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Effect of Universal Health Coverage On The Demand For Health Care In Togo

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Abstract *- The issue of universal health insurance is one of the orientations of the Togolese government's policy in the health sector. The objective of this study is to analyze the effect of health insurance on the demand for health care in Togo, approximately ten years after one of the first signs of this political will, which is the compulsory insurance of government employees. Using data from a nationally representative survey, with the help of an ordered logistic regression and a propensity score matching method to overcome endogeneity issues, we show an increase in the demand for health care, linked to health insurance. This effect is associated with a decrease in consultation costs for insured persons and is more accentuated for public care and the most vulnerable populations, calling for strong actions in favor of these groups who are the least covered.*

Keywords - *Health insurance, Demand, health care, Matching, Ordered logistic model*

I. INTRODUCTION

Health care coverage remains low in developing countries, including Africa (Dussault et al., 2006; WHO, 2017). However, the effect of health insurance in terms of improving well-being is still mixed (Cutler et al., 2000; Baicker, 2015). Theories on the subject and empirical studies very often result in a link between health insurance and health or well-being (Finkelsttein et al., 2012; Mebrati, 2018; Wang; 2016, Courtemanche et al., 2018). Thus, one of the channels through which insurance is expected to influence well-being, including access to care, remains poorly documented, especially in developing countries for which this emphasis on health insurance is relatively recent. Indeed, health insurance may not necessarily affect the use of care and may not have the desired effect.

Studies on the effect of health insurance on health care utilization are widely documented in the literature (Bernal et al., 2017; Finkelstein et al., 2012; Cutler et al., 2000, Bagnoli, 2019; Mebrati, 2018; Wang, 2016). This literature on the subject in developed countries, and especially in the United States, concludes that health insurance improves access to care by reducing the costs associated with health services (Newhouse et al., 1993; Finkelsttein et al., 2012). Research in developing countries, however, shows mixed results. There are positive results overall in terms of improved health care utilization concerned with health insurance (Bagnoli, 2019; Wang, 2016; Mebrati, 2018), whether in Africa or Asia. These improvements are associated with lower health care costs, especially in hospital settings (Wagner et al., 2018; Mebratie et al., 2018). Health insurance lowers the costs of services offered, making them more accessible. The psychological effect of health insurance has also been noted as a factor influencing the use of health care services.

The positive impact of health insurance is not observable everywhere. Indeed, the implementation of a health insurance system is not necessarily associated with an improvement in the use of health care centers (Kuwawenaruwaa et al., 2019; Mohanan et al., 2014) nor with a decrease in household expenditure on health care (Bernal et al., 2017; Manning et al., 2006).

Indeed, the presence of health insurance may not be associated with a decline in the cost of health goods and services (Cutler et al. (1999). The cost of services provided by health care providers may be more expensive for health insurance beneficiaries than for non-beneficiaries. Thus, health insurance-induced reductions do not necessarily lead to a decrease in the cost paid by the insured when compared to the uninsured.

In Togo, according to the health accounts for the year 2010, health-related expenditures represent 5.3% of the gross domestic product (GDP), or a total of 92 billion FCFA (CNS, 2016). Expenditures are attributable to curative care (38%) and pharmaceuticals (34%). The institutional entities that contribute the most are households, which contribute 48% through direct payments, followed by public administrations (38%).

Despite the actions taken by the public authorities to achieve universal health coverage, very few people are covered. The coverage rate, according to the latest figures published by the National Institute of Health Insurance (INAM) in 2020 is around 5%.

Health insurance is mainly provided by public institutions or programs with an emphasis on public health care facilities. The latest policy directions aim at gradually extending health insurance to all segments of the population to reduce the vulnerability of households to shocks related to the illness of one of their members.

This renewed interest in health insurance in the country, given the progress made since the main insurance provision to public sector workers, was introduced in 2011

deserves attention for the results achieved since then. Indeed, the extension of health insurance increases the use of health facilities and a certain congestion of the system (Huang, and Gan, 2017). In the Togolese context, this effect could lead to overcrowding of the system and a decline in the quality of services offered in health centers if provisions are not made for the provision of care.

Has health insurance in Togo increased the use of health care services in Togo? Have household expenditures on health care decreased as a result of health insurance? These are the questions that this study will attempt to answer. The results will make it possible to assess the effect of health insurance on the use of health care, to highlight the challenges relating to the supply of health care that would result in the presence of universal coverage for all.

The rest of the document is presented as follows: the first section presents the analytical framework of the study, the second section the Togolese context of health insurance, the third section the methodology and data, the fourth section the results, and the fifth section the discussions.

II. ANALYTICAL FRAMEWORK

The analysis of variations in the demand for health care as a function of health insurance is based on the overall analysis of the demand for health care. The most commonly used model of health care in economics is that of Grossman (1972), in which health is considered as a factor of production and consumption and health care as one of the many intermediate goods that provide this health. This work has been refined by other authors such as Hurley (2001) by taking into account the perception of health as an important factor, because of the uncertainty that reigns in this field. This issue of uncertainty was addressed by Arrow in 1963 in his book on uncertainty and health care, considered to be the foundation of health economics. According to these theories, the demand for health care is the result of a complex process that takes into account, beyond financial accessibility, knowledge of the health sector, the perception of the seriousness of the health condition, the individual's confidence in the care that will be provided, being uncertain of the quality of the care provided by the provider, and the geographical accessibility of the care. By influencing health expenditure, health insurance essentially acts on one of these determinants, namely access to health care. Moreover, rigorous evaluation of the effect of health insurance can be difficult, as the uninsured differ significantly from the insured (Levy and Meltzer, 2008). However, when studies are conducted on the topic, the analysis of the effect of health insurance usually focuses on three aspects, namely service care utilization, care expenditure, and health improvement (Lê et al., 2019). The present study focuses on the two channels through which insurance affects well-being, namely lower health care expenditure and improved access (apprehended by utilization) to health care.

The theoretical literature on the subject is quite controversial. Concerning health care expenditures, if the objective of health insurance is to remove financial barriers to access to care, insured persons would spend less than uninsured persons on health care during morbid episodes (Grossman, 1972). It is therefore expected that the out-of-pocket expenses of the insured for their care during these episodes will be lower than those of the uninsured. The work of Cutler et al. (1999) notes, however, that this cost reduction could be hindered by the interests of providers. Indeed, the latter would benefit from prescribing more expensive care to the insured in the knowledge that reimbursement is provided by the health insurance. This situation de facto leads to a higher cost of care paid by the insured and the uninsured, all other things being equal. The expected reduction in direct health expenditure may therefore prove insignificant.

