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Evaluation of Universal Health Coverage (UHC) in Public Health Establishments in Senegal: Case of the Kaffrine Public Health Establishment

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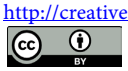

Abstract

The objective of our study is to assess the level of universal health coverage through health insurance mutuals in the public health facility of Kaffrine. To achieve this objective, we used a linear model with qualitative variables, inspired by Joseph Berkson's Logit regression model. Our main findings revealed that the key factors hindering membership in health insurance mutuals are essentially: the low level of education, a population largely composed of young people who place little importance on mutual health schemes, low monthly income, long distances between mutual agencies and populations in remote areas, and the population's lack of trust in health insurance mutuals.

Keywords

Universal Health Coverage, Health Insurance Mutuals, Adhesion, Public Health Establishments

1. Introduction

In Senegal, as in most African countries, only a segment of the population benefits from medical and social coverage for hospital expenses. This occurs through mandatory and optional systems, health insurance mutuals, and social assistance for vulnerable cases. The majority of the population—particularly those working in the informal sector (agriculture, crafts, small businesses, etc.)—does not have access to these social protection mechanisms.

Thus, Universal Health Coverage (UHC) has emerged as a global commitment

aimed at ensuring access to essential health services for all, without financial hardship. It encompasses a wide range of services, including prevention, treatment, rehabilitation, and palliative care, in line with Sustainable Development Goal (SDG) 3.8. Achieving UHC requires tailored strategies based on the socio-economic and demographic profiles of different populations, with an emphasis on effective, equitable, and needs-based health systems (Mishra, 2024; Endalamaw et al., 2024).

In response to this situation, the Senegalese government aims to develop and extend health risk coverage nationwide. It was in this context that the Universal Health Coverage (UHC) policy was launched in 2013. While it includes expanded fee exemption policies (e.g., free care for children aged 0 - 5 and seniors over 60), its core strategy rests on the development of health insurance mutuals, which are considered key pillars.

To this end, community-based health mutuals were created or restructured in each municipality and supported by the state to facilitate the expansion of health insurance. In Senegal, the emergence of mutual health schemes—at least in their current community-based form—is relatively recent. The promotion of mutual health schemes received political backing as early as 1997 when the Ministry of Health launched a support program for their development.

In 2013, as part of its continued effort to expand national health insurance, the government used community-based mutuals as primary instruments to achieve this goal. However, informal and voluntary management of these mutuals by community actors has led to limited membership and weak internal resources (Waelkens & Criel, 2004). This prompted the Senegalese state and its partners to reinforce their political commitment and enhance support for the mutuals' modernization.

This modernization initiative led to the creation of large-scale, departmental-level mutuals-professionalized and subsidized to enhance membership and improve healthcare access within communities.

Like other regions in the country struggling with healthcare access, the department of Kaffrine also faces challenges, including low coverage rates and inadequate health infrastructure. According to the Agency for Universal Health Coverage, Kaffrine has nine (9) mutual health organizations. These mutuals subsidize members' contributions by up to 50%, and in some cases, even 100% for vulnerable households identified as "indigent".

A large-scale departmental mutual has been established in Kaffrine with professional management (qualified personnel and efficient management software). This mutual faces a dual challenge: penetrating communities and securing institutional anchoring at the decentralized level.

However, it is evident that mutual health schemes, in their current state, struggle to attract enough members. This limits the government's ability to reach its national coverage target of 75% by 2021.

Despite growing interest in the issue of healthcare access, studies on different mechanisms for expanding health insurance show a low penetration rate for mutuals, and several key questions remain unanswered.

It is within this context that our study is situated, seeking to explore the true contribution of mutual health schemes to expanding health insurance and achieving universal health coverage. Our case study focuses on the Level 1 Public Health Facility (EPS 1) in the Kaffrine department.

Solving the challenges faced by mutuals in Kaffrine may require measures such as awareness campaigns and support to help mutuals further professionalize, build trust, and foster ideological and organizational alignment among key mutual stakeholders. Additionally, campaigns promoting the existence and benefits of mutuals, strategies to enroll the most disadvantaged, or even mandating mutual membership, could encourage broader participation.

To this end, we will conduct a study on how health mutuals operate within EPS 01 Kaffrine. This study aims to provide a deeper understanding of the real causes behind the low penetration of mutual health schemes and to help stakeholders better reorganize efforts toward achieving universal health coverage.

Our research problem leads us to the following research questions. The main question is: What is the level of universal health coverage through health mutuals in the public health facility of Kaffrine?

From this main question, we derive three specific questions:

- Are there disparities in access to quality healthcare through health mutuals in the Kaffrine department?
- What explains the low membership rates in health mutuals in the department of Kaffrine?
- What role do health mutuals play in improving healthcare accessibility in the department of Kaffrine?

To answer these questions, we have set the following objectives.

Our main objective is to assess the level of universal health coverage through health mutuals in the public health facility of Kaffrine. This main objective is broken down into three specific objectives:

- The first aims to identify disparities in access to quality care through health mutuals in the department of Kaffrine.
- The second seeks to explain the reasons behind the low membership of the population in health mutuals.
- The third analyzes the role of health mutuals in facilitating healthcare access in Kaffrine.

