

Health Insurance Coverage and Its Socioeconomic and Demographic Determinants in Cameroon

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Abstract: Health insurance coverage is a public health issue for global and national health financing in Africa where countries have gradually begun to implement universal health coverage. This study analyses the socioeconomic and demographic determinants of health insurance coverage in Cameroon using a cross-sectional study design. A nationwide stratified, two-stage sampling was used to sample 33,983 individuals. A logistic regression model was used for both bivariate and multivariate analysis with a statistically significant level of $p < 0.05$. The participants were predominantly male (77%) with a sex ratio of 3.3. The health insurance coverage rate was only 2.06% of people. Urban residents were significantly more likely to be covered (1.54%) compared to rural residents (0.51%; $p < 0.00$). Men (1.52%) were significantly more covered than women (0.54%; $p < 0.04$) and both sexes were cumulatively split between employer health insurance (54.94%), social security (22%), mutual health insurance (12.2%), private commercial insurance (10%) and help/relief from associations/family (0.87%). Working age influences insurance coverage with statistically significant differences among age groups (0.15%, 0.67%, and 1.23%, $p < 0.00$). A high level of education significantly increases insurance coverage with 82.5% of secondary and tertiary education compared to 17.5% for primary and no education ($p < 0.00$). The economic well-being quintile scale influences the susceptibility to health insurance coverage with 76.4% of the rich and/or richer, compared to 13.6% of the middle class, 10% of the poor, and none of the poorest ($p < 0.00$). Compared to the rich, the poorest were 78%, the poor 75%, and the middle class 67%, less likely to be covered by any type of health insurance ($p < 0.01$). Employability positively influences health insurance coverage with statistically significant differences between annual full-time workers (77.6%), seasonal workers (13.6%), and casual workers (8.8%, $p < 0.00$). These findings provided evidence to guide policies for improving equity in financing universal health coverage for people living in low-resource settings.

Keywords: Health Insurance, Coverage, Determinants, Socioeconomic, Demographic, Universal Health Coverage, Cameroon

1. Introduction

Over the past 20 years, many countries with limited resources have made efforts to extend health insurance for all, which is emerging as a central issue in public policy debates on financing the implementation of universal health

coverage [1]. Universal health coverage (UHC) is one of the targets that all countries in the world set themselves when they adopted the 2030 Sustainable Development Goals (SDGs) in 2015 [2]. The service coverage index for universal health coverage (SDG indicator 3.8.1) has risen from 45 in 2000 to 67 in 2019, while almost 2 billion people face

catastrophic or impoverishing health costs (SDG indicator 3.8.2) [3]. Despite political commitments, many countries face considerable difficulties in making health insurance a reality for all. Gaps in health insurance coverage and their adequacy to people's needs, particularly in Africa, are linked to socioeconomic conditions such as high levels of economic insecurity, persistent poverty, widening inequalities, the predominance of informal employment, the fragility of social protection and limited resources [4-6]. Poor socioeconomic conditions in African countries exacerbate the inequalities that represent a major challenge to achieving universal health coverage, as aggregate data masks inequalities in service coverage within countries.

Although service coverage has improved over the last 20 years, the proportion of people facing financial difficulties due to direct and indirect unreimbursed healthcare costs has increased, leading to an increase in poverty and a reduction in the income allocated to other essential household and family needs [2, 7, 8]. The problem of health financing arises both in terms of the volume of financial resources available and the sources of funding in many African countries. In these countries, the low public financial resources allocated to health means that households are exposed to catastrophic expenditure and impoverishment of the population, as a large proportion of health expenditure is paid directly by households. The share of health expenditure financed by direct and indirect household out-of-pocket payments remains above 40%, and more specifically in 2018, domestic health expenditure represented only USD 34 per capita, or 4.4% of GDP, of which almost 60% was borne by patients [3]. This trend shows a decline over the last twenty years, as health spending was estimated at USD 38 per capita in 2014 in low- and middle-income countries [9]. In sub-Saharan Africa, a large proportion of the population currently lives in extreme poverty and suffers from serious health problems, with out-of-pocket payments representing between 30%-72% of the total health expenditure [10-14]. Since people do not have any financial protection for health care and services, around 11 million people in Africa fall into poverty every year because of the high level of out-of-pocket payments for health care and services [8, 15, 16]. Providing financial protection to people for health care and services is a cornerstone of UHC, and helps to prevent poverty in Africa. Indeed, effective financial protection through health insurance makes it possible to reduce financial barriers to the use of health care and services and to make health services affordable for all. Above all, it ensures that poor people and workers in the informal sector benefit from pre-payment and that providers enjoy fair conditions for reimbursement of their costs in providing health care and services to the population.

In Cameroon, with an estimated population of 27.2 million in 2021, life expectancy at 58 years is lower than in Central Africa (60.6 years) and Sub-Saharan Africa (61.2 years), while the population coverage rate for essential health services (45.9%) is lower than the African average of 46% and the recommended standard of at least 50% [17]. The socioeconomic vulnerability of the population is exacerbated by the burden of health-related expenditure. Poverty limits

