Factors Associated with Membership in a Mutual Health Insurance Fund in the Thiès Region (Senegal) in 2023: Article

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Abstract:-

➢ *Introduction :*
Mutual health insurance constitutes a micro-insurance system which facilitates access to care by avoiding direct payment. They represent one of the pillars of our Universal Health Coverage. After years of existence and despite political commitment, community support for mutual health insurance remains low until now. The objective of our work was to study the factors linked to the membership of mutual health insurance companies in the Thiès region and to propose solutions.

➢ *Methodology :*
The study was cross-sectional, descriptive and analytical. It was carried out among a sample of 1,300 people, residing in the Thiès region for at least 6 months, chosen following a three-stage cluster survey. A questionnaire was used to collect data related to predisposing, facilitating and health system factors. These data were entered and analyzed using SPSS version 21 software. The significance value was P < 0.05. The Odds ratio was used to measure the strength of the link.

➢ *Results :*
The average age is 42 years and among the people surveyed 75.3% lived in an urban area, 84.5% claimed to know mutual insurance companies. The number of dependent children among the people surveyed was 9 and 90% had an income-generating activity, married people were 82.9% and 78.2% were educated. The mutual penetration rate was 69.3%.

The analysis showed that membership in mutual health insurance was significantly influenced by the area of residence with P < 0.001 [OR: 2.0; CI:1.4-2.8], by age group with P < 0.001[OR:1.4; CI:1.1-2.0], by income-generating activity with P < 0.001 [OR:2.1; CI:1.1-4.1], by knowledge of a mutual with P < 0.001 [OR:81.6; CI: 42.2-157] and education with P < 0.001 [OR: 1.9; CI: 1.3-2.6]. Membership was also associated with marital status and the number of children in care with P < 0.001 and P < 0.002 respectively.

➢ *Conclusion :*
This study made it possible to evaluate the penetration rate of mutual health insurance in the Thiès region in 2023, but also to identify the factors associated with membership in a mutual health insurance. Strengthening communication and targeted awareness and improving the level of knowledge of the populations will help to boost the level of support of the populations of the Thiès region.

Keywords:- Determinants, Risk Factors, Members, Beneficiaries, Mutual Health Insurance, Senegal.

I. INTRODUCTION

The deterioration of economic conditions in the 1980s was accompanied in developing countries by a deterioration in the state of health of the population, particularly among the poorest segments of the population. The reduction in public spending in the health sector, due to the application of structural adjustment policies, has had significant negative consequences on the availability and quality of care offered to the population through delivery costs. very high for populations [2].

The devaluation of the CFA franc complicated the situation, which resulted in an increase in the costs of basic social services and the low budgetary allocations intended for the health of populations in countries south of the Sahara. Actors in the informal sector, more than 80% of the active population in developing countries, are more affected by this situation. [2; 4]

➢ *In Senegal, the Development of Mutual Health Insurance has been Marked by Several Factors:*

- The deterioration of economic conditions and the sharp deterioration in the state of health of the populations;
- Nearly 80% of the population is not covered by the social protection system (the urban and rural informal sector);
- Around 7.8% of residents benefit from health risk coverage paid by the State or linked to employment in the private sector; [2]

The rise of mutual health insurance and voluntary and community health insurance systems constitute an antidote to the health care crisis in Senegal. In 2011, the Senegalese State gave importance to the fight against poverty and exclusion transcribed in the Poverty Reduction Strategic Document (PRSD). The PRSP II (2011 – 2015) aims to strengthen and extend social protection instruments by 2015 by increasing the health insurance coverage rate from 20 to 50% of the population of Senegal [4].

In the field of health, the National Health Development Plan (NHDP), established since 1993, is in its second phase (1998-2007) and the promotion of mutual health insurance is included among the priorities of this plan. A law on mutual health insurance was passed, and a strategic plan for the development of mutual health insurance was also developed jointly with mutual insurance stakeholders. An agency attached to the minister's office is responsible for coordinating interventions to promote mutual health insurance in Senegal with the mission of:

- The establishment of Universal Health Coverage (UHC);
- The mobilization of numerous local, national and international actors;
- The establishment of a space for coordination, exchanges and collaborations called "Concertation Nationale (CN)"; [2]

The organization of mutual societies in regional spaces into unions or coordinations at the level of the regions of Thiès, Dakar, Kaolack, Louga, Saint Louis and Diourbel.