To address our research questions and meet these objectives, we will use a linear model with qualitative variables, inspired by Joseph Berkson's Logit regression model.

The remainder of this article is structured as follows. Section 2 presents the literature review. Section 3 outlines the adopted methodology. Section 4 is dedicated to presenting and analyzing the results. The conclusion will discuss the policy implications of our findings.

2. Literature Review

The paradigm of Universal Health Coverage (UHC) globally requires a holistic

approach that encompasses the supply and demand of healthcare services as well as the governance of health systems.

To conduct our literature review, we will first examine the key components of UHC. We will then analyze the role of health insurance mutuals in achieving UHC.

2.1. Key Components and Challenges of UHC

UHC aims to eliminate financial barriers by ensuring that health services are accessible to all, especially marginalized groups (Bhaskar & Kumaraswamy, 2024). Health insurance is essential for reducing out-of-pocket spending and increasing the use of healthcare services, particularly among vulnerable populations (Datta & Bagli, 2024). In terms of equity and quality, UHC promotes health equity by addressing disparities in service availability, especially in rural areas (Septiana et al., 2024).

Although UHC is a noble goal, it is important to highlight both its challenges and opportunities. In fact, the understanding and implementation of UHC can vary significantly from one country to another, often resulting in gaps in service coverage (Endalamaw et al., 2024). Additionally, the practical implementation of UHC is often inadequate, with many services excluded from coverage and significant disparities remaining. Ongoing advocacy and research are crucial to addressing these gaps and ensuring that UHC becomes a reality for all populations. In this regard, big data analysis can enhance the evaluation of UHC policies by identifying the strengths and weaknesses of health systems to improve resource allocation and guide policy adjustments (Bhaskar & Kumaraswamy, 2024).

Furthermore, the effectiveness of UHC is a multifaceted issue that encompasses access to healthcare services, financial protection, and the overall quality of health systems. UHC aims to ensure that all individuals receive the necessary health services without experiencing financial hardship, in line with global health targets such as Sustainable Development Goal (SDG) 3.8. We will now describe the main aspects of UHC effectiveness.

Regarding access to healthcare, UHC enables equitable access to a full range of services, including prevention, treatment, rehabilitation, and palliative care (Mishra, 2024). For example, countries like Kenya are implementing social health insurance programs to improve healthcare access for low-income households, demonstrating a targeted approach to UHC (Maritim et al., 2024). In terms of financial protection, UHC seeks to eliminate out-of-pocket expenses that can lead to financial catastrophe, particularly for vulnerable populations such as the elderly (Mishra, 2024). In Indonesia, UHC has been shown to improve the quality of health services while protecting citizens from high healthcare costs (Zhafarin et al., 2023).

As for the effectiveness and quality of the health system, effective UHC systems require efficient resource allocation and infrastructure, as evidenced by the need for additional health facilities in geographically dispersed areas (Almeida et al.,

2024). A holistic approach, such as that advocated by global health law, highlights the importance of addressing social determinants of health to improve UHC effectiveness (O'Campo & Mason, 2023). While UHC offers significant advantages, challenges remain—particularly in ensuring equitable access and addressing systemic inefficiencies. Some critical perspectives argue that without sufficient funding and adequate infrastructure, UHC initiatives may fail to meet their goals, leading to disparities in health outcomes.

In conclusion, achieving UHC goals largely depends on the financing of healthcare demand. Making healthcare demand financially viable remains a major constraint in developing countries like Senegal. Various mechanisms are being experimented with to fund healthcare demand, including fee exemption policies, social assistance, and micro-health insurance such as the development of health mutuals.

2.2. Universal Health Coverage (UHC): The Role of Health Insurance Mutuals

The contribution of health insurance mutuals to expanding population coverage in health insurance is a topic of great interest in the field of health economics. Health insurance is a form of social protection which domain is health services. The major task of health insurance mutuals is therefore to provide populations with protection against financial risk and access to quality healthcare.

Picheral (2001) explains that access to care is the material ability to reach health resources and services, encompassing at least two dimensions: material and social. Accessibility reflects the possibility of turning to healthcare providers. The study by De Allegri et al. (2006) shows that members themselves associate their decision to join a mutual with the level of trust they have in its management. Documents received at the time of registration, support from an external organization, the collective nature of the mutual, and the enrollment of other community members all contribute to strengthening people's trust in the health mutual.

In many countries, the term "health insurance system" is widely used. In Senegal, as in some West African countries, people are more familiar with the term "health mutuals" because the word "insurance" often refers to large commercial insurance companies, whereas mutuals are by definition non-profit. This already reveals the sociological barriers in understanding even the terminology used.