their access to quality health care and services and reduces their life expectancy. Health sector financing has been falling since 2018, while the population's health needs are growing. Over the period 2017 to 2021, the domestic public spending on health varies between 3.5% and 5% of total public expenditure [18]. This is well below the recommended 15% recommended by the Abuja Declaration [19]. Domestic public health spending as a percentage of GDP in Cameroon is 0.6%, which is the third-lowest in sub-Saharan Africa. Health insurance coverage is crucial for reducing direct health expenditures by individuals and/or households. Among sub-Saharan African countries, while only 3.1% of people are covered by a social health protection mechanism, Cameroon has the fourth highest household out-of-pocket (OOP) expenditure estimated at about 475 billion francs per year, accounting for around 70% of total health expenditure [20]. This is much higher than the regional average for sub-Saharan Africa (39%) and the average recorded in lower-middle-income countries (56%) [21]. Unlike most other low- and middle-income countries, the use of various forms of insurance to mobilise financing and protect households against the impoverishing effects of paying direct and indirect costs of health care and services is not widespread in Cameroon. Indeed, among the various challenges facing the healthcare system, the issue of health insurance coverage currently appears to be paramount [22, 23]. Understanding the determinants of health insurance coverage is particularly challenging for Cameroon, where out-of-pocket payments for health care and services have a negative impact on equitable access to basic health services and the quality of care. Accessibility to health insurance markets enables a large number of individuals to benefit from coverage against the risk of illness through social protection, which increases their financial capacity to access affordable quality healthcare. To help understand the low level of social protection in health, it is possible to examine the economic theory of the demand for health insurance by attempting to analyse the essential socioeconomic determinants in the specific context of a developing country such as Cameroon. The lack of equity in health financing is not conducive to inclusive socioeconomic development in the long term [18].

Health insurance is a form of insurance that essentially covers medical expenses on the basis of a contract between an insurer and an individual/group in which the insurer agrees to provide specific health insurance coverage in return for an insurance premium or a contribution to a mutual health insurance scheme, prepaid in advance, subject to the terms and conditions specified in the insurance plan [6, 24, 25]. Health insurance protects insured people against the costs of outpatient and inpatient care in a health facility, such as consultations, medicines, diagnostic tests, hospitalisation costs, major surgery and serious illnesses, and reduces the costs payable at the time of hospitalisation [23, 24]. Health insurance coverage in the Cameroonian context, where almost 40% of the population lives below the poverty line, is crucial to ensure access to health services for the population, especially the poorest, by reducing the risks of

impoverishment and catastrophic expenditure due to the payment of health care costs to providers. The various health insurance schemes help to achieve universal health coverage, which is one of the sustainable development goals. In Cameroon, there is a paucity of research into the socioeconomic determinants of health insurance coverage among vulnerable population groups. The aim of this study was to determine health insurance coverage at the individual level and to identify the socioeconomic and demographic determinants of health insurance coverage in order to analyse the reasons for the low level of health insurance coverage in Cameroon. In doing so, this study makes an essential contribution to the framework for monitoring the 2030 Agenda for Sustainable Development.

2. Methods

2.1. Study Design

The study used a cross-sectional study design with retrospectively secondary data collected through a quantitative analysis of health insurance coverage patterns of the fifth Cameroon demographic and health survey (DHS-V) [26], which collected information from a nationally representative cross-sectional sample of Cameroonian households.

2.2. Study Site and Period

The study site was in the community (households) across all 10 regions of Cameroon. The capital city of Cameroon “Yaounde” and the main economic city “Douala” were oversampled in order to better capture the complex social and economic characteristics of the country’s most populous cities. The study covered the period of 16th June 2018 to 19th January 2019 during which the DHS-V was conducted by the national institute of Statistics in partnership with the Ministry of public health.

2.3. Sampling Technique

A nationwide stratified, two-stage sampling technique was used. In the first stage, 470 clusters were drawn systematically with probability proportional to their household size. In the second stage, a sample of 28 households per cluster was selected with equal probability. In each selected household, all women and men aged 15-49 years were eligible to participate in the study.

2.3.1. Selection Criteria

In this sampling technique, all eligible women and men aged 15-49 years who voluntarily give and sign their informed consent forms were included in the study. The parents of adolescents aged 15-19 years were asked to voluntarily give and sign the assent forms for their young girls/boys. Conversely, any adult (20-49 years) who refused to voluntarily give and sign his/her informed consent, and any adolescent aged 15-19 years of age whose parents refused to voluntarily give and sign his/her informed assent

form was excluded from the study.

2.3.2. Sample Size

In line with both the inclusion and exclusion criteria, the nationally representative sample of 33,983 individuals was selected for the study. This national sample was distributed as follows: 14,843 individuals in urban areas and 19,140 in rural areas, with respondents of both sexes ranging in age from 15 to 49 years.

2.4. Data Collection

Cameroon’s DHS-V 2018 survey, which focused primarily on maternal and child health issues, collected information on health insurance coverage. The respondents answered questions on their health insurance coverage by identifying if they are currently covered with different insurance mechanisms: mutual health insurance, employer’s insurance coverage, social security, commercial private insurance, and health aid from associations/family safety network. Respondents were classified as covered with health insurance and not covered with health insurance. The data were managed by identifying, sorting, and extracting relevant variables indicating the response on health insurance coverage in line with the socioeconomic characteristics of the respondents.

2.5. Statistical Analysis

The data analysis adopted a logistic regression model where the dependent variable is a set of binary indicators as an individual is covered or not covered by health insurance. The model, therefore, constructs a binary logistic model to estimate the probability of a binary response based on a set of predictor variables. The set of independent variables x includes age group, place of residence (rural or urban), gender, marital status (never married, living together, married, widowed/divorced/separated), region, the highest level of education (no education/pre-school, primary, secondary or tertiary), religion, occupation (unemployed, permanent, casual worker), quintile of economic well-being. Our dependent variable “health insurance coverage (covered or not covered)” is defined as follows:

$$y_i = \begin{cases} 1 & \text{if the individual } i \text{ is covered} \\ 0 & \text{if individual } i \text{ is not covered} \end{cases}$$

Let y_i^* be the unobserved variable defined by $y_i^* = x_i\beta + \varepsilon_i$ where ε_i is a random variable with mean zero and standard deviation σ_ε , with $\frac{\varepsilon_i}{\sigma_\varepsilon}$ which follows a logistic distribution function law $\phi(x) = \frac{\exp(x)}{1 + \exp(x)}$.