About the use of services, work on the demand for health care carried out in the 1970s (Fuchs and Kramer, 1972; Feldstein, 1971; Newhouse and Phelps, 1976) shows that it depends on price and income, resulting from the maximization of consumer utility. The price elasticity of demand for health goods, which represents the degree of variation in demand as a function of price, is one of the factors that most affect the sensitivity of demand for care to the reduction in costs induced by health insurance. The value of this elasticity to health insurance would determine the sensitivity of the demand for care to health insurance. The interactions identified by the theory concerning moral hazard and adverse selection are also points that affect demand for and expenditure on health care following health insurance (Cutler et al., 1999).

The problem of adverse selection, highlighted by Akerlof (1970) in the used car market, results from the asymmetry of information between the insurer and the insured. Individuals who are most at risk of illness, i.e., who use health care most frequently and have high expenses, will be more likely to want to insure themselves against the risk of illness. The use of health care can thus lead to health insurance. Moral hazard concerns the behavior of the various actors to derive maximum benefit from the insurer-policyholder relationship. It is twofold: the moral hazard associated with not protecting oneself is relatively low because of the inconvenience caused by the illness, apart from the price to be paid (Pauly, 2000)

The results of the theoretical evidence against these theoretical assumptions tend to validate them. In general, in developed countries, the general finding is that it induces higher utilization of health services and lower costs of medical care Finkelstein et al., 2012; Cutler et al., 2000).

In developing countries, where state involvement in improving access to health insurance is relatively recent, studies on the subject are rare, and the literature is sparse. When looking at both maternal and child health care, results are mixed, with some leading to improved access to care (Bagnoli, 2019; Bernal et al., 2017, Wang et al., 2017) while others lead to mixed or negative results (Kuwawenaruwaa et al., 2019; Mohanan et al., 2014).

Care expenses could be increased by providers for those who have health insurance (Newhouse, 1993, Baicker, 2015), inducing the fact that the costs of services paid by the insured are not lowered because of health insurance.

The endogeneity issue of insurance versus health care has been highlighted, and recent work on the topic (Bagnoli, 2019; Kuwawenaruwaa et al., 2019; Wang et al., 2017) circumvents it by using experimental or quasi-experimental methods. The most commonly used approaches are difference-in-differences and discontinuity regressions for experimental methods. Propensity score matching or using experimental variables are the approaches used for quasi-experimental methods. The results of health insurance on the cost of care are positive based on studies in Asia and Africa. Wagner et al. (2018), in analyzing health care expenditures in the Philippines, using an experimental method using the difference-in-differences method, lead to the result of a significant decrease in these expenditures following health insurance. The same results are obtained by Mebratie et al. (2018) in Ethiopia regarding the costs of care. Other studies result in the non-existence of effects on the cost of care. Bernal et al. (2017), using a regression approach on discontinuities in Peron, conclude that insurance does not affect the cost of care, although access has improved. They hypothesize that providers increase their costs, which raises the price level paid by the insured. Similar results have been obtained by Manning et al. (2006) in the US and Karan et al. (2017) in India.

When looking at health care utilization, the results are less clear-cut, with the bulk of studies finding an increase in demand for care even if the effect on overall health is not certain. Bagnoli (2019) and Wang et al. (2019); show an increase in maternal and child care utilization in Ghana, Rwanda, and Indonesia using propensity score matching. The work of Levine et al. (2016) finds an increase in public over private health care utilization following health insurance in Cambodia using experimental studies, with the point being that there are no effects when using a propensity score matching technique. In Tanzania, however, Kuwawenaruwa et al. (2019) do not find any improvement in health care utilization following health insurance using an experimental study design.

Beyond the salutary role of health insurance in terms of improving access to care, other authors draw attention to the fact that the existence of health insurance leads patients to abuse health care. Manning et al. (2006) note this situation of misuse of health care linked to the existence of health insurance which induces a higher demand in terms of quantity and quality of care. In addition, the intrinsic characteristics of people who subscribe to health insurance, if it is voluntary, induces the need to take into account the adverse selection (Duku et al., 2016). Adverse selection is, therefore, likely to induce greater utilization of insured individuals and greater health care for this purpose (Cutler et al., 2000).

If it is not insured patients who use health care more frequently and sometimes abusively, it is practitioners who act on the cost of care by prescribing care to patients that they do not need, especially if their income is linked to the cost of these interventions (Bernal et al., 2017; Baicker, 2015). In addition, the other assumption is that of the utilization of the most expensive care by the insured (Bernal et al., 2017).

Several works have looked at the case of Togo, intending to assess the effects of measures taken by public authorities to improve access to health care. Atake and Amenda (2018), in looking at Togo's public sector insured, find that despite being insured, most households face catastrophic health expenditures, and this is felt most acutely in the poorest households. Supplyside elements such as provider behavior, low quality of services offered, and long waiting lines are what induce this situation. Matie et al. (2018), using Demographic and Health Survey data, find an improvement in skilled birth attendance induced by health insurance, using logistic regression.

In general, the literature reveals an overall improvement in access to care following health coverage. This effect may be attributable either to a reduction in the cost of health goods and services, induced by the insurance, or to the psychological factor induced by the availability of this insurance, which encourages those who have it to make use of it without fear of large enough expenses that could lead to debt or a loss of production capital.

III. METHODOLOGY AND DATA

A. Data sources

To examine the relationship between health insurance and access to health care in Togo, data from the Harmonized Household Living Conditions Survey (EHCVM) in Togo will be used. This survey was conducted by the National Institute of Statistics and Economic and Demographic Studies (INSEED) in two phases: the first in 2018 and the second in 2019. Funded by the World Bank, this survey is conducted in a set of countries in the West African zone.