On this point, the International Labour Organization (BIT, 2002) recommended using the term "micro health insurance" or "social mutual", which encompasses the various models of initiatives that aim to address the challenge of healthcare access for underprivileged populations. The term "Micro" refers to the relatively small financial contributions from mutual members, and "insurance" because the goal is to anticipate the risk of illness. It is therefore a collective group that, essentially through members' contributions, seeks to carry out acts of foresight, mutual aid, and solidarity to prevent social risks related to the human person and mitigate their consequences, as illustrated in the following **Figure 1**.

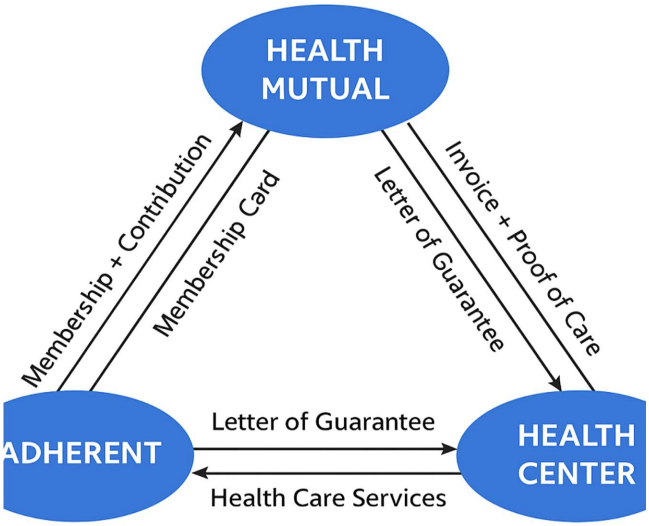

Figure 1. Relationships between health mutual, health center, and members. Source: Author.

This figure outlines the process through which mutual members access healthcare services at health centers. After enrolling and contributing to the health mutual, the insured person receives a membership card which allows them to obtain a guarantee letter to present at the health center in order to receive care. Once treatment is provided to the insured patient, the health center sends the invoice and supporting documents to the health mutual, which is then responsible for reimbursing the healthcare costs.

Moreover, it should be noted that micro-insurance through community-based mutuals and targeted or general social assistance barely manages to cover the most vulnerable individuals, but it remains a valid mechanism worth improving. For community-based health mutuals, several constraints hinder enrollment within the targeted populations (informal and rural sectors). The identified constraints that slow down people's adherence to health mutuals are related to volunteer-based management, the small size of the mutuals, and the lack of external resources.

After this overview of the literature on universal health coverage and the mechanisms for developing health mutuals, we will now present our methodology for processing and analyzing our data.

3. Methodology

This section presents the different components of the study's methodology, namely: the study design, the target population, sampling, data collection, and the definition of study variables. The methodology adopted for our study consists of two main parts: the collection of primary data and the information obtained from the staff of EPS 01. These data are gathered from health mutuals in the department of Kaffrine. They will enable us to understand the objectives and activities (analyzed using Stata software), and to determine whether there is a correlation be-

tween the functioning of health mutuals and the low rate of healthcare service utilization. We will use a linear model with qualitative variables, inspired by Joseph Berkson's Logit regression model.

The study took place in December 2020 and focused on the Level 01 Public Health Establishment (EPS1) in the department of Kaffrine. It involved all households who sought care at the hospital during the specified period, following a specific sampling method detailed below.

3.1. Study Design

We will conduct a cross-sectional descriptive and analytical study. It will be carried out within the Level 1 Public Health Establishment (EPS1) in Kaffrine, specifically in the dental and oral health service (odonto-stomatology). This is a linear econometric model with qualitative variables. The binomial regression model used has two main purposes: first, to describe the nature of the relationship between the expected probability of a success for the response variable and an explanatory variable (e.g., the probability of being vaccinated); second, to predict the expected probability of success for the dependent variable based on the value of the independent variable (e.g., the probability of being vaccinated given the child's age).

To describe the relationship or make predictions, the Logit model requires estimating parameters using the maximum likelihood method via the econometric software R. Estimating these parameters will allow us to test their significance and therefore determine whether a correlation exists between different variables. The significance threshold chosen for the study is 5%. To better understand our study design, we will now analyze the composition of our study population.

3.2. Study Population

The study will take place in December 2020 and will focus on the Level 01 Public Health Establishment (EPS 01) in Kaffrine, or the regional hospital center. Kaffrine is located 257 km east of the capital Dakar, along national road N1 between the regions of Kaolack and Tambacounda.

Nearby localities include Toune, Ngam, Kilomètre Six, Diogo, Djigui, and Lougue. In 2015, the department of Kaffrine a population of 231,495 (36.6% of the regional population) spread across an area of 2716 km^2, according to official figures from the National Agency for Statistics and Demography (NASD).

The target population includes both members and non-members of health mutuals who are encountered in the odonto-stomatology department of EPS1 in Kaffrine. This health center was selected due to limited resources and the difficulty of accessing households affiliated with mutuals. As such, patients will be directly surveyed in the department. The study will include patients aged twenty-one (21) years or older who voluntarily agree to participate without coercion. This age group is chosen because their health conditions may be more delicate, potentially affecting their ability to undergo questioning.