The multivariate logistic regression model inspired by Nugroho and Widyaningsih [27] was used to assess the relationship between health insurance coverage by sex and place of residence (urban/rural), age, marital status, education level, economic well-being quintile, religion, and region of the respondents.

Considering the latent variable y_i^* as follows:

$$\begin{cases} y_i = 1 & \text{if } y_i^* > 0 \\ y_i = 0 & \text{if } y_i^* \leq 0 \end{cases}$$

The model to be estimated can be written as follows:

$$y_i^* = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + \beta_4 x_{4i} + \beta_5 x_{5i} + \beta_6 x_{6i} + \beta_7 x_{7i} + \beta_8 x_{8i} + \varepsilon_i$$

where:

- x_{1i} : Age group of the individual i ;
- x_{2i} : Sex of the individual i ;
- x_{3i} : Marital status of the individual i ;
- x_{4i} : Level of education of the individual i ;
- x_{5i} : Economic welfare quintile of the individual i ;
- x_{6i} : Religion of the individual i ;
- x_{7i} : Region of the individual i ;
- x_{8i} : Residence area of the individual i .

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ and β_8 are coefficients of the model to be estimated and ε_i is the error term.

Data analysis was performed in Excel and Stata software (version 14). Odds ratios were calculated. The data of this study was initially analysed on the basis of descriptive statistics and the Chi2 dependence test. This technique provided an initial view of the level of association between health insurance coverage and the socioeconomic determinants. The data analysis used two techniques: descriptive analysis (bivariate and multivariate) and multivariate explanatory analysis. Different associations were made and the results were considered statistically significant at a 95% confidence level with $p < 0.05$.

2.6. Ethical Approval

Ethical approval was obtained from the ethical review committee for the protection of human subjects and adult participants provided written consent for themselves and signed the assent forms for their children prior to enrolment.

3. Results

3.1. Demographic and Socioeconomic Characteristics of Health Insurance Coverage

The study included 33,983 individuals nationwide among which 26,151 (76.95%) were male and 7832 (23.05%) were female with a sex ratio of 3.3. Overall, the prevalence rate of health insurance coverage was only 2.06% of people compared to 97.84% who were not covered by any type of health insurance scheme. The comparison by residence shows that in urban areas, 42.23% of people are not covered by health insurance compared to 55.81% in rural areas while 1.54% are covered by health insurance in urban areas compared to 0.51% in rural areas ($p < 0.00$). With regards to gender, more males are

covered with health insurance (1.52%) as compared to only 0.54% of females covered, while 75.44% of males are not covered by health insurance as compared to 22.51% of females who are not covered ($p < 0.00$). The coverage of health insurance by age group shows that the people aged 35-49 years olds are more covered (1.23%) follows by the 25-34 age group (0.67%) and 15-24 age group (0.15%), while inversely about 49.97% of people aged 35-49 years old are not covered, following by people aged 25-34 years (36.49%) and about 11.48% of people aged 25-24 years are not covered ($p < 0.00$). Concerning health insurance coverage by marital status, among never married people, about 6.6% are covered compared to only 0.19% who are not covered, while among married people, about 1.45% are covered compared to 62.53% who are not covered and the coverage among other marital status characteristics ranged from 0.25% for people living together, 0.07% for widowed, 0.04% for divorced, and 0.07% for separated people ($P < 0.00$). With regards to education, the lowest coverage is found among no preschool people (0.04%) compared to 27.65% who are not covered, following by people having primary school level with 0.32% of health insurance coverage as compared to 36.29% who are not covered, while the high coverage is found among people having secondary school level (1.18%) as compared to 31.21% who are not covered and the people having high school level with 0.52% of health insurance coverage as compared to 2.79% who are not covered ($P < 0.00$). Concerning the wealth quintiles, the poorest people are not covered by any type of health insurance scheme, about 0.21% of the poorer people are covered, 0.28% of the middle class are covered, 0.33% of richer people are covered and 1.24% of richest people are covered, while only about 13.06% of richest people are not covered, and the non-coverage by health insurance among other wealth quintiles is 18.06% for richer people, 23.91% for middle-class people, 24.16% for poorer people and 18.75% for poorest people ($p < 0.00$). With regards to religion, the high coverage is found among Catholics (0.96%), followed by protestants (0.96%), other Christian faiths (0.21%), Muslims (0.19%) and both animists and people not having religion are not covered by health insurance ($p < 0.00$). With regards to health insurance coverage by region, the relative high health insurance coverage is among people living the South region (0.43%) and both cities of Yaounde (0.38%) and Douala (0.36%), following by the East region (0.27%), West region (0.14%), North West region (0.12%) and the coverage in other regions are: Centre (0.09%), North (0.09%), South West (0.06%), Adamaoua (0.04%), Littoral (0.04%), and Far-North (0.03%). In Cameroon, health insurance coverage seems to be linked to demographic and socioeconomic characteristics of the population (Table 1).

Table 1. Demographic and Socioeconomics Characteristics of the Participant's health Insurance Status in Cameroon, 2018.