In Senegal, in 2007, the number of people contributing to a health micro-insurance system was estimated at 65,000 for a total number of beneficiaries of 421,670. Compared to other countries in the sub-region, this development has been relatively rapid [2].

In such a context of "statistical poverty", much empirical work has been carried out on the factors of membership in mutual health insurance in sub-Saharan Africa. [16; 26].

Studies generally agree that membership is not linked to gender. Dubois (2002) notes a significant number of people over 60 among mutual members, but this survey only concerns one mutual. [16; 6; 18].

Household income level is considered an important element of membership. Further reinforced by recent work by Gnawali et al. (2009), most studies indicate that a low contributory capacity of households constitutes a major obstacle to affiliation with a mutual health insurance fund . [8; 9; 15; 17].

According to Dubois (2002), the size of households does not have a significant influence. If a greater participation of large households can be observed, it would essentially be due to the higher level of income [13; 18].

While some studies highlight a very good understanding of mutualist principles, both by members and non-members, others highlight the low degree of knowledge of mutual health insurance by communities. [11; 9; 19; 8].

In Senegal, the study by Jütting (2005) shows that the level of education has a considerable effect on the probability of joining and that 15% of the population are simply unaware of the existence of mutual health insurance in the region of Thiès, due to incomplete information from certain sections of the community [6].

In 2010, Senegal had more than 130 mutual health insurance companies in operation. Based on data provided by SNDES 2013-2017, the coverage rate of the target population by mutual health insurance was 13.6% in 2012 [4].

The objective of this study was to identify the factors associated with membership in a health mutual and to propose areas of solutions at all levels in order to strengthen the mutual system for better appropriation of the development strategy. of Universal Health Coverage (UHC).
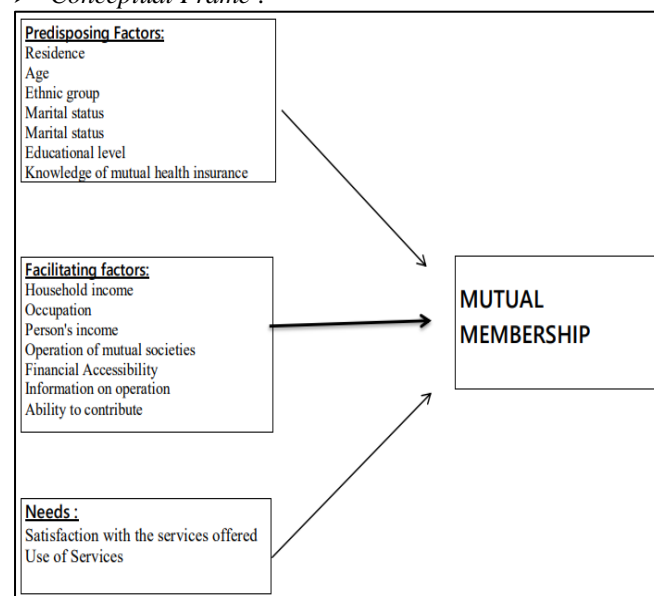
➢ *Conceptual Frame :*

Fig 1 Conceptual Framework of Determinants of Membership in Mutual Health Insurance
(Adapted from the Anderson Newman 1995 Model)

II. METHOD

> *Study Framework*

The study area consisted of the region of Thiés located approximately 70 km from Dakar with a population estimated at 2,049,764 inhabitants in 2018. It covers an area of 6,670 km2, or 3.4% of the national territory with proximity to the capital. Being a mining and coastal area, economic activity is very developed in the region with the influx of the tourist sector, quarrying, crafts, livestock and agriculture.

The evaluation of health insurance indicators in the Thiès Region reveals a proportion of functional mutualist organizations down to 85.5% (77/90) compared to 2020 (92%) and a percentage of Card beneficiaries of Equal Opportunities enrolled in mutual health insurance constant since 2019 at 47% (2,334). However, the number of Equal Chance Card (ECC) holders set at 5,460 in 2021 has been reached. The health risk coverage rate increased from 30% in 2020 to 26.6% for a target set at 45% while the penetration rate evolved in the same direction from 46% to 41.8% for a regional target of 95%.

According to the UHC regional service, the Thiès region has 90 mutual societies, spread over the 03 Departmental Union of Mutual Health Insurance (DUMHI) at the level of the different departments. [1]

> *Type and Study Population*

The study was of a descriptive cross-sectional type with an analytical aim, which was carried out from July 1 to November 25, 2023. The study population was represented by all populations aged at least 18 years old, who live in the Thiès region.