3.3. Sampling

The total number of consultations (working days) in the dental department for the year 2020 was 2400 patients [Source: Dental and Stomatology Department of the EPS 01 in Kaffrine], or an average of 200 patients consulted per month. For this purpose, we will use a sample of 200 patients (n = 200) for the study, whom we will interview. We will then proceed by linear extrapolation of the results to the entire population according to the study period indicated above (in the study scope).

3.4. Data Collection

Primary data will be collected through a randomized, individualized interview process for all 200 patients, regardless of their status. Thus, a randomly selected patient will be interviewed, without being influenced by their gender or social status, in order to gather information deemed important for the proper conduct of the study. Microsoft Excel will be used to record this primary data. Secondary data will be collected from medical staff through observation of patients' medical records and administrative documents.

After describing the data of our study, it is important to define the variables corresponding to our data.

3.5. Definition of Variables

Our model includes one independent variable and a dozen dependent variables to better account for the various determinants of population membership in health mutuals.

The dependent variable is the membership status (ADH), measured as follows: the ADH variable takes the value 1 if the individual is a member of a health mutual, and 0 otherwise. Individuals will be considered non-members if they have never subscribed to any insurance, if they dropped out at least two (2) months ago, or if they have been members for less than one (1) month in the case of annual contributions, or less than two (2) months for semi-annual contributions without having benefited from any services.

As for members, they include individuals who have been part of a health mutual for at least one (1) month (for annual contributions) or at least two (2) months (for semi-annual contributions) and who regularly pay their contributions according to the established payment schedule. All these standards are based on the fact that, after joining a health mutual in Kaffrine, new members must observe a waiting period of at least one (1) month (for annual contributions) or two (2) months (for semi-annual contributions) before becoming eligible for the guarantee letters offered by the mutual to access healthcare services.

Following the dependent variable, the independent variables are distributed as follows:

- Gender of the individual
- Awareness of health mutuals

- Trust in health mutuals
- Existence of a health mutual in the respondent's locality
- Distance between the nearest health mutual and the individual's place of residence
- Age of the individual
- Sector of activity (Informal, Private, Public)
- Marital status (Single, Divorced, Married)
- Individual's monthly income
- Individual's family size
- Individual's level of education
- Quality of healthcare

For the collection and processing of primary data, weightings ranging from 0 to 3 will be assigned to the different categories of qualitative variables, depending on the type of response provided by the respondent. These weightings will be used to calculate scores that will serve to determine probabilities. For example: if the respondent is female**,** the variable SEX in the model is assigned a weight of 0 (**SEX = 0**); otherwise, it is assigned 1 (**SEX = 1**). This procedure will be applied to all qualitative variables (see Table 1).

As for the quantitative variables, the values collected during the interviews will be recorded: distance (in km), age (in years), income (in thousands of FCFA), and family size (number of individuals). This process will help determine the effect of changes in an explanatory variable on the dependent variable (ADH).

3.6. Description of Variables

In this section, we will first describe the variables according to membership status, then present an overall picture of the surveyed population based on the study variables.

Structure of Respondents by Membership Status

The table below presents a partial overview of the individuals surveyed, categorized by their membership status.

Table 1. Distribution of qualitative variables by weighting.

Variables	Abbreviation	Description	Weighting
Gender	SEX	Female	0
		Male	1
Sector of activity (Informal, Private, Public)	INF	No	0
	PRI	Yes (for each sector)	1
	PUB		
Awareness	SEN	No	0
		Yes	1

Continued

Marital status (Single, Divorced, Married)	CEL DIV MAR	No Yes (for each status)	0 1
Trust	CONF	No Yes	0 1
Existence of mutual health scheme in locality	EXI	No Yes	0 1
Education level	EDU	No schooling Primary Secondary Higher	0 1 2 3
Quality of healthcare	QUA	Poor Good	0 1

Source: Author.

After presenting the distribution of qualitative variables, we now move on to show the distribution of data based on the membership status of individuals in health mutual (Table 2).

Table 2. Distribution of data by membership status.

	Men	Women	Total
Members	36	23	59
Non-members	89	52	141
Total	**125**	**75**	**200**

Source: Author, based on survey data.

In total, 200 people were surveyed, including 59 members (29.5%) and 141 non-members (70.5%). Women represent 62.5% of the sample, and men 37.5%. In other words, the majority of the surveyed population is female, with 125 women in total. Now, we present the structure of respondents according to the study variables.

3.7. Structure of Respondents According to Study Variables

The following Table 3 provides a comprehensive summary of the survey data across all variables:

Table 3. Complete distribution of survey data by variable.