The EHCVM is nationally representative, and the data are representative at the regional level and by area of residence (urban/rural). As titled, this survey addresses the living conditions of households in aspects related to education, health, employment, food security, expenditures, income, etc.

a) Study variables

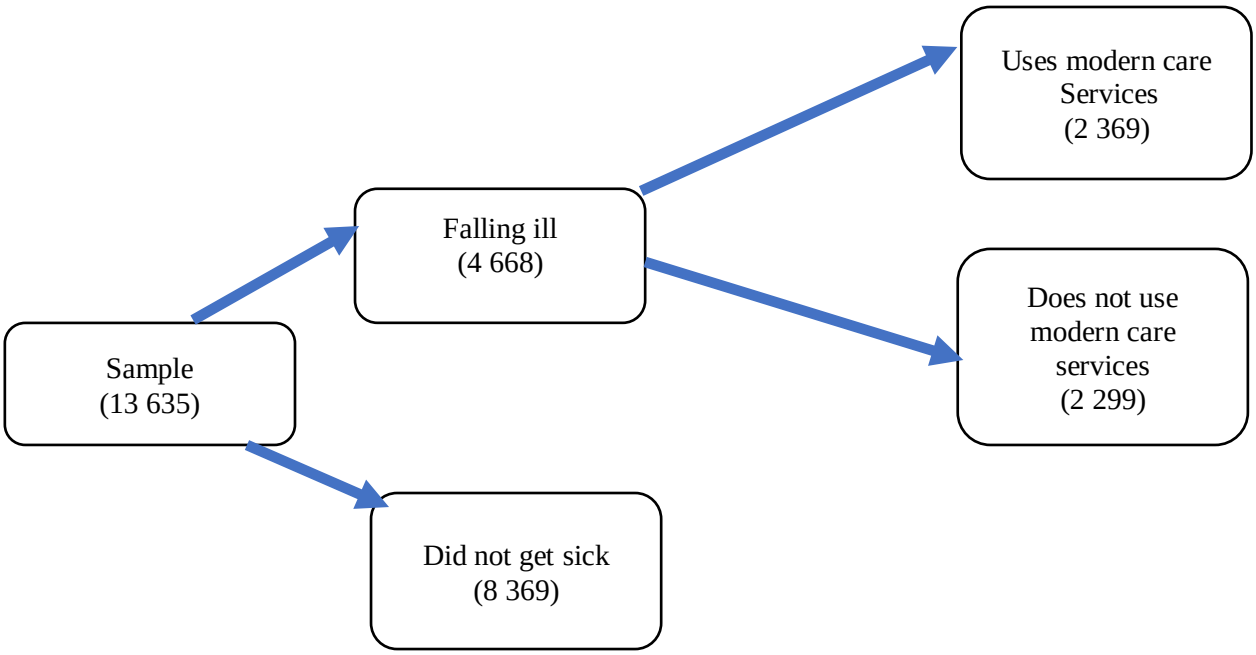
The objective of our study is to assess the effect of health insurance on the use of health care and health care expenditure. Regarding the demand for care, while several studies have addressed this issue, the use of health care has often been analyzed based on dichotomous variables by considering the use of care as not subject to conditions (Bagnoli, 2019; Wang, 2016). However, the use of care is a phenomenon conditioned on the occurrence of a morbid event. This conditionality induces a sequence in the process that we consider in this study.

The main dependent variable is health care utilization**.** In the HCVS, household members were asked about the occurrence of a morbid event in the past 30 days. When this response was positive, the person was asked what type

of care he or she used as a result of this problem; the modalities concerned all types of care, including health services, healers, and self-medication.

The use of health care thus takes place through two main stages, namely the occurrence of a morbid condition and the use or non-use of health care. This is a sequential process, and an individual can stop either at the stage of no occurrence of morbidity, non-use of a modern health service, or use of a modern health service.

The following diagram describes the process:



For our study on the effect of health insurance on health care utilization, we, therefore, construct a dependent variable using the procedure adopted by Afawubo et al.(2020), which results in an ordinal variable that takes the following values

1 if the individual does not get sick

2 if he/she becomes ill and does not use modern health care

3 if he/she becomes ill and uses modern health care

The same pattern is implemented for the public and private care use variables.

The treatment variable is health coverage. The question was asked about the fact of being covered by health insurance and then about the possession of a health cover such as mutual insurance or a consultation voucher. We, therefore, construct the variable health coverage, which takes the value 1 if the answer is yes to one of these questions and 0 otherwise.

Issues relating to health expenditure were also studied, as the cost is one of the elements affecting the use of care. In this respect, the most important expenses are those related to consultation fees and the purchase of medicines. These variables will also be included in the analysis.

To perform the determinant analysis focusing on the effect of health insurance, some independent variables were used, based on the literature to this effect (Lê et al., 2019; Bagnoli, 2019; Wang et al, 2016; Karan et al, 2017)

b) Region of residence*:* regions do not have the same facilities in terms of public services and structures that can be linked to health insurance or health care. This variable appeared in the work of Bagnoli (2019), Wang (2016), where it affects the use of care but is also correlated with health insurance.

c) The environment of residence (urban or rural)*:* the structures present in urban areas are different from those in rural areas, and the works of Bagnoli (2019), Wang (2016), Sengupta (2019) note its link with health insurance.

d) The education level of the head of the household: this is a variable that affects the probability of being insured, and it is shown that the higher the level, the more sensitive the household may be to health insurance issues. Bagnoli (2019), Wang (2016), Ghosh (2019), but have the opportunity to work in a public structure, which provides health insurance.

e) Gender of the household head*:* a household headed by a male household head, due to gender inequalities that are present in most societies, will tend to have more health coverage Ghosh (2019), Bagnoli (2019).

f) Household welfare quantile*:* this is calculated based on total household expenditure and is therefore divided into four groups, from the lowest to the highest expenditure. As health insurance is mainly related to government actions and programs, one would expect that those with health insurance are also those who are related to the public sector and hence have more income Bagnoli (2019), Wang (2016).

g) Marital status: predisposes individuals to take advantage of health insurance from a third party member of their household, especially their spouse Sengupta (2019), Wang (2016).

B. Analysis methodology

This study aims to apprehend the effects of insurance on the use of care. The literature on the subject identifies several approaches, namely experimental difference-in-differences (Wagner et al., 2018), propensity score matching (Bagnoli,2019; Wang et al., 2019), instrumental variables (Levine et al., 2016; Sengupta et al., 2019) or logistic regression (Agbanyo et al., 2021). In the rest of the paper, we will proceed 'analysis in the first step in a descriptive analysis. This will be followed by an identification of the determinants of health care utilization, with a particular focus on health insurance, using a quasi-experimental approach.

For the determinant analysis, ordinal regression will be used for the variables constructed for general, public, and private health care utilization. The ordinal variable regression is used to account for the sequential aspect in the process of health care utilization (Afawubo et al., 2020), knowing that health care utilization is conditional on the occurrence of a morbidity episode.