> *Sampling*

As part of this study, the three-stage cluster sampling method was chosen, the first stage concerned the choice of districts, the second stage constituted the choice of posts with their respective clusters and the third stage concerned the choice of households or concessions. The *SCHWARTZ* formula ($[1.96^2 * p * q] / I^2$) was used for the calculation of the sample with a penetration rate of 42.35% in 2021 and a precision of 4%.

Taking into account non-respondents led us to add **10%** of the minimum sample size. As in each cluster, **20** people had to be surveyed at the household level, which gave **65** clusters for a size of **1300** in this study.

For the distribution of the clusters to the different structures in the region, we needed the list of all the districts with their populations and the cumulative populations.

The number of clusters is set at **65** and was distributed over a sample size, **1300** people. The sampling interval is obtained by dividing the total number of the population by **65** . The step obtained was **31535** . A random number had to be chosen between **1** and **31535** . If this number corresponded to **54** , it belonged to the first cluster. The other clusters were obtained by successively adding the sampling interval.

For the choice of health areas (health center and posts), this same process was applied by dividing the total population over the number of clusters already allocated in each district. This made it possible to randomly obtain the number of health areas eligible to have a cluster.

The choice of concessions was made once at the sociological center of the village, a direction was drawn at random using a pencil. In the direction, we started with the first concession on the right and skipped the second concession and so on, if we didn't get the size of the cluster, we always turned to the right.

If in the village we did not have the size of the cluster, we moved to the nearest village . Inside the compound, only the head of household or his representative who was at least 18 years old was questioned.

> *Data Collection (Tools, Method, Procedure, Data Collected)*

A questionnaire was used to collect data, taking into account the different variables of our framework. The tool was first tested among the populations for an initial correction.

65 investigators and **9** supervisors were identified and trained on data collection distributed throughout all the districts of the Thiès region.

The emphasis was placed on the purpose of the survey, the understanding of the questionnaire in French and local languages, the definitions used and the fieldwork methodology. After the training, **09** supervisors left according to the daily work program at the level of the **65** clusters

The pilot survey was carried out in the Diourbel region, which presented the same socio-cultural, demographic and economic characteristics that the study framework had chosen, as a test site. A number of **40** people were surveyed, this made it possible to assess the understanding of the investigators and the average time to administer the tools, the methodology of work in the field and corrections were made as the process progressed.

Information was collected in households from household heads or their representatives, meeting the inclusion criteria. Information on membership in a mutual health insurance fund was collected from the booklet issued by the mutual insurance company for those beneficiaries who had it, for the others according to their background and skills. The investigators were supervised by a person, a member of the district management team. A period of **5** months was necessary for data collection.

For the purposes of our study two groups of variables were collected, dichotomous or multimodal qualitative variables and quantitative variables. These variables were based on personal characteristics which were sociodemographic, economic, knowledge and skills which were linked to the capacity for membership among beneficiaries in the Thiès region. Data entry was done using SPSS version 21 software.

➢ *Data Analysis*

The analysis consisted of two parts: descriptive analysis and analytical analysis.

In **the descriptive analysis** , the qualitative variables were described in number, percentage and the quantitative variables in average with the standard deviation, extremes and median. It consisted of a comparison between knowledge of mutual insurance, membership in a mutual insurance company and other variables. The Chi2 test was used for percentage comparison. The difference was statistically significant when the p value was strictly less than 0.05.

For **the multivariate analysis** we used the binary logistic regression method. All variables whose p value was ≤0.25 were retained to model knowledge of mutual insurance and membership in a mutual insurance company. Bottom-up modeling was carried out. The adjusted ORs with their [95% CI] were determined for each variable retained in the final model. The quality of fit of the model was investigated with the Hosmer and Lemeshow test to verify its adequacy.

➢ *Ethics*

Quantitative and qualitative data are collected anonymously. That is to say, only those responsible for the study (investigator and supervisors) had access to the data.

They are kept confidential. Previously, this protocol was submitted to the ethics committee of the Ministry of Health and Social Action (MHSA) and approval was made.

III. RESULTS

➢ *Descriptive Study*

In our work, out of 1300 people surveyed, 901 were beneficiaries of mutual health insurance, i.e. a penetration rate of 63.3%.

