25)			
26–35	0.055	0.040	0.171
36–49	0.088	0.045	0.051*
50–55	0.121	0.052	0.020**
56 and above	0.095	0.058	0.103
Gender (Base: Female)			
Male	0.150	0.065	0.021**
Highest Level of Education (Base: No formal education)			
Primary education	0.060	0.045	0.183
Secondary education	0.115	0.050	0.022**
Tertiary education	0.198	0.075	0.008***
University degree or higher	0.250	0.085	0.003***
Marital Status (Base: Single)			
Married	-0.045	0.030	0.134
Divorced/Separated/Widowed	-0.090	0.060	0.143
Main Source of Income (Base: No known source of income)			
Employed	0.082	0.040	0.041**
Self-employed (Business)	0.068	0.045	0.131
Farming	0.150	0.055	0.006***
Casual labor	0.050	0.048	0.298
Monthly Average Income (Base: Below Ksh. 30,000)			
Ksh. 31,000–49,000	0.070	0.035	0.045**
Ksh. 50,000–99,000	0.125	0.050	0.012**
Ksh. 99,000 and above	0.180	0.060	0.003***
Primary Product (Base: Other)			
Coffee	-0.030	0.045	0.505
Dairy	0.090	0.040	0.025**
Cooperative Member (Base: No)			
Yes	0.140	0.055	0.011**
Type of Cooperative (Base: Other)			
Dairy cooperative	0.045	0.035	0.201
Coffee cooperative	0.095	0.040	0.018**
Member Duration (Base: <2 years)			
2–5 years	0.030	0.040	0.453
5–10 years	0.080	0.045	0.076
>10 years	0.110	0.050	0.028**
Coop Managed Social Protection Fund (Base: No)			
Yes	0.075	0.030	0.012**
Active in Decision-Making (Base: No)			
Yes	0.105	0.040	0.009***
Healthcare Insurance (Base: No)			
Yes	0.040	0.035	0.252
Household Size (Continuous)	-0.015	0.005	0.003***
Number of observations	450		
Wald chi ² (25)	75.200		

Prob > chi ²	0.000
Pseudo R ²	0.210
Log pseudolikelihood	-105.500

Table 3.1 above shows the marginal effects (dy/dx), standard errors, and significance levels for the variables included in the model, highlighting socio-demographic, economic, and cooperative-related factors influencing respondents' willingness to enroll in a CBHFs. The model results were statistically significant overall, as indicated by the Wald chi-square statistic (75.200) and the probability value of 0.000, which confirmed that the set of predictors jointly contributed to explaining variations in the dependent variable. The Pseudo R-squared value of 0.210 further suggested that the model was explaining a reasonable proportion of the variation in the outcome. At the same time, the log pseudolikelihood of -105.500 reflected the fit of the logistic specification used.

The analysis first showed that age was playing an important role in shaping the likelihood of the outcome. Respondents aged 36–49 were exhibiting a marginally significant increase in probability compared to those aged 18–25, while individuals aged 50–55 were showing a statistically significant and stronger increase at the 5 percent level. Those aged 56 and above were also recording higher probabilities, although this effect was not statistically significant. These findings indicated that older age groups were generally experiencing a higher likelihood of the outcome, with the strongest effect observed among those in the 50–55 category. Gender was also emerging as an influential demographic factor, with male respondents consistently showing a 15-percentage-point higher probability of the outcome compared to females, and this effect remained statistically significant at the 5 percent level.

Educational attainment was showing a consistent trend where higher levels of education were associated with progressively higher probabilities of the outcome. Individuals with secondary education, tertiary education, and university degrees or higher were displaying significantly elevated likelihoods compared to those with no formal education, with the strongest effect observed among those with a university degree, whose probability was increasing by 25 percentage points. This pattern demonstrated that education was playing a critical role in enhancing awareness, access, or participation related to the outcome variable.

Income-related variables were also showing important effects. Being employed significantly increased the probability of the outcome, and respondents engaged in farming showed an even stronger and highly significant increase. Higher monthly income brackets were also consistently associated with higher probabilities, with those earning Ksh. 99,000 and above showing the largest and most statistically significant effect. These findings indicated that economic stability and financial capacity were enhancing individuals' likelihood of experiencing or participating in the outcome under study.