The analysis of health expenditure, particularly concerning consultation costs and the purchase of medicines, will be analyzed using quantile regressions, and specifically quartiles. Quantile regression developed by Koenker and Bassett (1978) is used to transform a conditional distribution function into a conditional quantile function. It describes the cumulative distribution of a conditional dependent variable Y, knowing a set of explanatory variables X by making use of quantiles (D'haultfœuille et al., 2014). This is a specified model. It is then a matter of estimating the parameters of the model defined by:

$$(Y/X) = X'\beta\tau + \varepsilon\tau$$

With (Y/X) the conditional quantile of order τ, $\beta\tau$ the coefficients that depend on the quantile, and $\varepsilon\tau$ the error term. This methodology allows to capture the specificities linked to the distribution and to ensure the robustness of the results compared to the linear model. These determinant analyses will be reinforced by an effect analysis, focusing on health insurance.

However, as pointed out above, the analysis of the effects of health insurance in terms of care utilization is subject to endogeneity. The classical method of correcting for endogeneity is instrumental variables (Levine et al., 2016; Sengupta et al., 2019). However, the main problem when studying health-related factors is to identify an instrument that is related to one of the variables and not associated with the other, in this case, health insurance, and expenditure or use of care (Makate et al., 2016; Adu, 2020). Indeed, the instruments usually used, such as the presence of chronic disease (Munki et al., 2003; Wagner et al., 2011), are also related to factors that can affect the variables of interest that are here the use of care and health expenditures. To correct these shortcomings, the conditional mixed process (CMP) method is usually used. This method controlled for endogeneity and compared to experimental and quasi-experimental methods such as double difference and propensity score method (PMT) applies to variables that are not dichotomous (Agbanyo, 2020; Makate, 2016).

The CMP method was used to test for endogeneity. This method is carried out in two stages: in the first stage, the endogeneity test, and once this test is carried out, the second stage which consists of the estimation. This technique, developed by Roodman (2011), allows estimating recursive models by taking into account the cross-relationships that may exist between different equations. The non-presence of endogeneity allowed us to limit ourselves to the initial methods and then to measure the robustness through a propensity score matching.

Propensity score matching is among the experimental and quasi-experimental methods adopted for measuring the effects of interventions. A double-difference that uses individual panel data (Lê et al., 2019, Boyle et al., 2014; Khan et al., 2007) to which propensity score matching method can be combined (Lê et al., 2019). It should be noted that Although experimental research, in the randomized controlled sense, is considered the gold standard method, its application may not be possible for various reasons, including ethical reasons (Lecocq et al., 2014). Furthermore,

In the absence of baseline data, the propensity score matching technique is one of the most widely used methods for measuring the effects of health insurance in recent years (Lê et al., 2019).

The aim here is to evaluate the relationship between health insurance and the use of health care services in Togo. The possession of health insurance should, in principle, make health care more accessible to beneficiaries by covering part of the cost. We would therefore expect the use of services to be greater than that of the uninsured.

Health insurance affects health care utilization in two ways: having health insurance has a reassuring psychological effect on patients who feel more confident about seeking health care. Also, by reducing the cost of health care, health insurance makes it more economically accessible.

In addition, there is an endogeneity issue related to the study of the link between health insurance and health service use. Indeed, adverse selection issues could induce that people being regular in health centers due to chronic morbidity and regularly facing quite high health care expenses are those who subscribe to health insurance (Duku et al., 2016).

On the other hand, several household or individual characteristics may affect both income and health insurance. Indeed, health insurance and the use of health care services could be induced by the same variable, such as the income or the level of education of the members of a household. This hypothesis is even more relevant in the Togolese context where health insurance is mostly

provided by public services, and where the situation could be such that people with permanent sources of income, particularly salaries, are also those who have health insurance and who have sufficiently precise information on the benefits of health care to use it. This is why the methodology used is propensity score matching.

Developed by Rosebaum and Rubin (1983), this model is based on the calculation of a score for being exposed to an intervention, using a set of variables that are linked to the treatment and possibly to the effect that we are trying to measure. Furthermore, it is necessary to ensure that the variables are not affected by the treatment, and the sources must be the same for both individuals who have undergone the treatment and those who have not (Lecocq et al., 2014).

The method differs from other matching methods such as stratification in that it reduces to a single matching dimension and facilitates the determination of nearest neighbors while not losing a significant number of individuals from the database. This score can be a probability when using logistic regression or a product of the classification associated with the regressions.

When a logistic regression is used, the score e(xi) for an individual i in the database is determined by determining the conditional probability :

E(xi) = P (zi = 1 | xi)

Zi = 1 if individual i benefited from the intervention

Zi = 0 if individual i did not benefit from the intervention

Xi = set of treatment-related variables observed for individual i

This score, which is a probability, is based on two fundamental hypotheses: that of the independence of the basic variables of the intervention and that of common support, which assumes that individuals who receive or do not receive the intervention have the same coefficients, making it easier to compare the same score value between treated and untreated individuals. The propensity score is therefore only used in the common support zone between individuals receiving and not receiving the intervention. The tests relating to the common support zone are carried out for this purpose.

The use of the propensity score makes it possible to determine the treatment effect. This effect is usually defined for an individual i by the difference between the outcome he or she would have if he or she had received the treatment (noted Yi (1)) and the outcome he or she would have in the absence of treatment (noted Yi(0)) (Quantin, 2018). Two average treatment effects can then be estimated; The Average Treatment effect on the Treated (ATT). ATT = E[Yi(1) -Yi(0)|Ti = 1] and the Average Treatment Effect (ATE)

ATE = E[Yi(1) -Yi(0)]

Estimators are usually computed for these two quantities. The simplest ones in the case of M nearest neighbor matching, are :

$$\widehat{ATT} = \frac{1}{N_t}\sum_{i=1}^{N_t}(Y_i - \frac{1}{M}\sum_{j\in J(i)} Y_j)$$

Where N_t is the number of treated individuals for which the matching is performed, J(i) is the set of M untreated individuals matched to the individual i

The estimator of the average treatment effect in this case is :

$$\widehat{ATE} = \frac{1}{N}\sum_{i=1}^{N}(\widetilde{Y}_i(1) - \widetilde{Y}_i(0))$$

where $\widetilde{Y}_i(1) = \begin{cases} Y_i\ si & T_i = 1 \\ \frac{1}{M}\sum_{j\in J(i)} Y_j\ if & T_i = 0 \end{cases}$:

and

$$\widetilde{Y}_i(0) = \begin{cases} Y_i\ si & T_i = 0 \\ \frac{1}{M}\sum_{j\in J(i)} Y_j\ if & T_i = 1 \end{cases}$$

It should be noted that several approaches allow for error correction either by changing the metric or by correcting with correction terms. In addition, the calculation of the ATE relies on stronger assumptions than the ATT (Quantin, 2018).