Of the 1,300 people surveyed, women represented 51.8%, compared to 48.2% of men. Most resided in urban areas, i.e. 75.3% of cases. The average age was 42 years and the 40-49 age group was the most represented with 30.2%. Married status was the most representative with a proportion of 82.9%. The care of 3 to 4 children by household heads was more representative with 28.69% and the average number of children looked after by household head was 9 children. Educated people were 78.2%, 90% carried out an income-generating activity and the average monthly income of 50,000 FCFA represented 66.2% against 9.1% above 150,000 FCFA. Most people declared having received information about mutual health insurance, i.e. 84.5%.

Of the 901 beneficiaries, 94.8% made regular and up-to-date contribution payments, 62.2% and 71.5 were respectively satisfied with the smooth functioning and contributions.

Of the 834 beneficiaries who attended health structures, 56.9% declared that the care was good.

The reasons for non-membership for the 399 non-beneficiaries were 27.5% for lack of information, followed by 23.05 for the cost being too expensive. *(See table 1)*

Table 1 Description of the Factors Associated with Membership in a Mutual Health Insurance Fund in the Thiés Region

Variables	Frequency absolute (not)	Relative frequency (%)	IC at 95%	
Sex n= 1300				
Male	626	48.2	49.1	54.6
Feminine	674	51.8	45.4	50.9
age range				
20-29 years old	84	6.5	5.1	7.8
30-39 years old	300	23.1	20.8	25.4
40-49 years old	393	30.2	27.7	32.7
50-59 years old	273	21.0	18.8	23.2
60-69 years old	240	18.5	16.4	20.6
Age NA	10	0.8	0.3	1.2
Area				
Urban	979	75.3%	73.0	77.7
Rural	321	24.6	22.0	28.6
Number of children in care				
Less than 2	165	12.7	10.9	14.5
2 – 4	373	28.7	26.2	31.2
4 – 6	346	26.6	24.2	29.0
6 – 8	220	16.9	14.9	19.0

Variables	Frequency absolute (not)	Relative frequency (%)	IC at 95%	
8 – 10	111	8.5	7.0	10.1
10 – 12	41	3.2	2.2	4.1
12 and up	44	3.4	2.4	4.4
Generative activities income _				
Sector formal (employees)	104	8.1		
Sector informal	1176	90.4		
None activity	20	1.5		
Income monthly in FCFA				
Below 50,000 _	774	66.2	63.6	68.8
50,000-100,000	158	13.6	11.7	15.5
100,000-150,000	130	11.1	9.4	12.8
Greater than 150,000	107	9.1	7.5	10.7
Educational level				
Educated	1016	78.2	75.9	80.4
Uneducated	284	21.8	19.6	24.1
Marital status				
Bachelor	127	9.8	8.2	11.4
Married	1078	82.9	80.9	85
Widower widow _	93	7.2	5.8	8.6
Divorce	2	0.2	0.1	0.4
Awareness				
Yes	1098	85.44	82.5	86.4
No	202	84.5		
Membership				
Yes	901	69.3	66.8-	71.8
No	399	30.7		
Daily contribution n= 901				
Yes	854	94.8	93.3	96.2
No	47	5.2	3.8	6.7
Satisfaction with the services offered				
Good	512	56.9	53.7	60.2
Acceptable	373	41.4	38.2	44.6
Bad	15	1.7	0.8	2.5
Operating satisfaction				
Good	560	62.2	59	65.3
Acceptable	327	36.3	33.1	39.4
Bad	14	1.6	0.7	2.4
Satisfaction Contribution				
Accessible	644	71.5	68.5	74.4
A little Dear	247	27.4	24.5	30.3
Too expensive	10	1.1	0.4	1.8
Reason for non-adherence n= 399				
Lack information	110	27.5		
Too expensive	92	23.05		
Means of fooling	75	18.7		
Stopping MS services	56	14		
Service unavailable	33	8.2		
No difference	25	6.2		
Not interested	8	2.0		

> *Analytical Study*

The multivariate analysis revealed that heads of households with a high level of education, knowledge about mutual insurance, with a profession (employees) and an advanced age of more than 50 years were more likely to join a mutual insurance company. health ($p < 0.001$). Likewise, membership in mutual health insurance was higher among households residing in urban areas ($p < 0.001$). *(Table 2).*

Table 2 Analysis of Factors Associated with Membership in a Mutual Insurance Company

Factors associated with membership in a mutual insurance company	OR aj [95% CI]	P value
Area		**<0.001**
Rural	1	
Urban	2.0 [1.4-2.8]	
Age		**0.031***
<50 years	1	
>50 years	1.4 [1.1-2.0]	
Instruction		**<0.001***
Educated	1	
Uneducated	1.9 [1.3-2.6]	
Occupation		**0.038***
Non-employees	1	
Employees	2.1 [1.1-4.1]	
Knowledge of mutuality		**<0.001***
No	1	
Yes	81.6 [42.2-157]	