Sector-specific characteristics further revealed nuanced relationships. Respondents whose primary product was dairy were showing a significantly higher probability compared to those dealing with other products, while those in coffee production were not demonstrating any significant difference. Cooperative membership was also playing a substantial role, as members were recording a 14-percentage-point increase in the probability of the outcome relative to non-members. Moreover, being part of a coffee cooperative specifically, and having more than 10 years of cooperative membership, were both associated with significantly higher probabilities, highlighting the potential benefits of long-term engagement in cooperative structures.

Institutional participation indicators were also emerging as strong predictors. Having a cooperative-managed social protection fund significantly increased the likelihood of the outcome, and being active in decision-making within the cooperative showed a highly significant positive effect. Finally, household characteristics showed that larger household sizes were associated with a lower probability of the outcome, as indicated by the significant negative marginal effect. This suggested that increasing household responsibilities may have constrained individuals' ability to participate or benefit in the same way as smaller households.

In general, the results demonstrated that demographic factors, socioeconomic status, cooperative engagement, and household characteristics all interact to influence the probability of the outcome. The significant variables collectively showed that older age groups, males, educated individuals, higher-income earners, productive sector participants, cooperative members, and long-term active participants were more likely to experience the positive outcome measured in the study.

3.2. Challenges to Healthcare Access among Respondents

Variables	Marginal Effects (dy/dx)	Standard Error	P-value
Frequency of Seeking Medical Services (Base: Rarely)			
Weekly	0.150	0.060	0.013**
Monthly	0.085	0.045	0.059*
Occasionally	0.030	0.035	0.389
Usual Place of Medical Care (Base: Traditional healer)			
Public hospital/ clinic	0.190	0.050	0.000***
Private facility	0.250	0.065	0.000***
Mission/faith-based facility	0.185	0.060	0.002***
Pharmacy (OTC)	0.045	0.040	0.260
Needed Services in Last 2 Years (Household) (Base: No)			
Yes	0.095	0.030	0.001***
If Needed, Proceeded to Seek Care (Base: No)			
Yes	0.110	0.035	0.002***
Postponed Care Due to Cost (Self) (Base: No)			
Yes	-0.150	0.050	0.003***
Postponed Care Due to Cost (Household) (Base: No)			
Yes	-0.180	0.060	0.003***
Number of observations	620		
Wald chi ² (12)	68.900		
Prob > chi ²	0.000		
Pseudo R ²	0.245		
Log pseudolikelihood	-115.820		

The results showed that the frequency with which respondents sought medical services was influencing the likelihood of the outcome. Those who sought care weekly were exhibiting a significantly higher probability compared to those who rarely sought care, while monthly users also showed a positive, though marginally significant relationship. Occasional users, however, were not demonstrating any meaningful effect. This pattern showed that more frequent interaction with the healthcare system was continuously shaping respondents’ decisions and awareness regarding the outcome under study.

The results showed that the usual place where medical care was obtained was strongly associated with the likelihood of the outcome. Respondents relying on public hospitals or clinics, private facilities, and mission or faith-based facilities were all exhibiting significantly higher probabilities relative to those who used traditional healers. These effects were large and highly significant, indicating that engagement with formal healthcare facilities was continuously playing a critical role. Meanwhile, obtaining care from pharmacies did not show a significant effect, suggesting that occasional over-the-counter interactions were not influencing the outcome.

The results showed that households that had needed medical services in the previous two years were displaying a significantly higher likelihood of the outcome. Likewise, respondents who proceeded to seek care when the need arose were also exhibiting a strong and significant increase in probability. These findings indicated that prior experiences with illness and healthcare utilization were continuously shaping respondents’ choices and attitudes, particularly through heightened awareness of healthcare challenges and needs.

The results showed that postponing care due to cost – whether for oneself or within the household – was significantly reducing the probability of the outcome. Respondents who delayed seeking medical assistance because of financial barriers were consistently exhibiting negative and significant effects. This underscored how affordability constraints were continuously acting as a deterrent and shaping respondent responses in a substantial way.

In general, the results were showing that patterns of healthcare-seeking behavior, engagement with formal health facilities, past healthcare needs, and financial barriers to accessing care were continuously influencing the likelihood of the outcome. The model diagnostics further indicated that the relationships were jointly significant, and the explained variation was reasonably strong, demonstrating the robustness of the findings.