Category	Non-Covered by health insurance		Covered by health insurance		P-value
	N	%	N	%	
Residence	33.284	97.94	699	2.06	0.000
Urban	14.318	42.13	525	1.54	

Category	Non-Covered by health insurance		Covered by health insurance		P-value
	N	%	N	%	
Rural	18.966	55.81	174	0.51	
Sex	33.284	97.84	699	2.06	
Male	25.636	75.44	515	1.52	0.038
Female	7.648	22.51	184	0.54	
Age (years)	33.284	97.84	699	2.06	
15-24	3.901	11.48	52	0.15	0.000
25-34	12.402	36.49	228	0.67	
35-49	16.981	49.97	419	1.23	
Marital status	33284	97.84	699	2.06	
Never married	2.243	6.6	63	0.19	
Married	21248	62.53	493	1.45	
Living together	5681	16.72	81	0.25	0.000
Widowed	1686	4.96	24	0.07	
Divorced	601	1.77	14	0.04	
Separated	1825	5.37	24	0.07	
Education	33284	97.84	699	2.06	
No preschool	9395	27.65	14	0.04	
Primary	12334	36.29	108	0.32	0.000
Secondary	10607	31.21	401	1.18	
High	948	2.79	176	0.52	
Wealth quintiles	33284	97.84	699	2.06	
Poorest	6371	18.75	0	0.0	
Poorer	8211	24.16	70	0.21	0.000
Middle	8127	23.91	95	0.28	
Richer	6138	18.06	112	0.33	
Richest	4437	13.06	422	1.24	
Religion	33284	97.84	699	2.06	
Catholics	11269	33.16	326	0.96	
Protestants	8983	26.43	235	0.69	
Other christians	2491	7.33	70	0.21	0.000
Muslims	9218	27.13	63	0.19	
Animists	604	1.78	0	0.0	
No religion	603	1.77	0	0.0	
Other faiths	116	0.34	5	0.1	
Region	33284	97.84	699	2.06	
Adamaoua	2764	8.13	14	0.04	
Centre (without Yaounde)	3619	10.65	30	0.09	
Douala	1887	5.55	123	0.36	
East	3131	9.21	92	0.27	
Far-north	4740	13.95	10	0.03	
Littoral (without Douala)	2018	5.94	15	0.04	0.000
North	4317	12.70	29	0.09	
North-west	1733	5.10	42	0.12	
West	3429	10.09	49	0.14	
South	3035	8.93	146	0.43	
South-west	561	1.65	20	0.06	
Yaounde	2050	6.03	129	0.38	

Source: Authors' calculations based on EDS 2018 data

3.2. Logit Estimation of Health Insurance Coverage in Cameroon

The bivariate associations between health insurance coverage and demographic and socio-economic determinants were confirmed in multivariate logistic regression analyses. The results of the logistic regression indicate that there is a slight but non-statistically significant difference between health insurance coverage in urban and rural areas so people living in rural areas are slightly less likely (about 0.07%) to have health insurance coverage. Higher levels of education increase the likelihood of having health insurance coverage. There is a statistically significant difference in the likelihood

of having health insurance coverage between different levels of education. People with tertiary education are 16.4 times more likely to have health insurance coverage, people with secondary education are 6.1 times more likely to have health insurance coverage and people with primary education are 2.5 times more likely to have health insurance coverage than those with no education or less than formal education. Health insurance coverage is also a function of the region of residence. Using the Adamoua region as a base, people living in the East and South regions are 3.6 and 3.3 times respectively more likely to be covered by health insurance. People living in the North and North-West regions are respectively 1.9 and 1.8 times more likely to be covered, while people living in the large cities of Yaounde and Douala

are 1.8 times more likely to be covered by health insurance. People living in the South West and West regions are 0.06% and 0.03% respectively more likely to be covered by health insurance. Conversely, again compared to the Adamaoua region, people living in the Littoral (excluding Douala), Far-North and Centre (excluding Yaounde) regions are 52%, 19% and 14% respectively less likely to be covered by health insurance. In terms of well-being quintiles, poorer people, the poor and the middle classes are respectively 79%, 75% and 68% less likely to be covered by health insurance than both the rich and richest people. With regards to religion, Muslims are 30% less likely to be covered by health insurance than

Catholics. On the other hand, Protestants, other Christians and other faiths are respectively 0.04%, 10% and 18% more likely to be covered by health insurance than Catholics. Concerning the marital status, divorced, married and widowed people are respectively 3.4 times, 1.8 times and 1.4 times more likely to have health insurance cover than single people. Conversely, cohabitees and separated persons are 15% and 18% respectively less likely to have health insurance coverage. The results of the bivariate associations between health insurance coverage and demographic and socio-economic determinants are presented with the different degrees of statistical significance (Table 2).

Table 2. Logistic Odds Ratios of Respondents Covered and not Covered by Health Insurance in Cameroon, 2018.