P value = 0.643

IV. DISCUSSIONS

This penetration rate of mutual health insurance was strongly influenced by the place of residence of the people surveyed. Thus, people who resided in an urban area were more willing to join a mutual health insurance (P < 0.001). These results were supported by a study conducted by *I. Seck , Tal Dia A, O. Sagna , MM. Leye (2017)* on the determinants of membership and loyalty to mutual health insurance in the region of Ziguinchor (Senegal), which revealed that membership in a mutual health insurance was higher among households residing in urban areas and those with a good perception of the quality of care (P< 0.001). **[20].**

This penetration rate of mutual health insurance was associated with the age group with an average of 42 years. The older the person, the greater their ability to join a mutual health insurance plan (P< 0.003). These results corroborate with the study carried out by *Dubois (2002),* which noted a significant number of elderly people (over 60 years) among mutual insurance companies, but this survey only covers one mutual insurance company. **[22].**

On the other hand, another study conducted by *Criel (1998)*, reported the fact that older people are more economically and socially excluded from the community and therefore experience more difficulty participating in mutual insurance **[11].**

This penetration rate of mutual health insurance was strongly influenced by the level of education of the people. The higher the level of education, the stronger the ability to join a mutual health insurance (P< 0.001). These results are supported by the study carried out by *I. Seck , Tal Dia A, O. Sagna , MM. Leye (2017)* , which showed that membership in mutual health insurance was influenced by households with a high level of education (P < 0.001). **[20].**

Elsewhere, these results were supported by the study carried out in the mutual society of Zabré, in Burkina Fasso, which revealed that individuals having benefited from formal education would be more open to innovation and would have greater abilities to understand the interest of the mutualist system **[22].**

This penetration rate of mutual health insurance was strongly influenced by the income-generating activity of the people surveyed. Employees were more willing to join a mutual health insurance plan than those in the informal sector (P<0.001). These results are supported by the study carried out by *I. Seck , Tal Dia A, O. Sagna , MM. Leye (2017),* that membership in mutual insurance was associated with heads of households having a high income (P<0.001). **[20].**

Elsewhere in the world, in Asia, studies have shown that there is a clear relationship between employment or household income and their willingness to pay within the framework of community health micro-insurance systems, particularly in India **[17].**

This penetration rate of mutual health insurance was strongly associated with the knowledge of the people surveyed. Knowledge about people's mutuality had a direct link with the ability to join a mutual health insurance (P < 0.001). These results were supported by a study conducted in a rural setting by *Faye. A et all* in 2016, which showed that membership of a mutual health insurance in a rural area was associated with knowledge of the principles and operation of mutual health insurance (OR: 2.06; 95% CI). **[21]**

Likewise, these results are supported by the study carried out in Senegal, which indicates that 15% of the population are simply unaware of the existence of mutual health insurance in the Thiès region, due to incomplete information from certain sectors. of the community **[6].**

Other results of research carried out in Senegal, which indicated that the insufficiency of awareness campaigns and the inaccessibility of messages often faced with mostly illiterate targets, constituted a no less important constraint [3].

V. LIMITATIONS OF THE STUDY

This study has the following limitations, the failure to take into account the associative past of the people surveyed and the failure to take into account the assessment of pharmacy managers (pharmacists).

VI. CONCLUSION

This present study made it possible to identify the factors associated with membership in a mutual health insurance fund in the Thiés region. It also made it possible to better understand the different factors that interact around this problem in order to allow the authorities to adapt their interventions according to the identified needs.

The study showed that advocacy with the authorities for the reconsideration of Family Security Grants for traditional members, the strengthening of the capacities of managers in administrative and financial management of mutual health insurance, the development and implementation of a integrated communication plan to support the development of Departmental Union of Mutual Health Insurance (DUMHI) and mutual health insurance (including community health actor) and advocacy with partners and local authorities for support in the operation and awareness of mutual health insurance proves appropriate to better succeed in social policy within the framework of Universal Health Coverage (UHC).

Finally, strengthening targeted communication and improving the level of knowledge will help boost the level of support among populations in the Thiés region.

REFERENCES

[1]. **Thiès Medical Region (RM).** Annual performance report. Joint Annual Review (RAC); 2018.