Variable	Non-members		Members		Total
	Count	Percentage	Count	Percentage	
SEX					
Male	52	36.88%	23	38.98%	75
Female	89	63.12%	36	61.02%	125
AGE					
<41 years	94	66.67%	31	52.54%	125
≥41 years	47	33.33%	28	47.46%	75
INF	Yes	87.94%	45	76.27%	169
PRI	Yes	4.96%	4	6.78%	11
PUB	Yes	7.09%	10	16.95%	20
REV					
<30,000	111	72.78%	16	27.12%	127
≥30,000	30	21.28%	43	72.88%	73
TAIL					
<5	49	34.75%	42	71.19%	91
≥5	92	65.25%	17	28.81%	109
EDU					
No schooling	92	65.25%	15	25.42%	107
Schooling	49	34.75%	44	74.58%	93
DIV	Yes	2.84%	2	3.39%	6
CEL	Yes	7.09%	5	8.47%	15
MAR	Yes	90.07%	52	88.14%	179
QUA					
Poor	22	15.60%	10	16.95%	32
Good	119	84.40%	49	83.05%	168
EXI					
No	49	34.75%	1	1.69%	50
Yes	92	65.25%	58	98.31%	150
DIS					
<10 km	63	44.68%	58	98.31%	121
≥10 km	78	55.32%	1	1.69%	79

Continued

SEN					
No	51	36.17%	2	3.39%	53
Yes	90	63.83%	57	96.61%	147
CONF					
No	72	51.06%	3	5.08%	75
Yes	69	48.94%	56	94.92%	125

Source: Author.

In total, 200 people were surveyed, of whom 59 were members (29.5%) and 141 non-members (70.5%). Women represent 62.5% of the total respondents, and men 37.5%. In summary, women make up the majority of the surveyed population, with 125 respondents.

The majority of respondents are female, totaling 125 individuals. From all the results highlighted in this table, certain variables—such as trust, income, distance, etc.—already stand out clearly.

After presenting the methodological approach for processing and analyzing the data, we can now move on to the presentation and analysis of our results.

4. Presentation and Analysis of Results

In this section, we aim to identify the variables that are statistically linked to membership. We will then examine how health mutuals behave in relation to individuals in these categories of variables, particularly in terms of their likelihood to join a mutual health scheme.

It is important to note that for the model, only variables that are significant at the 5% threshold will be retained.

4.1. Presentation of Results

Table 4. Estimation results. Endogenous variable: membership status.

Variable	Estimate	Std. Error	z value	Pr(>|z|)		Deviance Residuals
(Intercept)	−5.24	1.415	−3.703	0.000213***	Min	−2.34723
AGE	0.06161	0.02176	2.832	0.004629**	1Q	−0.21175
REV	1.041E−05	0.00000479	2.174	0.029727*	Median	−0.00298
EDU	1.052	0.3524	2.986	0.002831**	3Q	0.23553
DIS	−0.5654	0.587	−0.563	0.000366***	Max	2.60329
CONF	0.631	0.496	1.274	0.009***		

Source: Author.

The data we have comes from individuals surveyed within EPS 01. Part of this sample consists of members of a health mutual, while the other part are non-members. For these respondents, we previously defined a set of variables in the methodology section. The parameter estimation of these variables yields the following results (Table 4).

For each individual i in the sample, the set of explanatory variables is defined as:

$$X_i = \begin{pmatrix} 1 \\ AGE_i \\ REV_i \\ EDU_i \\ DIS_i \\ CONF_i \end{pmatrix} \quad \text{with} \quad i = 1, \cdots, n$$

We recall that the model should highlight, through the differences in individuals' probabilities of enrollment, the behavior of health mutuals in the enrollment process, as explained by the identified explanatory variables.

To this end, we define the probability as follows:

$$\begin{aligned} P\left(ADH_i = 1\right) &= P\left(x_i \le \beta' x_i\right) = F\left(\beta' x_i\right) \\ &= F\left(\beta_0 + \beta_1 AGE_i + \beta_2 REV_i + \beta_3 EDU_i + \beta_4 DIS_i + \beta_5 CONF_i\right) \end{aligned}$$

It becomes, according to the estimation parameters:

$$P\left(ADH_i = 1\right) = \frac{score_i}{1} + score_i \text{, with:}$$

$$\begin{aligned} score_i = \big(&-5.240 + 6.161 * 10^{-2} * AGE_i + 1.041 * 10^{-5} * REV_i \\ &+ 1.052 * EDU_i - 5.654 * 10^{-1} * DIS_i + 3.631 * CONF_i\big) \end{aligned}$$

The score determines eligibility for membership. As for probability, it determines the chance that an individual in that department will enroll in a health mutual.

This is a graph of the estimated logistic regression coefficients, with their 95% confidence intervals (Figure 2):

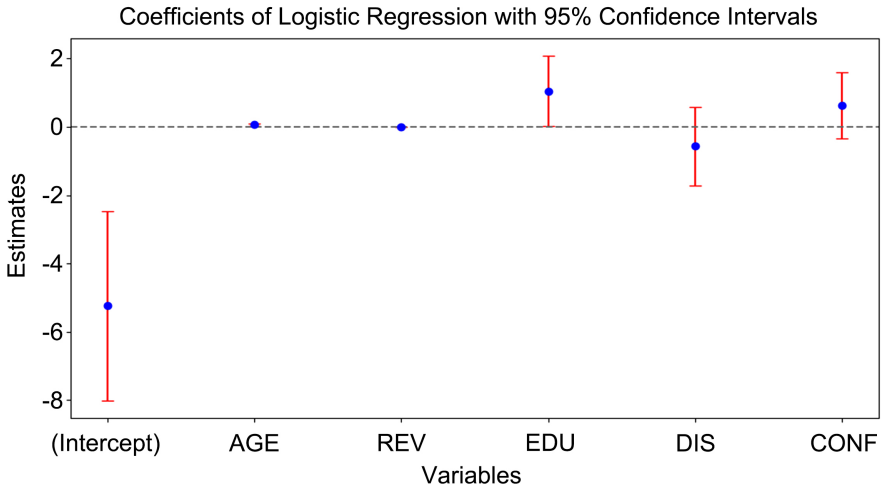

Figure 2. Logistic regression coefficients with their 95% confidence. Source: Author.