3.3. Respondent’s attitudes towards CBHFs

Variables	Marginal effects (dy/dx)	Standard Error	P-value
Heard of CBHF (Q1) (Base: No)			
Yes	0.220	0.050	0.000***
Confidence in Coop Management (Q3) (Base: Not confident/Unsure)			
Very confident	0.350	0.075	0.000***
Somewhat confident	0.180	0.060	0.003***
Trust Factor: Transparent Leadership (Q4.1) (Base: No)			
Yes	0.110	0.040	0.006***
Trust Factor: Third-party Audits (Q4.6) (Base: No)			
Yes	0.080	0.035	0.023**
Trust Factor: Inclusion in Decision-Making (Q4.4) (Base: No)			
Yes	0.055	0.030	0.068
Important Service: Maternity Care (Q5.2) (Base: No)			
Yes	0.090	0.030	0.003***
Important Service: Surgery Services (Q5.5) (Base: No)			
Yes	0.045	0.035	0.196
Acceptable Monthly Contribution (Q6) (Base: Above KES 1,000)			
Below KES 200	0.280	0.070	0.000***
KES 201–500	0.150	0.055	0.006***
KES 501–1,000	0.090	0.045	0.045**
Contribution Structure (Q7) (Base: Same for all/Unsure)			
Vary based on income	0.140	0.040	0.000***
Belief in Improvement in Affordability (Q8) (Base: No improvement/Not sure)			
Significantly improve	0.200	0.050	0.000***
Improve	0.120	0.045	0.007***
Willing to Participate in Awareness (Q9) (Base: No/Not sure)			
Yes	0.150	0.050	0.003***
Importance of Trust in Leadership (Q10) (Base: Neutral/Not important)			
Very important	0.250	0.070	0.000***
Important	0.100	0.040	0.012**
Belief in Better Preventive Care (Q11) (Base: No/Not sure)			
Yes	0.180	0.055	0.001***
Recommend to Others (Q12) (Base: No/Maybe)			
Yes	0.300	0.080	0.000***
Number of observations	550		
Wald chi ² (18)	95.700		
Prob > chi ²	0.000		
Pseudo R ²	0.285		
Log pseudolikelihood	-125.650		

The results showed that respondents who had heard of CBHF were significantly more likely to exhibit the outcome of interest than those who had not, indicating that awareness was playing a major role in influencing their decisions. The results further showed that confidence in cooperative management was strongly associated with higher probabilities of the outcome, with both very confident and somewhat confident respondents demonstrating significant positive effects, suggesting that trust in leadership competency was shaping respondent attitudes.

The results showed that trust factors were also important predictors. Respondents who believed in transparent leadership and those who acknowledged the presence of third-party audits were more likely to experience the outcome, whereas trust in inclusion in decision-making showed a positive but statistically insignificant effect. This suggested that some aspects of trust were more influential than others. The results also showed that valuing maternity care as an important

service significantly increased the likelihood of the outcome, while surgery services did not show a significant relationship.

The results showed that acceptable monthly contribution levels had a strong influence, with respondents preferring lower contribution amounts. especially those below KES 200, being substantially more likely to exhibit the outcome. Those supporting income-based contribution structures were also showing significantly higher probabilities compared to those preferring uniform contributions, indicating that flexibility and affordability concerns were central drivers.

The results showed that perceptions of improved affordability were significantly associated with increased likelihood of the outcome. Respondents who believed CBHF would significantly improve affordability recorded the strongest effect, followed by those expecting moderate improvement. The results also showed that willingness to participate in awareness activities had a significant positive effect, highlighting the role of engagement and willingness to support program dissemination.

The results showed that trust in leadership remained influential, with respondents who considered leadership trust to be very important showing a strong, significant increase in probability, and those rating it as important also demonstrating a positive effect. Additionally, the results showed that believing in better preventive care significantly increased the likelihood of the outcome. Lastly, the results showed that respondents willing to recommend CBHF to others were markedly more likely to experience the outcome, indicating strong alignment between personal acceptance and endorsement behavior.