Various other estimators are used ((Lecocq et al., 2014). The Radius method using a metric consists of matching according to a certain maximum distance between matched individuals. Thus, the lower the metric, the closer the matched individuals are in terms of the propensity score. However, this method has the shortcoming of excluding a large number of individuals from the matching for a low metric.

The kernel method is similar to the Radius method but gives more weight to controls with small distances, making use of kernels. Our analysis will incorporate these different approaches to estimating the average effect of health insurance on health care utilization and cost.

However, although the propensity score matching technique is frequently used, it has limitations, especially for small sample sizes and covariates that can induce quite large biases (Deaton and Cartwright, 2018; Cremer et al., 2014). To this end, metrics to minimize these biases have been developed, and the Mahalanobis distance, one of these approaches, is the one that will be adopted in this study.

To perform the determinant analysis and propensity score matching, some variables not impacted by treatment (in this case, health coverage) but that could determine the probability of treatment (being insured) were used, drawing on the literature to this effect (Lê et al., 2019; Bagnoli, 2019; Wang et al., 2016; Karan et al., 2017)

IV. ANALYSIS OF CARE USE

The literature on health insurance and the use of health care points to the possible effect of health insurance on the use of health care and health care expenditure. On the other hand, it has been shown through distortions such as adverse selection that frequent use of health care and fairly high health care expenditure lead to the use of health insurance. These two realities, therefore, lead to endogeneity when it comes to analyzing the effects of health insurance on the use of health care and health expenditure. To this end, we use the CMP method to test for endogeneity in the models used for health care utilization and expenditure. The results are presented in the table below:

Table 1: Results of the endogeneity test on health care use and health insurance

	Care services	Public care	Private care
atanhrho	.09057	.13008	.07983
P-value	0.362	0.241	0.465

Source: EHCVM 2018 and our calculations

These results highlight the non-endogenous nature of the use of health care. Indeed, the value of rho is not significantly different from 0, and this reflects the heterogeneity in the variables of the models that explain the use of care in general, private and public care. The compulsory nature of health insurance, making subscription not voluntary in order to attract people with higher propensities to use health care, could explain this finding. A logistic model will therefore be used in the following to study the effects of health insurance on the use of care.

Table 2: Determinants of care utilization

Table 2 below presents the results for the determinants of general, public, and private health care utilization from the ordinal logistic regression.

	Health care utilization		Use of public care		Use of private care	
	Coef.	***dy/dx***	***Coef.***	***dy/dx***	***Coef.***	***dy/dx***
Health coverage	.2034047*	.0307891	.2181762***	.0274834	.1399177*	.0052796
	(2.64)		(2.82)		(1.80)	
Region						
Trays	-.0134968	-.0020226	.0189037	.0023295	-.010487	-.0004039
	(0.21)		(0.29)		(0.16)	
Central	-.0534912	-.0079164	-.0001478	-.0000181	-.0852517	-.0031734
	(0.76)		(0.00)		(1.19)	
Kara	-.1567377**	-.022448	-.1020861	-.0120505	-.242441***	-.0084071
	Health care utilization		**Use of public care**		**Use of private care**	
	Coef.	***dy/dx***	***Coef.***	***dy/dx***	***Coef.***	***dy/dx***
	(2.42)		(1.57)		(3.70)	
Savannahs	-.1038568*	-.0151275	-.0650757	-.0077839	-.1295396**	-.004726
	(1.68)		(1.05)		(2.06)	
Lomé commune	-.1292646	-.0186767	-.191289**	-.0218684	-.0311107	-.001187
	(1.63)		(2.44)		(0.38)	
Place of residence						
Rural	-.1089592**	-.0158037	-.0549186	-.0065133	-.1678029***	-.006151
	(2.17)		(1.10)		(3.30)	
Level of education of the head of the household						
Primary	.0523328	.007517	.0490683	.0058169	.0180932	.0006499
	(1.14)		(1.07)		(0.39)	
Secondary1	.0204329	.0029048	.0122538	.0014335	-.0057124	-.0002029
	(0.40)		(0.24)		(0.11)	

Secondary2	.1305485*	.0192268	.0966138	.011651	.087104	.0032306
	(1.74)		(1.29)		(1.15)	
Superior	-.2153369**	-.0283164	-.238145**	-.0254207	-.2542615**	-.008067
	(2.01)		(2.24)		(2.33)	
Sex Female						
	.2027147***	.0289109	.2059854***	.0241428	.193079***	.0068415
	(5.69)		(5.78)		(5.35)	
Religion						
Christian	.0808754	.0116064	.0777391	.0091738	.0956214*	.0033858
	(1.56)		(1.49)		(1.82)	
Animist	-.0087407	-.0012183	-.0041378	-.000474	.0405493	.0013993
	(0.14)		(0.07)		(0.64)	
Other Religion	-.0056232	-.0007846	.0365826	.004253	-.1007305	-.0032564
	(0.03)		(0.19)		(0.52)	
Without Religion	-.0942161	-.0127653	-.098752	-.0109258	-.0721937	-.0023647
	(1.15)		(1.20)		(0.87)	
Well-Being Quartile						
Second	-.0738091	-.0099602	-.0779062	-.0086556	-.1100417**	-.0036869
	(1.36)		(1.43)		(2.00)	
Third	.1045507*	.0149642	.0866741	.0102271	.052538	.0018972
	(1.91)		(1.58)		(0.95)	
Fourth	.1427132***	.0206801	.1205229**	.0143965	.076562	.0027959
	(2.62)		(2.20)		(1.38)	
/cut1	.7213069		.7687327		.6140086	
/cut2	1.634028		1.964868		3.235287	

Significant at 1%; ** significant at 5%, * significant at 10%; errors in brackets

Source: EHCVM 2018 and our calculations

The table shows the determinants of the use of both public and private care. When we look at health insurance, it is a real determinant of the use of public care, with a positive coefficient reflecting the greater use of health care by insured persons. In the case of general and private care, this influence is relatively weak. Apart from health insurance, another factor associated with the use of health care as a whole is gender, revealing that female persons have a stronger tendency to use health care, whether in the public or private sector.