Socioeconomics variables	Odds Ratio	Standard Error	t-value	p-value	[95% Conf. Interval]	Sig.
Residence						
Urban	1					
Rural	0.93	0.144	0.57	0.568	[0.831 1.403]	
Educational level:						
No education	1					
Primary	2.582	0.775	3.16	0.002	[1.434 4.651]	***
Secondary	6.112	1.834	6.03	0.000	[3.395 11.005]	***
Higher	16.433	5.187	8.87	0.000	[8.852 30.506]	***
Region:						
Base Adamaoua	1					
Centre (without Yaounde)	0.861	0.294	-0.44	0.661	[0.441 1.682]	
Douala	1.864	0.559	2.08	0.038	[1.036 3.355]	**
East	3.618	1.098	4.24	0.000	[1.996 6.558]	***
Far-north	0.819	0.344	-0.48	0.634	[0.359 1.867]	
Littoral (without Douala)	0.481	0.185	-1.90	0.057	[0.226 1.023]	*
North	1.947	0.65	2.00	0.046	[1.012 3.745]	**
North-west	1.834	0.597	1.86	0.063	[0.968 3.472]	*
West	1.035	0.326	0.11	0.914	[0.557 1.92]	
South	3.361	1.001	4.07	0.000	[1.876 6.024]	***
South-west	1.066	0.391	0.17	0.862	[0.519 2.189]	
Yaounde	1.888	0.568	2.11	0.035	[1.047 3.406]	**
Religion:						
Base Catholic	1					
Protestant	1.044	0.098	0.46	0.647	[0.869 1.255]	
Other Christians	1.1	0.155	0.68	0.496	[0.835 1.449]	
Muslim	0.705	0.111	-2.21	0.027	[0.518 0.962]	**
Other faiths	1.186	0.565	0.36	0.720	[0.466 3.019]	
Quintile of revenue:						
Richer	1					
Poorest	0.216	0.039	-8.40	0.000	[0.151 0.309]	***
Poor	0.253	0.037	-9.42	0.000	[0.19 0.337]	***
Middle-Class	0.329	0.038	-9.60	0.000	[0.262 0.413]	***
Marital status:						
Never in union	1					
Married	1.803	0.254	4.19	0.000	[1.369 2.376]	***
Living with partner	0.857	0.15	-0.88	0.379	[0.607 1.209]	
Widowed	1.441	0.36	1.46	0.144	[0.883 2.353]	
Divorced	3.416	1.075	3.90	0.000	[1.843 6.332]	***
No longer living together	0.821	0.203	-0.80	0.424	[0.506 1.332]	
Constant	0.005	0.002	-12.62	0.000	[0.002 0.012]	***
Mean dependent var	0.026		SD dependent var		0.159	
Pseudo r-squared	0.182		Number of obs.		27038	
Chi-square	1178.596		Prob > chi2		0.000	
Akaike crit. (AIC)	5367.352		Bayesian crit. (BIC)		5597.092	

Source: Authors' calculations based on EDS 2018 data, *** p<0.01, ** p<0.05, * p<0.1

3.3. Socioeconomic and Demographic Distribution of Health Insurance Coverage by Different Types of Insurance Sub-Schemes in Cameroon

Overall, the people of Cameroon are covered by five different types of health insurance as follows: community health mutuals, employer health cover, social security, private commercial insurance and health assistance from family security associations/networks. As might be expected, the distribution of people covered by health insurance shows that according to the area of residence, the majority (75.1%) of people covered by health insurance live in urban areas, compared with 24.9% in rural areas. The distribution between urban and rural areas by type of health insurance shows a statistically significant difference ($p < 0.00$) with community health mutuals covering 8.3% of people living in urban areas against 3.8% of people living in rural areas, while employers' health insurance covers 40.6% of people living in urban areas against 14.3% in rural areas. Social security covers 15.8% of people living in urban areas compared with 6.2% of people living in rural areas, and private commercial insurance covers 9.4% of people living in urban areas compared with 5.7% of people living in rural areas, while health assistance from the association/family network covers 0.8% of people living in urban areas compared with the absence of this type of health insurance in rural areas. The gender distribution of people covered by health insurance shows a statistically significant difference, with 73.7% of men covered compared with 26.3% of women ($p < 0.01$). Men benefiting from health insurance are distributed between the different types of sub-schemes as follows: employers' health cover (41.1%), social security (14.3%), private commercial insurance (8.8%), community health mutuals (8.7%), and health assistance/relief from the network of associations/families (0.7%). The distribution of women under the different types of insurance sub-schemes is as follows: employer health cover (13.9%), social security (7.7%), community health mutuals (3.4%), private commercial insurance (1.1%), and health assistance/relief from the network of associations/families (0.1%). In terms of age, the older people are, the more likely they are to be covered by health insurance. Approximately 58.9% of people covered by health insurance are in the 35 to 49 age group, compared with 32.6% in the 25 to 34 age bracket and only 7.4% in the 15 to 24 age group, with a statistically significant difference ($p < 0.00$). The distribution of insured persons between the different types of sub-schemes follows the same ascending order of age group, for community health mutuals: 1.7% for 15-24 year olds, 2.7% for 25-32 year olds and 7.7% for 35-49 year olds; for employer-sponsored health insurance: 2.8% for 15-24 year olds, 17.4% for 25-34 year olds, and 34.6% for 35-49 year olds; for social security: 2.1% for 15-24 year olds, 7.4% for 25-34 year olds, and 12.4% for 35-49 year olds; for private commercial insurance: 0.1% for 15-24 year olds, 4.7% for 25-34 year olds, and 5.1% for 35-49 year olds; for association/family network health assistance or relief: 0.5% for 15-24 year olds, 0.3% for 25-234 year olds, and no health

assistance or relief for 35-49 year olds.