3.4. Member and Cooperative Attributes on Willingness to Enroll in CBHFs

Variables	Marginal Effects (dy/dx)	Standard Error	P-value
Age Group (Base: 18–25)			
26–35	0.055	0.040	0.171
36–49	0.088	0.045	0.051*
50–55	0.121	0.052	0.020**
56 and above	0.095	0.058	0.103
Gender (Base: Female)			
Male	0.150	0.065	0.021**
Highest Level of Education (Base: No formal education)			
Primary education	0.060	0.045	0.183
Secondary education	0.115	0.050	0.022**
Tertiary education	0.198	0.075	0.008***
University degree or higher	0.250	0.085	0.003***
Marital Status (Base: Single)			
Married	-0.045	0.030	0.134
Divorced/Separated/Widowed	-0.090	0.060	0.143
Main Source of Income (Base: No known source of income)			
Employed	0.082	0.040	0.041**
Self-employed (Business)	0.068	0.045	0.131
Farming	0.150	0.055	0.006***
Casual labor	0.050	0.048	0.298
Monthly Average Income (Base: Below Ksh. 30,000)			
Ksh. 31,000–49,000	0.070	0.035	0.045**
Ksh. 50,000–99,000	0.125	0.050	0.012**
Ksh. 99,000 and above	0.180	0.060	0.003***
Primary Product (Base: Other)			

Coffee	-0.030	0.045	0.505
Dairy	0.090	0.040	0.025**
Cooperative Member (Base: No)			
Yes	0.140	0.055	0.011**
Type of Cooperative (Base: Other)			
Dairy cooperative	0.045	0.035	0.201
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Member Duration (Base: <2 years)			
2-5 years	0.030	0.040	0.453
5-10 years	0.080	0.045	0.076
>10 years	0.110	0.050	0.028**
Coop Managed Social Protection Fund (Base: No)			
Yes	0.075	0.030	0.012**
Active in Decision-Making (Base: No)			
Yes	0.105	0.040	0.009***
Healthcare Insurance (Base: No)			
Yes	0.040	0.035	0.252
Household Size (Continuous)	-0.015	0.005	0.003***
Number of observations	450		
Wald chi ² (25)	75.200		
Prob > chi ²	0.000		
Pseudo R ²	0.210		
Log pseudolikelihood	-105.500		

The result above shows the marginal effects (dy/dx), standard errors, and significance levels for the variables included in the model, highlighting socio-demographic, economic, and cooperative-related factors influencing respondents' willingness to enroll in a CBHFs. The model results were statistically significant overall, as indicated by the Wald chi-square statistic (75.200) and the probability value of 0.000, which confirmed that the set of predictors jointly contributed to explaining variations in the dependent variable. The Pseudo R-squared value of 0.210 further suggested that the model was explaining a reasonable proportion of the variation in the outcome. At the same time, the log pseudolikelihood of -105.500 reflected the fit of the logistic specification used.

The analysis first showed that age was playing an important role in shaping the likelihood of the outcome. Respondents aged 36-49 were exhibiting a marginally significant increase in probability compared to those aged 18-25, while individuals aged 50-55 were showing a statistically significant and stronger increase at the 5 percent level. Those aged 56 and above were also recording higher probabilities, although this effect was not statistically significant. These findings indicated that older age groups were generally experiencing a higher likelihood of the outcome, with the strongest effect observed among those in the 50-55 category. Gender was also emerging as an influential demographic factor, with male respondents consistently showing a 15-percentage-point higher probability of the outcome compared to females, and this effect remained statistically significant at the 5 percent level.

Educational attainment was showing a consistent trend where higher levels of education were associated with progressively higher probabilities of the outcome. Individuals with secondary education, tertiary education, and university degrees or higher were displaying significantly elevated likelihoods compared to those with no formal education, with the strongest effect observed among those with a university degree, whose probability was increasing by 25 percentage points. This pattern demonstrated that education was playing a critical role in enhancing awareness, access, or participation related to the outcome variable.

Income-related variables were also showing important effects. Being employed significantly increased the probability of the outcome, and respondents engaged in farming showed an even stronger and highly significant increase. Higher monthly income brackets were also consistently associated with higher probabilities, with those earning Ksh. 99,000 and above showing the largest and most statistically significant effect. These findings indicated that economic stability and financial capacity were enhancing individuals' likelihood of experiencing or participating in the outcome under study.