The level of education of the head of the household is also a factor and concerns people with a higher level of education who tend to use less health care, reflecting one of the results of Grossman (1972), who associates education with health and, according to which educated people to take better care of their health and tend to fall ill less than others and thus use care. Other factors associated with health care use are the region of residence, household welfare level, especially the bottom quartile.

These factors are associated with the use of care as a whole, but also with the use of public and private care. We observe that the use of public care is the one that seems to be more associated with health insurance. The rural-urban divide seems to be more important for general access to care and private care, while for public care, this is less true. These results, therefore, demonstrate that health insurance appears to be associated with greater use of public health care, and this is consistent with the literature on the subject (Bagnoli, 2019; Wang et al.,2016; Mebratie et al., 2018).

Analysis of health expenditures

The results for health expenditure are presented in table 5 below:

Table 3: Determinants of Health Expenditures

Dependent variables	**Consulting expenses**		**Drug expenditure**		
Quantile	**0,5**	**0,75**	**0,25**	**0,5**	**0,75**
Variables	**Coef.**	**Coef.**	**Coef.**	**Coef.**	**Coef.**
Health coverage	-100*	-333.33**	-1557.33***	-2327.5***	-2831.25***
	(51.73)	(136.22)	(317.93)	(404.74)	(818.31)
Region					
Trays	87.5*	400***	-1138.66***	-1329.28***	-1806.25**
	(50.99)	(134.28)	(313.39)	(398.96)	(806.64)
Central	-112.5**	-100	-204.66	-658.57	-2462.5***
	(53.67)	(141.35)	(329.82)	(419.87)	(848.92)
Kara	-100**	-133.33	-362	-720*	-1687.5**
	(50.17)	(132.12)	(308.33)	(392.51)	(793.60)
Savannahs	-125**	166.66	846***	616.42	-650
	(49.90)	(131.41)	(306.63)	(390.35)	(789.23)
Lomé commune	150**	733.33***	380.66	1616.07***	2662.5***
	(58.75)	(154.71)	(361.31)	(459.96)	(929.97)
Place of residence					
Rural	-162.5***	-533.33***	-200	-888.92***	-1875***
	(38.03)	(100.14)	(233.72)	(297.54)	(601.57)
Level of education of the head of the household					
Primary	-50	-133.33	580.66**	445.35	312.5
	(36.75)	(96.79)	(225.62)	(287.22)	(580.72)
Secondary1	-62.5	-133.33	476.66*	274.64	-668.75
	(39.94)	(105.18)	(245.25)	(312.22)	(631.25)
Secondary2	1.42e-14	33.33	1523.33***	1283.57***	12.5
	(53.82)	(141.74)	(332.39)	(423.14)	(855.52)
Superior	-150**	-300	1718.66***	1778.21***	2225*
	(75.42)	(198.62)	(463.20)	(589.67)	(1192.22)
Sex					
Female	-1.14e-13	5.68e-14	119.33	332.5	706.25
	(27.95)	(73.62)	(171.81)	(218.72)	(442.23)

Religion					
Christian	25	166.66	300	332.85	831.25
	(39.17)	(103.16)	(240.30)	(305.92)	(618.52)
Animist	-37.5	33.33	-238.66	-383.57	518.75
	(50.55)	(133.13)	(310.35)	(395.09)	(798.81)
	375**	866.66**	-838.66	-387.14	-25
Other religion					
	(147.18)	(387.58)	(903.97)	(1150.78)	(2326.69)
No religion	-5.68e-14	166.66	446	676.07	1162.5
	(65.70)	(173.02)	(407.28)	(518.49)	(1048.30)
Well-Being Quartile					
second	37.5	0	515.33*	228.92	518.75
	(47.64)	(125.46)	(292.67)	(372.57)	(753.29)
Third	87.5*	100	1080.66***	725.35**	1650**
	(46.68)	(122.93)	(286.70)	(364.99)	(737.94)
Fourth	112.5**	233.33*	1500***	1552.85***	3518.75***
	(45.78)	(120.55)	(281.32)	(358.13)	(724.07)
_cons	362.5***	1000***	1038.66**	4214.64***	8818.75***
	(75.11)	(197.80)	(461.50)	(587.51)	(1187.84)

Source: EHCVM 2018 and our calculations

Health insurance is associated with lower drug expenditures. The results are borderline significant concerning health care expenditures. Residence is one characteristic associated with both health care and drug expenditures. The other variables in the model are not significant concerning consultation expenditures, but the level of education of the head of household is positively associated with drug purchase expenditures.

The effects of health insurance seem to be greater when expenses increase both in terms of consultation fees and the cost of drugs. The same is true for the level of the residence. As for the use of care, the welfare quartile is only decisive for the highest levels.

This section has identified many factors that are associated with the use of care in general and public and private care in particular. Health care expenditure is also related to health insurance, and the largest effects are observed for higher expenditure. Propensity score analysis will be used to test the robus*tness of* the results obtained**.**

a) Robustness analysis: propensity score estimation

Propensity scores were estimated using logistic regression (Table 6) with the following explanatory variables: region of residence, area of residence, education level of the head of household, gender, marital status, and expenditure quartile. The results already shown in Table 2 are confirmed. Individuals living in the Kara, Centrale, and Savanes regions are more likely to be insured when compared to the basic modality, which is the maritime region. The level of education of the head of the household is a determining factor, and households whose head has a higher level of education or secondary 2 are more likely to be insured.

Table 4: Logistic model for calculating health insurance scores

	Coef.	**z**	**P>z**
Region			
Trays	-.1805638	-0.96	0.335
Central	.4713702	2.74	0.006
Kara	1.277821	8.33	0.000
Savannahs	.690751	4.38	0.000
Lomé commune	-.3175616	-1.74	0.082

Place of residence			
Rural	-.0378575	-0.39	0.697
Educational level			
Primary	-.4707637	-3.76	0.000
Secondary1	-.2539463	-2.02	0.043
Secondary2	1.755915	16.00	0.000
Superior	1.973269	14.20	0.000
Gender			
Female	-.1204116	-1.56	0.118
Marital status			
Married monogamous	-.3554051	-3.75	0.000
Married polygamist	-.733951	-4.05	0.000
Common-law union	-1.326732	-2.53	0.011
Widow(er)	-1.426679	4.11	0.000
Divorced	-.6387518	-1.05	0.292
Separated	-.8884076	-1.49	0.136
Spending Quartile			
2nd quarter	.0139649	0.09	0.925
3rd quarter	.6603253	4.90	0.000
4th quarter	1.103825	8.62	0.000
constant	-3.869688	-18.38	0.000

Source: EHCVM 2018 and our calculations

The final selection of variables for the model building was determined by theory and literature on the subject (Rubin et al., 1996, Wang et al., 2016).