The blue dots represent the estimated values of the coefficients and the vertical red bars indicate confidence intervals around each estimate.

If a bar does not cross zero, it means that the effect is statistically significant.

4.2. Discussion and Analysis of Results

4.2.1. Characteristics of Non-Members

The results of the primary data estimations (Table 4 and Annex) reveal certain variables that influence individuals' membership status in health mutuals. These findings are also supported by the overall survey data (Table 3). According to this table, young people under 41 years old (94 individuals) account for the largest group of non-members, representing 66.67%—twice the proportion of individuals aged 41 and over in the same membership status.

In contrast, among members, individuals aged 41 and over represent 47.46%, nearly half of all members. This suggests that older individuals appear to be more interested in joining a health mutual than younger ones. This is corroborated by the estimations (See Annex), which indicate a correlation between age and membership status.

The table also shows no relationship between the sector of activity and membership status. For example, individuals working in the informal sector make up 87.94% of non-members and 76.27% of members—high percentages compared to the private and public sectors. This means that although most non-members are from the informal sector, so are most members.

Furthermore, the same table shows that 78.72% of non-members have an income less than or equal to 30,000 FCFA, compared to only 27.12% among members. This indicates an influence of income on membership status. Table 4 reports a p-value of 0.0297 (<0.05), indicating a statistically significant relationship between income and membership status.

There is no relationship between gender and membership status. The proportion of women among non-members (63.12%) and among members (61.02%) is dominant compared to that of men.

The level of education is a determining factor in membership, with a significant number of non-school-aged members (92 peoples) for a percentage of 65.25. It is only 25.42% among members; education level therefore influences membership status.

The distance between the target population and health insurance companies is a determining factor in an individual's choice to join a health insurance company. The table shows that 55.32% of non-members live more than 10 km from the nearest health insurance company. However, it is 1.69% among members. This shows that distance influences membership in a health insurance company. 84.40% of non-members believe that the quality of care is good, the response is also positive among members at 83.05%. The quality of care does not influence membership status. Regarding trust, 5.08% of members believe they do not trust mutual insurance agencies. This is not the case among non-members, where

51.06% disapprove of trusting mutual health insurance companies; trust therefore influences membership status.

Whether or not an individual has a mutual health insurance plan in their locality has no bearing on their membership status, as the table shows that both non-members and members report the existence of a mutual health insurance plan in their locality, with respective proportions of 65.25% and 98.31%. There is no correlation between mutual health insurance coverage and membership status.

We note that 90.07% of non-members are married, compared to 88.14% among members. These percentages show that both membership categories are largely dominated by married couples. There is no relationship between marital status and membership status.

Non-members are characterized by being young, low-income, uneducated, living in remote areas, and lacking real confidence in mutual health insurance plans. We conclude from these analyses that age, income, education level, distance, and trust influence individuals' health insurance membership status. As such, they represent significant variables affecting membership status.

4.2.2. Low Mutual Health Insurance Enrollment

Low mutual health insurance enrollment is a recurring problem in almost all sub-Saharan African societies. This is one of the main points on which scientific ideas on mutual health insurance converge (Turcotte-Tremblay et al., 2012).

During our survey, we interviewed 200 patients at the Institution; only 59 patients were members of a mutual health insurance plan, representing 29.5% of the total population studied. This further reinforces the problem of the low penetration rate of mutual health insurance in most sub-Saharan African countries. Certain household characteristics contribute to this low rate.

1) Income level

The household income level is a key factor in the decision of populations to join health mutuals. This was supported by a recent study by Gnawali et al. (2009), which noted that a household's low income simultaneously limits its ability to meet certain needs. Basaza et al. (2008) also argue that a low financial contribution from households constitutes a major obstacle to the population's membership in health mutuals.

During our survey, the lack of financial resources was one of the main reasons cited by non-members for not joining health mutuals. As shown in **Figure 3**, more than three-quarters of respondents have an income less than or equal to 50,000 FCFA. In this sense, income appears to be a determining factor in the decision to join.

Moreover, **Table 4** indicates a P-value = 0.0297 < 0.05. This means that the relationship between an individual's perceived income and their membership status is statistically significant.

Higher income is associated with a higher probability of adherence. This may reflect a better ability to pay premiums or a greater appreciation of health services.