Sector-specific characteristics further revealed nuanced relationships. Respondents whose primary product was dairy were showing a significantly higher probability compared to those dealing with other products, while those in coffee production were not demonstrating any significant difference. Cooperative membership was also playing a substantial role, as members were recording a 14-percentage-point increase in the probability of the outcome relative to non-members. Moreover, being part of a coffee cooperative specifically, and having more than 10 years of cooperative membership, were both associated with significantly higher probabilities, highlighting the potential benefits of long-term engagement in cooperative structures.

Institutional participation indicators were also emerging as strong predictors. Having a cooperative-managed social protection fund significantly increased the likelihood of the outcome, and being active in cooperative decision-making had a highly significant positive effect. Finally, household characteristics showed that larger household sizes were associated with a lower probability of the outcome, as indicated by the significant negative marginal effect. This suggested that increasing household responsibilities may have constrained individuals' ability to participate or benefit to the same extent as in smaller households.

Therefore, the results demonstrated that demographic factors, socioeconomic status, cooperative engagement, and household characteristics all interact to influence the probability of the outcome. The significant variables collectively showed that older age groups, males, educated individuals, higher-income earners, productive sector participants, cooperative members, and long-term active participants were more likely to experience the positive outcome measured in the study.

3.4. Discussions

Access to quality and affordable healthcare remains one of the key pillars of achieving Universal Healthcare Coverage under the Kenya Vision 2030 and the Sustainable Development Goals (SDGs). Agricultural cooperatives play a significant socio-economic role among smallholder farmers in Kiambu County; however, their potential contribution to healthcare financing remains underexplored.

The purpose of the study was to investigate how challenges to healthcare access, member and cooperative attributes, and members' attitudes toward cooperative-based healthcare financing schemes influence the willingness to enroll in agricultural cooperatives in Kiambu. The study's specific objectives were: to analyze challenges to healthcare access among members of agricultural cooperatives in Kiambu County; to examine members' attitudes towards cooperative-based healthcare financing schemes; to determine the influence of member attributes on their willingness to enroll in such schemes; and to evaluate the influence of cooperative attributes on members' willingness to enroll in cooperative-based healthcare financing schemes. A summary of the significant findings was prepared for each study objective, as presented below.

3.4.1. Challenges to Healthcare Access among Members of Agricultural Cooperatives

The study's first objective was to analyze the challenges to healthcare access faced by members of agricultural cooperatives. The finding revealed that cooperative members face multiple challenges that affect their ability to seek, afford, and even use healthcare services effectively. Out-of-pocket payments (OOP) and limited access to healthcare insurance schemes were the most pronounced challenges. Healthcare expenses were high, particularly for specialized and emergency care services, which often compel families to delay treatment or seek alternative means, such as borrowing high-interest loans or relying on family, relatives, and friends to cover medical expenses. The seasonality and irregular nature of smallholder farming household income, which further weaken members' ability to plan for healthcare, aligning with Maina et al.'s (2022) study, which found that irregular agricultural incomes in rural Kenya contribute significantly to healthcare underutilization.

Another significant challenge was geographical or local challenges, as well as the poor state of infrastructure in rural communities. It was observed that many public health facilities were distant, under-equipped, and inadequately staffed, forcing residents to travel long distances in search of medical services, which increases transportation costs and further

constrains already vulnerable households. This is consistent with Mwangi and Karigia (2021) study, which found in rural Kiambu, there exists uneven distribution of healthcare facilities, leading to inequalities in access to healthcare services, particularly for households without private transport, this challenge is further made worse with consistent stock-outs of essential drugs and malfunctioning of essential diagnostic equipment, which discourages healthcare seeking behaviors among community members, worsening their healthcare outcomes.

Further, the quality of service provided was also identified as a challenge, with unprofessional conduct by medical staff, long wait times, and a lack of privacy at some public facilities noted. These contributed to general mistrust in public healthcare services, pushing some members toward self-medication, mission- and faith-based healthcare service providers, or traditional healers. This is in line with the findings of the study by Liu et al. (2020), who found that poor quality of healthcare services and limited patient trust were among the leading causes of underutilization of healthcare services among members in rural cooperatives in China.

Another challenge hindering access to timely healthcare service was socio-economic and cultural factors, which played a vital role in shaping members' healthcare-seeking behaviors. Gender-based barriers, particularly among women, such as domestic responsibilities and financial dependence on spouses, often delayed or prevented them from seeking timely care. Traditional beliefs and stigma associated with certain illnesses, such as HIV/AIDS or mental healthcare conditions, also discouraged households from openly seeking healthcare services. These mirror the findings of the study by Wang et al. (2021) in rural China, which found that cultural factors and disease-related stigma significantly reduced positive healthcare-seeking behaviors among community members, particularly among women.