Checking the balancing property

The graph below shows the pre-and post-match distribution of treated and untreated individuals:

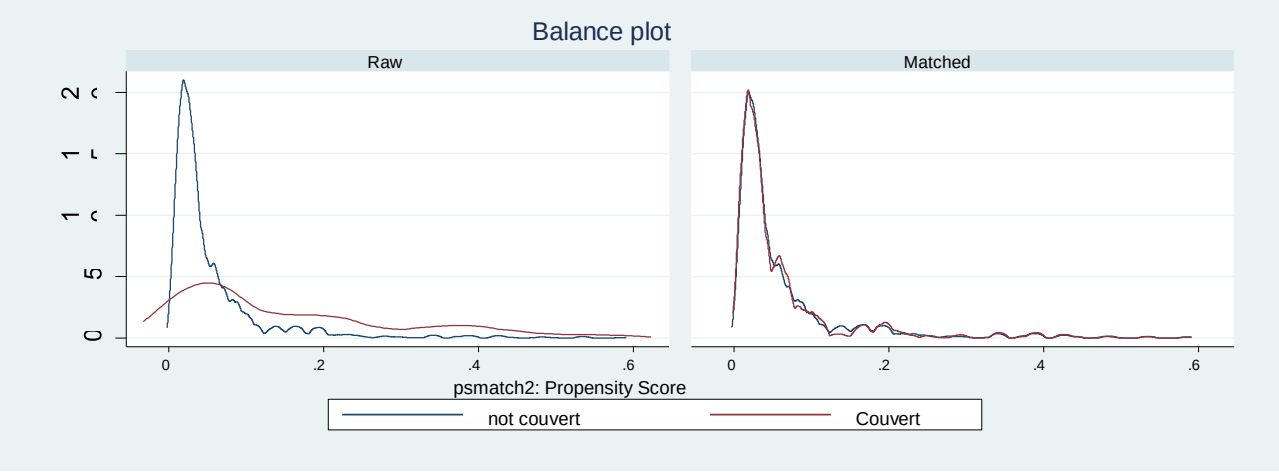


Figure 1: Distribution of treated and untreated individuals before and after matching

When we look at the two distributions, we can say that the distribution of those covered is flatter than that of those not covered by health insurance, in the figure on the left. After matching, the distributions are similar, reflecting this balance that the method requires. For further results, the following graph was analyzed:

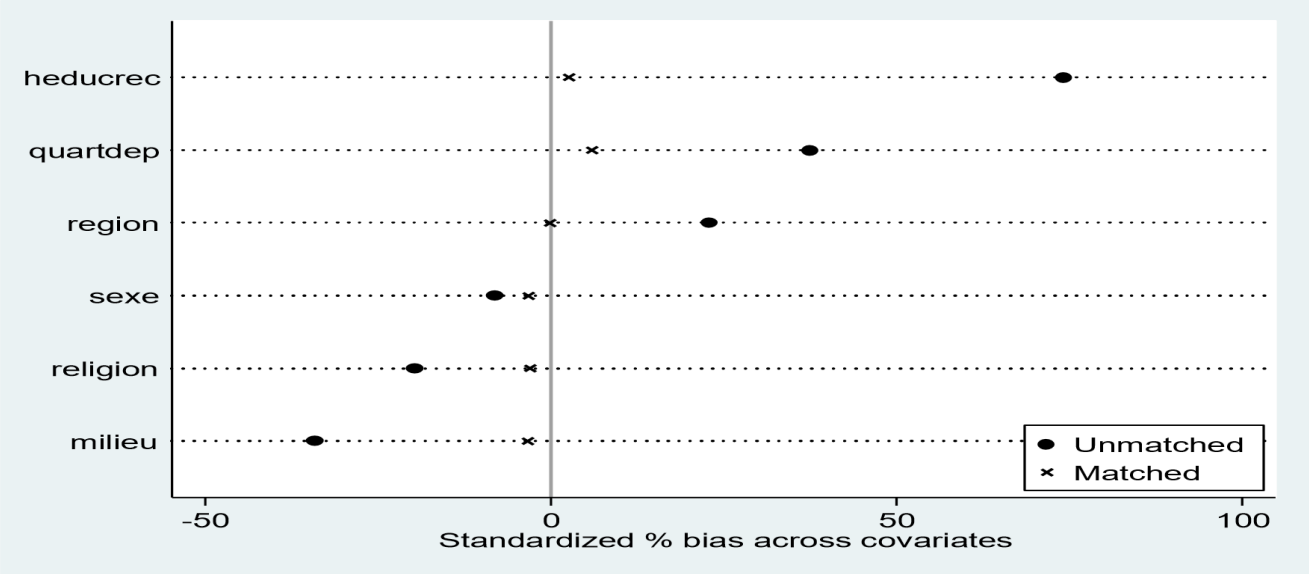


Figure 2: Distribution of treated and untreated individuals before and after matching

Several models were thus estimated and tested, and the one retained takes into account the balancing property after matching. Information on the measures of this information and the number of matched individuals are presented in Appendix 1.

Regarding the window width when estimating using the kernel method, that of 0.06 was chosen with reference to Garrido et al. (2014), which shows that such a window width optimizes the fit.
The results are presented in Table 5 below:

Table 5: Effect of health insurance on health care utilization and expenditure

	NN	Kernel	Radius
Health care utilization	0.064**	0.102***	0.161***
Public health care utilization	0.121***	0.134***	0.158***
Private health care utilization	-0.031	-0.032	0.031
Consulting expenses	-435*	-720*	-772**
Drug expenditures	-2596*	-3303**	-3183*

*** significant at 1%; ** significant at 5%, *significant at 10%.

Table 5 presents the results regarding the effect of health insurance on the use of health care services and costs. This effect seems to be significant in the light of the results indicating that people with health insurance have on average 10 percentage points more chance of using health care services than uninsured people, with a value of the average effect on treated (ATT). The significance of the result concerning the nearest neighbor (NN) method is low, reflecting a situation potentially attributable to the relatively small number of individuals reached by health insurance (Quantin, 2018). Matching in this case for individuals in the control group would have to use the same treated individuals several times and would therefore affect the variance of the estimator, which would then not be significant.