In terms of distribution by marital status, married people are more likely to be covered by health insurance. Approximately 70.5% of people with formal health insurance are married, followed by 11.6% of those cohabiting, 9.0% single, 3.4% widowed or separated and 2% divorced, with a statistically significant difference ($p < 0.00$). The breakdown between the different types of sub-schemes still shows that married people are more likely to have health insurance, since of those covered, 7.6% are married in community health mutuals, 41.2% in employer-sponsored health insurance, 13.2% in social security, 8.0% in private commercial insurance and 0.6% in association/family network health assistance or relief. By level of education, 57.4% of people with formal health insurance had secondary education, followed by 25.2% with tertiary education, 15.4% with primary education and 2% with no education, with a statistically significant difference ($p < 0.00$). By income quintile, those with the most formal health insurance were the very rich (60.4%), followed by the rich (16.0%), the middle class (13.6%) and the poor (10.0%). It should be noted, however, that the poorest are not covered by any type of existing health insurance. According to employment status, employed people are more likely to be covered by health insurance: 81.1% of people with formal health insurance are workers, compared with 18.9% of non-workers, although the difference is not statistically significant ($p < 0.29$). Depending on the type of employment, there was a statistically significant difference in health insurance coverage ($p < 0.00$), as the people who had the most formal health insurance were full-time workers (77.6%), followed by seasonal workers (13.6%) and occasional workers (8.7%). Among full-time workers, employer-provided health insurance is in the first place (44.2%), followed by social security (17.2%), community health mutuals (8.1%), private commercial insurance (7.1%) and health aid or assistance from associations or family (1.0%). In terms of religion, 46.6% of those covered are Catholics, 33.6% are Protestants, 10.0% are other Christians, 9.0% are Muslims and 0.7% are other believers. The distribution by religion shows that all religious beliefs are mainly covered by employer-sponsored health insurance, followed by social security, then private commercial insurance, community health mutuals and, finally, health aid or assistance from associations or families covers only Muslims and Protestants. In relation to the region of residence of the people covered, the inhabitants of the southern region are more represented with 20.9%, followed by the large cities of Yaounde (18.4%), Douala (17.6%), then the eastern region (13.2%), and the other regions: West (7%), North-West (6%), North (4.1%), Centre (4.3%), South-West (2.9%), Littoral (2.1%), Adamaoua (2%), and Extreme-North (1.4%). The regional breakdown by type of sub-scheme shows that employer-sponsored health insurance is most widely used, followed by social security, then community health mutuals, private commercial insurance and finally health assistance or relief from associations or family. The total distribution of people covered by different types of insurance in Cameroon are in order of importance: employer's insurance coverage (54.9%), social security (22%), mutual health insurance (12.2%), private

commercial insurance (10%), and health aid from associations/family safety network (0.9%) (Table 3).

Table 3. Socioeconomics and demographics' distribution of health insurance coverage by different types of insurance's schemes in Cameroon, 2018.

Different types of health insurance schemes							P_value
Socioeconomics variables	Mutual/comm unity health insurance	Employer's insurance coverage	Social security	private/commer cial health insurance	Health aid from associations/family safetynet	All	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Residence							
Urban	58 (8.30)	284 (40.63)	111 (15.8)	66 (9.44)	6 (0.86)	525 (75.11)	0.000
Rural	27 (3.86)	100 (14.31)	43 (6.15)	4 (5.71)	0 (0.00)	174 (24.89)	
Sex							
Male	61 (8.73)	286 (41.06)	100 (14.31)	62 (8.87)	5 (0.72)	515 (73.7)	0.005
Female	24 (3.43)	97 (13.88)	54 (7.73)	8 (1.14)	1 (0.14)	184 (26.3)	
Age (years)							
15-24	12 (1.72)	20 (2.86)	15 (2.15)	1 (0.14)	4 (0.57)	52 (7.44)	0.000
25-34	19 (2.72)	122 (17.45)	52 (7.44)	33 (4.72)	2 (0.29)	228 (32.62)	
35-49	54 (7.73)	242 (34.62)	87 (12.45)	36 (5.15)	0 (0.00)	419 (58.94)	
Marital status							
Never married	3 (0.43)	35 (5.01)	22 (3.15)	2 (0.29)	1 (0.14)	63 (9.01)	
Married	53 (7.58)	288 (41.20)	92 (13.16)	56 (8.01)	4 (0.57)	493 (70.53)	0.000
Living together	8 (1.14)	42 (6.01)	26 (3.72)	4 (0.57)	1 (0.14)	81 (11.59)	
Widowed	14 (2.00)	4 (0.57)	2 (0.29)	4 (0.57)	0 (0.00)	24 (3.43)	
Divorced	4 (0.57)	10 (1.43)	0 (0.00)	0 (0.00)	0 (0.00)	14 (2.0)	
Separated	3 (0.43)	5 (0.72)	12 (1.72)	4 (0.57)	0 (0.00)	24 (3.43)	
Education							
No preschool	6 (0.86)	2 (0.29)	6 (0.86)	0 (0.00)	0 (0.00)	14 (2.0)	
Primary	17 (2.43)	66 (9.44)	16 (2.29)	9 (1.29)	0 (0.00)	108 (15.45)	0.000
Secondary	44 (6.29)	212 (30.33)	88 (12.59)	51 (7.30)	6 (0.86)	401 (57.37)	
High	18 (2.58)	104 (14.88)	44 (6.29)	10 (1.43)	0 (0.00)	176 (25.18)	
Wealth quintiles							
Poorest	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	
Poorer	19 (2.72)	23 (3.29)	28 (4.01)	0 (0.00)	0 (0.00)	70 (10.01)	
Middle-Class	16 (2.29)	58 (8.30)	13 (1.86)	8 (1.14)	0 (0.00)	95 (13.59)	0.000
Richer	4 (0.57)	55 (7.87)	27 (3.86)	22 (3.15)	4 (0.57)	112 (16.02)	
Richest	46 (6.58)	248 (35.48)	86 (12.30)	40 (5.72)	2 (0.29)	422 (60.37)	
Employment							
No	21 (3.00)	75 (10.73)	23 (3.29)	13 (1.86)	0 (0.00)	132 (18.88)	0.292
yes	64 (9.16)	309 (44.21)	131 (18.7)	57 (8.15)	6 (0.86)	567 (81.12)	
Type employment							
all year	47 (8.09)	257 (44.23)	100 (17.2)	41 (7.06)	6 (1.03)	451 (77.62)	0.000
seasonal	13 (2.24)	35 (6.03)	19 (3.27)	12 (2.07)	0 (0.00)	79 (13.60)	
occasional	14 (2.41)	20 (3.44)	13 (2.24)	4 (0.69)	0 (0.00)	51 (8.78)	
Religion							
Catholic	45 (6.44)	161 (23.03)	77 (11.02)	43 (6.15)	0 (0.00)	326 (46.64)	
Protestant	35 (5.01)	134 (19.17)	59 (8.44)	5 (0.72)	2 (0.29)	235 (33.62)	0.000
Other christians	0 (0.00)	59 (8.44)	4 (0.57)	7 (1.00)	0 (0.00)	70 (10.01)	
Muslim	5 (0.72)	27 (3.86)	14 (2.00)	13 (1.56)	4 (0.57)	63 (9.01)	
Others	0 (0.00)	3 (0.78)	0 (0.00)	2 (0.29)	0 (0.00)	5 (0.72)	
Region							
Adamaoua	3 (0.43)	5 (0.72)	6 (0.86)	0 (0.00)	0 (0.00)	14 (2.00)	
Centre (without Yaounde)	9 (.29)	18 (2.58)	3 (0.43)	0 (0.00)	0 (0.00)	30 (4.29)	
Douala	4 (0.57)	79 (11.30)	24 (3.43)	15 (2.15)	1 (0.14)	123 (17.6)	
East	10 (1.43)	30 (4.29)	38 (5.44)	14 (2.00)	0 (0.00)	92 (13.16)	
Far-north	0 (0.00)	9 (1.29)	1 (0.14)	0 (0.00)	0 (0.00)	10 (1.43)	
Littoral (without Dla)	0 (0.00)	13 (1.86)	2 (0.28)	0 (0.00)	0 (0.00)	15 (2.15)	0.000
North	4 (0.57)	25 (3.58)	0 (0.00)	0 (0.00)	0 (0.00)	29 (4.15)	
North-west	17 (2.43)	18 (2.58)	0 (0.00)	7 (1.00)	0 (0.00)	42 (6.01)	
West	18 (2.58)	13 (1.86)	5 (0.72)	9 (1.29)	4 (0.57)	49 (7.01)	
South	0 (0.00)	84 (12.02)	58 (8.03)	4 (0.57)	0 (0.00)	146 (20.89)	
South-west	0 (0.00)	19 (2.72)	0 (0.00)	0 (0.00)	1 (0.14)	20 (2.86)	
Yaounde	20 (2.86)	71 (10.16)	17 (2.43)	21 (3.00)	0 (0.00)	129 (18.45)	
Total	85 (12.16)	384 (54.93)	154 (22.03)	70 (10.01)	6 (0.85)	699 (100)	