[2]. **Defourny J, Failon** J. The determinants of membership in mutual health insurance in sub-Saharan Africa: an inventory of empirical work. Developing worlds. 2011; 1 (153): 7-26

[3]. **JÜTTING J., TINE** J. The impact of mutual health insurance in rural Africa. An empirical analysis in the Thiès region of Senegal, Bonn: Development Research Center (ZEF), Bonn; 2000.

[4]. **Ministère de Santé et de l'Action Sociale (MSAS)**. Plan Stratégique de Développement de la Couverture Maladie Universelle au Sénégal; 2013-2017.

[5]. **Makhtar M. Backe Leye M**. Study of the Viability of the Departmental Health Insurance Unit in the Health District of Koungheul (Senegal). Cent African J Public Heal. 2019;5(4):156.

[6]. **JÜTTING J. (2005)** Health insurance for the poor in developing countries, Ashgate Publishing, Aldershot.

[7]. **ALDERMAN H., PAXSON C. (1994)** Do the poor insure ? A synthesis of the literature on risk and consumption in developing countries, in Bacha E. (ed.), Economics in a changing world, St Martin's, New York, 48-78.

[8]. **BHATTAMISHRA R., BARRETT C. (2010)** Community-based risk management arrangements: a review, World Development, vol. 38, n°1, 923-932.

[9]. **CRIEL B., BARRY A., VON ROENNE F. (2002)** The PRIMA project in Guinea Conakry. An experience of organizing mutual health insurance in rural Africa, Medicus Mundi Belgium, Brussels.

[10]. **BASAZA R., CRIEL B., VAN DER STUYFT P**. (2008) Community health insurance in Uganda: Why does enrolment remain low? A view from beneath, Health Policy, vol. 87, n° 2, 172-184.

[11]. **CRIEL B. (1998)** District-based health insurance in sub-Saharan Africa, Part II: Case studies, Studies in Health Services Organization & Policy, Anvers.

[12]. **DE ALLEGRI M., SANON M., BRIDGES J., SAUERBORN R. (2005)** Understanding consumers' preferences and decision to enrol in community-based health insurance in rural West Africa, Health Policy, vol. 76, n°1, 58-71

[13]. **EKMAN B. (2004)** Community-based health insurance in low-income countries: a systematic review of the evidence, Health Policy and Planning, vol. 19 (5), 249-270

[14]. **FONTENEAU** B. (2006) Determinants of membership in mutual health insurance: proposal for an analysis grid and results of some research, Communication at the GRAP-OSC seminar Crossing perspectives: determinants of membership in mutual health insurance, Liège, October 6.

[15]. **GNAWALI DP, POKHREL S., SIE A., DE ALLEGRI M., SOUARES A., DONG H.** , **SAUERBORN R. (2009)** The effect of community-based health insurance on the utilization of modern health care services: Evidence from Burkina Faso, Health Policy, vol. 90, n°2-3, 214-222.

[16]. **DE ALLEGRI M., SANON M., BRIDGES J., SAUERBORN R. (2005)** Understanding consumers' preferences and decision to enrol in community-based health insurance in rural West Africa, Health Policy, vol. 76, n°1, 58-71.

[17]. **JAKAB M., PREKER A., SCHNEIDER P., DIOP F., JÜTTING J., GUMBER A., RANSON K., SUPAKANKUNTI S., KRISHNAN C. (2001)** Social inclusion and financial protection through community financing : initial results from five household surveys, Working Group 3, Background Report for the Commission on Macro-Economics and Health of the WHO, Geneva.

[18]. **MUSANGO L**, **MARTINY P., PORIGNON D., DUJARDIN B. (2004)** The profile of members and non-members of mutual health insurance in Rwanda: the case of the Kabutare health district, Cahier de santé, vol. 14, no. 2, 93-99.

[19]. **TINE J. (2000)** Rural health mutuals in the Thiès region in Senegal. Community initiatives to improve access to health care, Center for Development Research (ZEF), Bonn.

[20]. **I. Seck , Tal Dia A, O. Sagna , MM. Leye (2017).** Determinants of membership and loyalty to mutual health insurance in the Ziguinchor region (Senegal). In Public Health 2017/1 (Vol. 29) , pages 105 to 11

[21]. **Faye A, Amar S, Tal-Dia A.** Determinants of membership in mutual health insurance in rural Senegal. Rev Epidemiol Public Health. 2016; 64: S259.

[22]. **DUBOIS F. (2002)** The determinants of participation in mutual health insurance: study applied to the Leeré Laafi Bolem mutual health insurance in Zabré, Dissertation, University of Liège.