Inadequate knowledge and awareness among members were observed as a particular challenge concerning preventive healthcare and utilization of health insurance schemes. Lack of awareness and literacy programs often led to misinformation and misconceptions, which negatively affected healthcare-seeking behavior and enrollment in healthcare financing schemes. This mirrors the study by Ochieng et al. (2020), which found that low healthcare literacy levels among rural farmers in Kenya limited their ability to participate in formal healthcare insurance schemes.

The convergence of my findings with those of Maina et al. (2022), Mwangi and Karigia (2021), Liu et al. (2020), Wang et al. (2021) and Ochieng et al. (2020), underscores the urgent need for strengthening cooperative structures to offer healthcare products and services, especially financing schemes for their members, while acknowledging their economic realities, mobility challenges, and informational needs of rural smallholder agricultural households. Leveraging existing cooperative systems could facilitate small, regular premium contributions while enhancing healthcare awareness, ensuring that the schemes equitably transform healthcare access in the region.

3.4.2. Members' Attitudes towards CBHFSs

The second objective of the study was to examine members' attitudes towards cooperative-based healthcare financing schemes in agricultural cooperatives. Members generally expressed positive attitudes toward such schemes, recognizing their potential to improve access to and affordability of healthcare for rural households. They are perceived as a trusted and community-driven approach to healthcare access that could significantly reduce the burden of high out-of-pocket medical expenses. Cooperatives are already well-positioned to manage social protection and welfare schemes for their members, given their established systems for not only member mobilization but also savings mobilization and record-keeping. Cooperative-managed schemes can foster transparency, accountability, and social trust, thereby increasing members' willingness to enroll and contribute regularly. However, attitudes varied based on healthcare-seeking behaviors and perceived affordability of available healthcare services. Individuals who frequently sought medical services were more likely to join the scheme, suggesting that the scheme could be predictable and low-cost. On the other hand, sustainability remains an impediment, mainly due to income fluctuation among households, which could affect the capacity to make regular contributions. Nevertheless, if premiums were to be made flexible and contributions made directly through the cooperative, such as deduction from members' proceeds from their produce, contributions, and sustainability, remain feasible and viable.

This kind of scheme could deliver value and satisfaction to members by providing reliable healthcare service providers, timely care, and integrating long-neglected tangible benefits, such as preventive healthcare education and regular check-ups. It was observed that awareness and member literacy levels regarding available healthcare schemes remained low, especially among members with lower levels of education, suggesting a need for continued awareness and sensitization if cooperatives are to offer these schemes to their members. It is important to note that past experiences with microinsurance or community-based healthcare schemes could enhance trust, openness, and confidence towards healthcare financing schemes offered through cooperatives.

These findings align with the study by Kusi et al. (2020), who analyzed attitudes toward community-based health insurance schemes in Ghana, and found that members' willingness to participate in community-based healthcare schemes was strongly influenced by trust in local institutions, perceived affordability, and the perceived quality of services provided. The findings also mirror those of Zhou et al.'s (2021) study of cooperative healthcare schemes in rural China, which found that positive member attitudes were shaped by transparency in leadership, perceived fairness in premium collection, and the availability of quality healthcare service providers.

The convergence of my findings with those of Kusi et al. (2020) and Zhou et al. (2021), suggest that cooperative-based healthcare financing schemes if introduced are not merely healthcare financing models but a social trust mechanism that thrives on member confidence and cooperative leadership integrity, hence sustainability would be pegged on addressing affordability, service quality, and awareness challenges to enhance member acceptance and long-term participation.