In other words, the fact that 78.72% of non-members have a monthly income less than or equal to 30,000 FCFA may explain the low penetration rate of health mutuals in thedepartment of Kaffrine. This is also visible in the chart in Figure 3, which shows a concentration of individuals earning less than or equal to 25,000 FCFA.

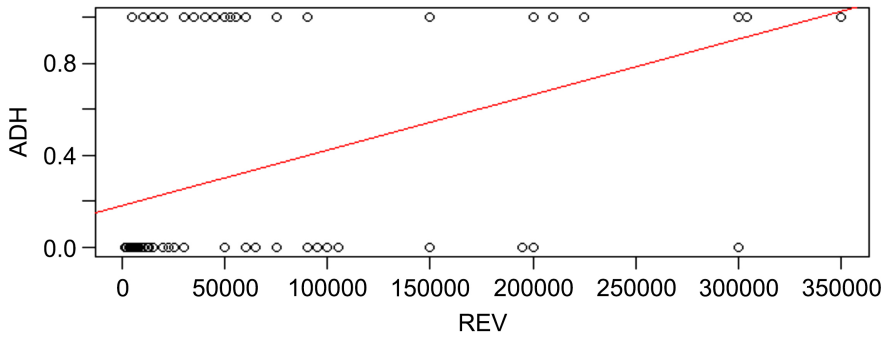

Figure 3. Distribution of respondents by income bracket. Source: Author based on primary survey data using R software.

In some we can underline that higher income is associated with a higher probability of adherence. This may reflect a better ability to pay premiums or a greater appreciation of health services.

2) Geographical accessibility

The problem of accessibility to mutual health insurance and membership are phenomena that can be correlated, especially in African societies where mutual systems are not well organized. The distance to travel to access a mutual health insurance scheme can be an obstacle to membership. In this respect, the results of our surveys on the influence of distance to a mutual health insurance company are very revealing.

According to the results in Table 4, the P-value = 0.00036 < 0.05. This value shows a highly significant relationship between distance and membership status. That said, the fact that 58 of the 59 members live less than 1 km from the nearest mutual health insurance company is an explanatory factor for their high membership.

Now, we can retain that greater distance (likely from a health center) decreases the probability of adherence. This highlights the importance of geographic accessibility in the success of UHC.

3) trust in mutual health insurers

The decision to join a mutual health insurer is not just a financial one, as people's trust in mutual insurers can be a key factor in their choice. According to De De Allegri et al. (2006), members themselves establish a link between the decision to join and the confidence they have in the mutual's management.

Table 4 shows a P-value = 0.0129 < 0.05, so there is a correlation between people's confidence and their membership status. As for the question of lack of confidence, some patients in the survey cited the cumbersome administrative paper-

work required to obtain a letter of guarantee as a constraint. However, others revealed that they were cautious about mutual health insurers, due to previous experience of poor management by other systems. All these disappointments have a negative impact on people's confidence, leading them to adopt a reticent attitude towards mutual agencies.

Than, greater confidence (in the health system, institutions, or providers) increases the probability of adherence. This shows that trust is a key lever for the acceptance of UHC.

4) Level of education

Education appears to be an important factor in participation in a health mutual. An educated person would be better equipped in terms of the importance attached to health risks than an uneducated person and would have a greater capacity to understand the workings and importance of mutualist organizations.

Our survey results show that 65.25% of non-members are uneducated, compared with 25.42% of members (**Table 3**). In addition, the results of the data estimations indicate a P-value = 0.0028 < 0.05, reflecting a significant link between people's level of education and their health mutual membership status. Most of the people interviewed during our survey spoke only two languages, Wolof and Pulaar, but they were strongly dominated by Wolof.

Finally, we can note that more educated individuals are significantly more likely to adhere. This may be related to a better understanding of the benefits of UHC or greater trust in institutions.

5) The influence of age

The influence of age on an individual's membership status is the subject of contradictory debates among researchers. While some studies reveal a significant number of elderly people (over 60 years old) among mutual members, other studies indicate that age does not appear to have an influence, as neither younger nor older individuals are ever under- or over-represented among members (Defourny & Failon, 2011: pp. 10-21).

In our specific context, the dominant proportion in the non-member block is that of young people, i.e. under 41 (**Table 3**). **Table 4** also shows a P-value = 0.0046 < 0.05, indicating a correlation between age and membership status. Of the 200 patients questioned, those aged 41 months and over accounted for 125, or 62.5%, and the graph below (**Figure 4**) shows a decreasing trend in age frequencies as age increases. This reflects the large number of young people in this population.

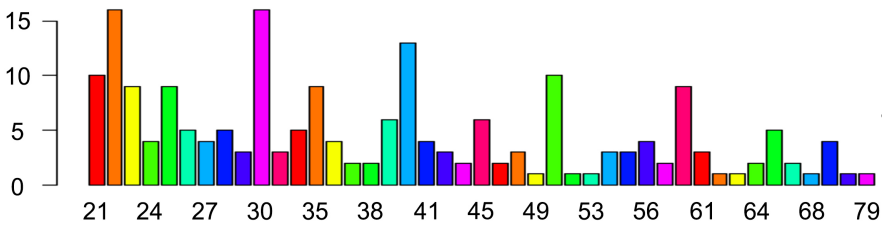

Figure 4. Diagram of respondents by age group. Source: Author based on primary survey data using R software.