When looking at the use of public health care, the results show that people with health insurance are more likely to use public health care. This reflects the fact that insured people, because of the facilities induced by this fact, will make more use of these services. The analysis of the effects on the use of private care is not significant, although the results of the logistic regression seemed to show a positive correlation.

According to the theory, expenditure on health care is one of the channels through which health insurance affects the use of health care. Analysis of the effects on expenditure reveals that expenditure on consultations and the purchase of medicines seem to be the most sensitive to health insurance (see annex 2). We observe an average decrease of about 600 FCFA in the cost of consultations, linked to health insurance.

Regarding expenditure on medicines, the same observation is made concerning the effect of health insurance, with a drop of about CFAF 3,000.

The sensitivity analysis of the results as described by Becker et al. (2007), based on the MantelHaenszel statistics, is as follows:

Table 6: Sensitivity testing of results

Gamma	Q_mh+	Q_mh-	p_mh+	p_mh-
1	5.39677	5.39677	3.4e-08	3.4e-08
1.05	4.98725	5.81008	3.1e-07	3.1e-09
1.1	4.59849	6.20622	2.1e-06	2.7e-10
1.15	4.22891	6.58731	.000012	2.2e-11
1.2	3.87666	6.95466	.000053	1.8e-12
1.25	3.54015	7.30944	.0002	1.3e-13
1.3	3.21798	7.65264	.000645	9.9e-15
1.35	2.90894	7.98516	.001813	6.7e-16
1.4	2.61194	8.3078	.004502	0
1.45	2.32604	8.62125	.010008	0
1.5	2.05039	8.92614	.020163	0

This test shows that the analysis is insensitive to hidden bias as the probability of being insured increases. However, the decrease in the probability of bias related to an overestimation of the effect (pmh+) indicates that the results are significant but should be taken with caution for higher probabilities of exposure to the treatment, which in this case is having health insurance.

V. DISCUSSIONS

Our results reveal an improvement in the use of health care services following health insurance and higher use of public services by insured individuals. These results are similar to those present in the literature (Bagnoli, 2019; Wang et al., 2016; Mebratie et al., 2018; Bernal et al., 2017; Levine et al., 2016). This improvement in utilization is associated with lower spending on consultation care and drug purchases. The utilization of health care, especially public health care, appears to be induced by health insurance.

These results, therefore, show that there is an effect of health insurance on the use of health care but also the expenses incurred during consultations and for the purchase of medicines. This relationship does not seem to be subject to endogeneity, as the tests relating to it are not significant. The question of endogeneity, particularly about adverse selection, does not seem to be relevant, as health insurance in Togo is more a matter of government programs than of voluntary subscriptions.

By lowering the cost of consultations, health insurance encourages greater use of care in the event of illness. The services sought in this case are those of the public sector, while those of the private sector are not affected at all by health insurance. This situation could be explained by the fact that public services are those covered by the main health insurance system in Togo, that of civil servants. If current trends continue, with a concentration of essential health insurance services by this state structure, an influx, albeit small, could be induced by health insurance on the use of this type of service.

However, the level of this increase is low, as the literature points out (Comfort et al., 2013; Erlangga et al., 2019). Health insurance certainly induces an increase in the use of care, but other factors, as well as psychological and other forms of accessibility, affect the use of care (Comfort et al., 2013)

There is a decline in costs associated with health insurance. These decreases are all the more significant as people have higher expenditures on care and medication. This reflects the fact that covering part of these costs reduces the financial burden on households. However, the small decline in costs could limit the effects of health insurance on household welfare. Indeed, as the cost reduction is small, only people with a relatively low level of income, or those who usually have high expenses, will be sensitive to it, and this could explain the reduced effect of health insurance on the use of care.

In addition, several administrative procedures are necessary with the INAM to obtain a reduction in the costs of certain medical goods and services deemed to be expensive. The current compensation is essentially based on the costs of generic products. Thus, the reduction for specialty drugs for which generics are available is very small.

People with more resources and high opportunity costs associated with these administrative procedures will be less likely to use these services when they fall ill and when the expenses are not high enough to allow them to save the amount of time they would otherwise spend waiting. They will therefore tend to prefer to pay directly for their medical services and goods without using health insurance. In addition, the technical facilities of public health structures, particularly about referral centers, which are less well-supplied than their counterparts in the private sector, and which are not necessarily eligible for public health insurance, are all factors that could explain these results. These different factors relating to waiting times, quality of care in public facilities, and provider behaviors, as noted by Atake and Amendah (2018), are those that could explain the results obtained. This suggests that health insurance for the poorest people will have a greater effect on health care utilization than those for the better-off.

In addition, health insurance leads to greater use of public health services, which would be saturated if the supply of care remains at the same level and the emphasis is placed on demand, particularly health insurance. These results, therefore, highlight the challenge that an extension of health coverage represents for the supply of care in Togo.

VI. CONCLUSION

Our analysis consisted in estimating the effect of health coverage on the use of health care in Togo, a country with a low rate of health care coverage. It was done through an analysis of determinants and effects using a quasi-

experimental method, that of propensity score matching, using data from a survey on household living conditions. The results obtained suggest an improvement in the use of care in public centers, associated with a reduction in the cost of consultations and medication. These results are a significant advance, which could be improved by including more parameters in the analysis.

Indeed, the data used in this study did not make it possible to identify some of the elements that could facilitate further knowledge on the subject, such as the types of morbidity that individuals faced, the frequency of individuals in health centers, the type of care used, the share of insured and uninsured expenses, and information from the hospital environment that would have favored triangulation of the data. Further studies would be used to explore these different aspects to better understand the relevance of actions in the health sector to facilitate access to quality care for all.

It should also be noted that the effects measured here do not take into account potential moral hazard or adverse selection, which could have influenced the results observed. However, the compulsory nature of the payment of insurance premiums for individuals benefiting from state programs could make it possible to exclude a priori the question of adverse selection without eliminating the question of moral hazard.

In light of the results obtained, public actions beyond universal health coverage could better target the factors related to the supply of health care mentioned above to improve the use of health services by the most vulnerable people.

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