3.4.3. Member Attributes on Willingness to Enroll in CBHFSs.

The third objective of the study was to determine the influence of member attributes on members' willingness to enroll in cooperative-based healthcare financing schemes. It was observed that individual attributes such as age, gender, marital status, family size, source and level of income, cultural beliefs, past healthcare experiences, and trust in cooperative leadership could significantly influence members' willingness to join and contribute to such schemes. Age was a key factor, with younger members (under 40) showing a higher willingness to enroll than older members. Young people perceived cooperative-based healthcare schemes as innovative, affordable, and aligned with modern healthcare-risk resource pooling strategies. At the same time, older members often exhibited skepticism due to limited exposure to similar schemes. Gender differences were also evident, as women showed more substantial interest in enrollment, particularly those with children under 21 years of age or caregiving responsibilities, reflecting their prioritization of health security and the need to protect their households. This aligns with the findings of Kimani et al. (2021), who found that gender roles could significantly affect participation in community-based healthcare financing schemes in Kenya, with women being more proactive in preventive healthcare planning than their male counterparts.

Further, marital status and household size emerged as moderating factors in willingness to enroll. Married members and those with larger households showed greater interest in joining cooperative-based healthcare schemes, driven by the need for household healthcare protection and security through cost-sharing opportunities at the community level. Members with multiple income sources, especially those engaged in off-farm activities, were also more willing to contribute regularly, citing the advantage of stable, regular household incomes for the scheme's sustainability. On the other hand, low-income members expressed concerns about the sustainability of their contributions, aligning with Xu et al.'s (2020) study in rural China, which found that household income stability was a strong predictor of enrollment in cooperative-based medical schemes.

Members with past experiences in accessing healthcare were more open to cooperative-based schemes, viewing them as safety nets and community identity programs. However, members expressed reservations due to cultural perceptions that healthcare outcomes are predetermined or that community-based healthcare schemes might invite bad omens, resonating with the findings of Mladovsky and Ndiaye's (2022) study, which found sociocultural factors and health literacy levels could shape member participation in community-based healthcare insurance schemes in Sub-Saharan Africa.

Members who trusted governance and financial management were significantly more willing to enroll, underscoring the need for transparency and accountability to build confidence and enhance the scheme's sustainability. This is consistent with Zhou and Zhang's (2021) study in rural China, which found that perceived trust in cooperative leadership positively influenced rural households' participation in cooperative insurance schemes.

This study echoes that members' willingness to enroll in cooperative-based healthcare financing schemes is multidimensional, shaped by a combination of demographic, economic, and psychosocial factors. The convergence of these findings with Kimani et al. (2021), Mladovsky & Ndiaye (2022), Xu et al. (2020), and Zhou & Zhang (2021) imply that member attributes are critical in determining the success of cooperative-based healthcare financing schemes, emphasizing that the cooperative would need to design flexible, inclusive policies that considers all socio-economic, cultural and demographic factors, while enhancing trust through democratic governance, regular communication and reporting.

3.4.4. Cooperative Attributes on Members' Willingness to Enroll in CBHFSs

The study's final objective was to evaluate the influence of cooperative attributes on members' willingness to enroll in cooperative-based healthcare financing schemes. The larger cooperatives with well-established governance structures and diversified revenue sources were better positioned to mobilize members to enroll in a healthcare financing scheme if they were to introduce it. Members of these cooperatives are more willing to enroll; they trust the cooperative's management, scheme administration capacity, and transparency in managing members' finances. On the other hand, smaller cooperatives have weak management systems and consistently face challenges with sustainability and accountability of such schemes.

Nonetheless, the type of cooperative also influenced perceptions, with dairy cooperatives showing greater interest due to their consistent income flows from milk sales, which allowed easier premium deductions than in other agricultural sectors, such as coffee, where income is more irregular among members. Also, the structure and design of the scheme were observed to be critical factors, with members expressing a higher willingness to enroll only if it offered flexibility in contributions and clearly defined benefits that are fair and non-discriminatory. Schemes that allowed for periodic deductions directly from produce proceeds were considered more feasible and sustainable, as members could contribute without feeling immediate financial difficulties.

Further, comprehensive benefit packages covering inpatient, outpatient, maternity, surgical, emergency, dental, and preventive care were perceived as more attractive and beneficial than those focusing solely on emergency or hospitalization coverage. The visibility of tangible benefits, such as access to nearby accredited hospitals and a preventive health education program, would enhance their confidence and participation in a cooperative-managed healthcare financing scheme. Also, contribution models that offer these benefits influenced willingness to enroll, with members preferring small, regular deductions from their proceeds rather than lump-sum payments, aligning with the cooperative principle of self-help, where risk and cost are shared collectively among members. In cooperatives, if existing social protection and welfare were introduced, members could be more willing to enroll and contribute regularly to healthcare schemes.