Globally, we retain that older individuals are more likely to adhere to UHC. This may be due to increased health risks or medical needs with age.

4.3. Exclusion Factors for Mutual Health Insurers

Our various analyses to date have enabled us to draw up a profile of the non-members of mutual health insurance companies in the context of our study. In the same context, several studies have been carried out on mutual health insurance in terms of membership. According to the conclusions of the various authors, age, gender, ethnicity, religion, marital status, level of education, professional status of the head of household, household financial capacity, cultural beliefs, household size, trust in healthcare providers, distance, (…) are the characteristics most linked to mutual health insurance (Defourny & Failon, 2011: pp. 10-21). Regarding certain factors such as household size, some studies present somewhat contradictory results, although it seems that household size is not always understood in the same way. Household size would therefore not have a significant influence if a high participation of large households can be observed (Musango et al., 2004). Conversely, Basaza et al. (2008) report that larger households find it more difficult to participate in a health risk pooling scheme.

In our specific context, the profile of excluded people revealed by our study concerns, among others, individuals aged under 41, heavily dominated by women, and people living on a monthly income of 30,000 FCFA or less. Of the 59 participants, 43 have a monthly income of over 30,000 FCFA, i.e. 72.88%.

The uneducated represent a significant number of the excluded in this department, largely represented by the two major languages (Wolof and Pulaar). Few are those with at least elementary school education, i.e. 46.5% of the total population studied (See Annex). In addition to this group of excluded people, there are also those who have no confidence in the mutual insurance systems, most of whom denounce the non-lucidity of mutual insurance companies in the process of accessing healthcare. We close this list of the excluded with individuals whose distance from the nearest mutual insurance company does not allow them to access it, i.e. those who live more than 10 km away. During the survey, most respondents with a monthly income of 100,000 FCFA or more justified their non-membership by the distance they had to travel to reach a mutual agency.

Analysis of the results of our study shows that the opposites of the main factors determining non-membership are those influencing membership of a mutual health insurance scheme. That said, mutual health insurance members are those who are not only well educated, but whose financial capacity and many other characteristics enable them to meet the requirements of mutual systems.

To this end, mutual health insurance companies seem to favour certain factors specific to individuals when they join. A situation which we could describe as selection, aimed at eliminating certain people who would be a negative burden on the mutual health insurance scheme, such as illiterate people who are difficult to manage, those who do not have the financial capacity to pay their contributions,

or those from remote areas who are considered hard-to-reach targets (…).

5. Conclusion and Economic Policy Implications

The aim of our study was to assess the level of universal health coverage through mutual health insurance in the Kaffrine public health establishment.

Our main results enabled us to understand the reasons for the low level of adherence to mutual health insurance in the department of Kaffrine. The main factors that act as barriers to membership are: low levels of education, a population dominated by young people who attach less importance to mutual health insurance, low monthly income, long distances between mutual agencies and people in remote areas, and people's lack of confidence in mutual health insurance.

These barriers are due to the fact that, in providing their services, mutual health insurance companies seem to favour a certain segment of the population. As a result, they reproduce disparities in access to healthcare. To overcome these obstacles, decision-makers need to think about implementing strategies that will give people easy access to care. A reorganization of mutual health insurance based on a regulatory framework and the intervention of mutual players could be a good idea. The persistently low membership rates raise questions that call for real responsibility on the part of the government in terms of its control, financing and support policies for the mutual health insurance sector in particular, and health insurance in general.

Based on discussions of results, we can formulate some economic policy implications in order to strengthen the UHC policy in Senegal:

- Target younger and less educated individuals with awareness campaigns.
- Subsidize premiums for low-income households.
- Enhance physical accessibility to health services (infrastructure, transport).
- Improve transparency and quality of care to build trust.
- Use community leaders to promote UHC in remote areas.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Annex

Annex: Table of results.

```
glm(formula = ADH ~ AGE + REV + EDU + DIS + CONF, family = binomial(link = "logit"), data =
donnees)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-2.34723 -0.21175 -0.00298   0.23553   2.60329

Coefficients:

             Estimate Std. Error z value Pr(>|z|)
(Intercept) -5.240e+00  1.415e+00  -3.703  0.000213 ***
AGE          6.161e-02  2.176e-02   2.832  0.004629 **
REV          1.041e-05  4.790e-06   2.174  0.029727 *
EDU          1.052e+00  3.524e-01   2.986  0.002831 **
DIS         -5.654e-01  1.587e-01  -3.563  0.000366 ***
CONF         3.631e+00  8.496e-01   4.274  1.92e-05 ***
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Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)
    Null deviance: 242.627 on 199 degrees of freedom
Residual deviance:  92.579 on 194 degrees of freedom
AIC: 104.58
Number of Fisher Scoring iterations: 9

>
```

Source: Author.