Source: Authors' calculations based on EDS 2018 data

4. Discussion

The results of this study show some important differences in health insurance coverage in Cameroon. The results show that socioeconomic status is the main reason for having or not having health insurance coverage. The prevalence of health insurance coverage is 2.06% in this study, which is more relevant as it comes from a cross-sectional study of national primary data. However, it is lower than the prevalence of health insurance coverage sometimes derived from extrapolations of aggregated secondary data ranging from 3.1% [20] to 6.46% [28] generally quoted at national level. The reason for the decrease in the rate of health insurance coverage in this study would be linked to the fact that the estimate of 6.46% had taken into account in social health protection all the funds from the various free health services and care policies financed by the state budget and support from partners. The other reason for this disparity may be linked to the fact that active people aged between 50 and 65 were not included in this study. Indeed, the present health insurance coverage rate is encouragingly better and accurate. In terms of social health protection, health insurance coverage in Cameroon is well below the average coverage rate (17%) for the total population in Africa. This can be explained by the dominance of the informal economy as the main source of employment and income, and by significant under-investment in social protection, which represents on average less than 5% of a country's GDP, compared with a world average of 12.9% [4, 29]. The significant socioeconomic determinants of health insurance coverage are area of residence, age, gender, education, welfare quintile, marital status, religion and region of residence.

It turns out that living in an urban area has a positive effect on the probability of being covered by health insurance in Cameroon. Health insurance coverage in urban areas was significantly higher (1.54%) than in rural areas (0.51%; $p < 0.00$). The distribution by type of health insurance showed a statistically significant difference ($p < 0.00$) with the predominance of health cover in urban areas from employers (40.6%), social security (15.8%), private commercial insurance (9.44%), mutual health insurance (8.30%) and assistance/rescue from the association/family network (0.86%). These results are broadly in line with expectations in a country where resources are limited and where the informal sector is very present, and more formal jobs are found in urban areas in the national economy. On the other hand, the results revealed by the logistic regression, indicate a slight but non-statistically significant difference between health insurance coverage in urban and rural areas, where people living in rural areas are slightly less likely (around 0.07%) to have health insurance coverage. This may be explained by the fact that despite the presence in some rural areas of the country of large plantations and labour-intensive forestry industries, many part time employees or workers are not covered by health insurance. These results corroborate those of previous studies, which have found that

strong disparities persist between regions, between rural and urban areas, and between women and men and that urban dwellers have a greater propensity to be covered by health insurance or social health protection in low- and middle-income countries [4, 23, 27, 30, 31].

In terms of gender, men (1.52%) have significantly more health insurance coverage than women (0.54%; $p < 0.04$). This shows that being male could have a positive effect on the likelihood of being covered by health insurance in Cameroon. The distribution by type of health insurance shows a greater proportion of men represented in each type and that overall, both sexes are more covered by employer health insurance (54.94%), social security (22%), mutual health insurance (12.2%), private commercial insurance (10%) and aid/rescue associations/family (0.87%). These results contrast with those of previous studies, which generally agree that health insurance coverage does not appear to be linked to gender [10, 32-34]. Furthermore, with regard to social health protection coverage, it appears that women are more likely to be covered [5, 27].