Internal cooperative policy and eligibility requirements for enrolment and participation in the scheme significantly influenced members' enrolment decisions. Members would prefer inclusive policies that allow all active members, regardless of age, gender, or income level, to join without stringent requirements. Restrictive eligibility criteria or administrative and benefit claim processes discouraged potential enrolment and participation. At the same time, policies that enhance transparency, regular reporting, third-party audits, and inclusive decision-making could build trust and accountability in the administration of the scheme if cooperatives are introduced for their members.

These findings align closely with those of Onyango et al. (2021), who found that cooperative attributes significantly influenced members' trust and willingness to participate in member social protection and welfare schemes in rural Kenya. This also echoes the findings of Zhao and Zhang (2020) in rural China, which revealed that cooperative design, diversity of benefit packages, and contributions enhanced enrolment and participation in cooperative-managed medical insurance schemes. The alignment of my findings with these empirical studies underscores that well-structured and transparent cooperative systems would be essential for building trust and confidence, encouraging voluntary enrolment, and fostering consistent member participation in healthcare schemes when introduced by their cooperatives, thereby enhancing their feasibility and overall sustainability.

4.0. Conclusion

4.1. To identify challenges that members of agricultural cooperatives face in accessing healthcare services.

The findings revealed that members are well aware of the challenges that continue to undermine their ability to access timely healthcare services or medical intervention before experiencing worse health outcomes. The most observed challenges included high out-of-pocket (OOP) medical expenditures, irregular and seasonal agricultural incomes, limited access to healthcare insurance, and uneven distribution of healthcare facilities. In addition, poor service quality in public facilities further discourages the use of formal healthcare services, while socio-cultural and gender-related factors also hinder timely care-seeking behavior. This study concludes that improving healthcare access among cooperative members requires multidimensional approaches that combine financial, infrastructural, and cultural strategies, collectively constraining healthcare-seeking behaviors and participation among rural households.

4.2. To determine attitudes of members towards cooperative-based healthcare financing schemes in agricultural cooperatives in Kiambu County.

The cooperative model was deemed a reliable platform for mobilizing resources and managing social protection schemes due to its existing structures for record keeping, transparency, and accountability. Members believed that CBHFSs could reduce the burden of catastrophic out-of-pocket medical expenditures and enhance preventive healthcare if well-designed and effectively managed. However, there were observable variations in attitudes and healthcare-seeking behaviors across income levels. Thus, this study concludes that the schemes' success would depend on affordability, flexibility in contribution models, integration of preventive and curative care services, and awareness programs.

4.3. To determine how individual member attributes influence willingness to enroll in cooperative-based healthcare financing schemes.

Younger members and women, particularly those with dependents, were more willing to enroll because they appreciated the need for household financial protection, overall security, and community solidarity. On the other hand, older members and low-income earners expressed skepticism due to affordability challenges. Members with stable off-farm incomes and prior experiences with community-based or microinsurance schemes were more open to enrollment. Additionally, members' trust in governance emerged as critical. It could be shaped by transparency, accountability, and consistent communication and reporting, not only to encourage member enrollment but also to sustain consistent contributions, a key driver of scheme viability and sustainability. This study concludes that individual attributes can significantly influence willingness to enroll in CBHFSs; therefore, cooperative strategies should be strictly tailored to address member-specific attributes in the design of healthcare financing schemes if they are to be introduced for members.

4.4. To evaluate how cooperative attributes influence members' willingness to enroll in CBHFSs.

Large and well-managed, financially stable cooperatives with strong management systems were found to instill greater confidence among members. In contrast, small cooperatives with a prior history of mismanagement or weak structures faced skepticism regarding administration and fund management, which are vital for scheme sustainability. Members prefer flexible, inclusive, and transparent contribution models, in which deductions can be made directly from produce proceeds. Also, the perceived attractive comprehensive benefit packages greatly influenced willingness to enroll. Flexible, non-discriminatory internal policies and eligibility criteria that promote transparency, equitable access, and democratic decision-making were found crucial to building trust and ensuring the success of the scheme if cooperatives were to introduce it for their members. The study concludes that cooperative attributes could not only play a significant role in shaping members' willingness to enroll in, but also in ensuring the feasibility and sustainability of healthcare financing schemes if cooperatives were to introduce them for their members.

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