The results of this study show that age has a positive effect on the likelihood of being covered by health insurance. There is a significant difference between the different age groups for health insurance cover. In this study, health insurance coverage changes according to the active age group, with 0.15% for the 15-24 age group, 0.67% for the 25-34 age group, and 1.23% for the 35-49 age group. This shows that health insurance coverage is relatively low at the start of working age and rises as working age increases and could drop considerably or fall when a person reaches the inactive age of retirement. The distribution by type of health insurance shows that on the whole all age groups are more covered by employers' insurance, followed respectively by social security, mutual health insurance, private commercial insurance and finally help/rescue from associations/family. These results are consistent with those of previous studies indicating that the fact that younger or older people are more economically and socially excluded from the community and therefore find it more difficult to be covered by health insurance in developing countries [6, 35, 36]. On the other hand, these results contrast with the findings of other studies which indicate that age does not seem to exert any influence, with the youngest and oldest people never being under- or over-represented among those covered by health insurance [33, 34].

Education increases the likelihood of being covered by health insurance. The results of this study show that the higher the level of education, the greater the chance of being covered by health insurance, and compared with a person's lack of education, tertiary education is around 16 times more likely, secondary education 6 times more likely and primary education 2.5 times more likely to be covered by health insurance. Of those covered by some type of health insurance, 82.5% have secondary and/or tertiary education. Of those with secondary and/or tertiary education, 45.2% were covered by employer insurance, 18.9% by social security, 8.7% by private commercial insurance, 8.9% by mutual health insurance, and 0.8% by association/family

assistance. This can be explained by the fact that people with a higher level of formal education would pay more attention to covering the health risks to which they are exposed, would be more open to the demand for modern medical services and care, and would have greater perceptions and ability to understand the value of the health insurance system. These results corroborate those of previous studies which show that the higher the level of education, the greater the probability of subscribing to health insurance [27], whether the level of education is measured in terms of the number of years of schooling or in terms of the ability to read and write. Thus, among the population covered by a study on membership of mutual health insurance in Senegal, around 80% of individuals with secondary education and 90% of individuals with a university degree are members of a mutual health insurance scheme [34].

In this study, economic capacity measured in terms of the quintile of economic well-being appears to be an essential determinant of health insurance coverage. As individuals move up the economic well-being quintile scale, their susceptibility to being covered by health insurance increases. Among those covered by health insurance, more than 3 out of 4 people (76.4%) are rich or richer, compared with 13.6% of the middle class, 10% of the poor and none of the poorest, with a statically significant difference ($p < 0.00$). Low economic capacity is a major obstacle to taking out health insurance. Thus, to be covered by health insurance, the poorest person is 78% less likely, the poor is 75% less likely, and the middle class is 67% less likely than the rich and the difference is statically significant between quintiles of economic well-being ($p < 0.01$). This indicates that low economic capacity implies a lack of financial resources and therefore a low capacity to pay for health insurance. These results can also be explained by the predominance of people (around 80%) working in the informal private sector in Cameroon with low and unstable wages that do not provide sufficient means to subscribe to health insurance and insofar as affordable access to health services is strongly affected by income as an increase in household income would also increase a household's willingness to subscribe to an insurance scheme [30, 39]. These results are broadly consistent with the findings of other studies which have found that the socio-economic level of people covered by health insurance is higher than that of people not covered, whose low ability to pay is a major barrier to their access to health insurance [30, 33, 34]. These results are also in line with those of a study on community health insurance (CHI) carried out in the two major cities of Yaoundé and Douala in Cameroon, which found that family size, the priority given to health and household income were determining factors in the willingness to join an insurance scheme, and that an increase in household income would also increase a household's willingness to join an insurance scheme [37]. However, in the Cameroonian context, where the level of poverty is relatively high, with more than 55% of people living in poverty and around 37.7% extremely poor [17], despite a large disparity between rich and poor, the poorest people (42.9%), but also some relatively well-off people (31.1%) in

the population studied, are more represented among those not covered by health insurance. This situation may be explained by the fact that some richer and wealthier people may be less apprehensive about their future financial ability to bear the costs of health services and care without health insurance coverage, but also by the selfishness of wealthier people who simply do not want a health risk pooling system in which the poor benefit disproportionately from their insurance contribution [29, 38, 43, 44]. Furthermore, a person's employability appears to have a positive influence on health insurance coverage, as employed people are more likely to be covered (81.1%) than unemployed people (18.9%), although the difference is statistically insignificant ($p < 0.29$). This can be explained by the fact that the main types of health insurance available in the country, such as employer-provided insurance, social security and private commercial insurance, are aimed at people in formal employment, whereas the unemployed can only benefit from help/assistance from associations/families and community health mutuals. Among the workers covered, the majority (77.6%) work full-time all year round, compared with only 13.6% of seasonal workers and 8.8% of occasional workers, with a statistically significant difference ($p < 0.00$). These results contrast with those of studies indicating that, strictly speaking, professional status does not seem to influence the decision to take out health insurance or not [40, 41].

Marital status appears to influence health insurance cover. While married people are more likely to be covered by health insurance at 70.5% compared to insured people, divorced people are 3.4 times more likely compared to 1.8 times for married people and 1.4 times for widows/widowers to be covered by health insurance than unmarried people. These results are consistent with those of previous studies which indicate that married men are more likely to be covered by health insurance than unmarried men [44]. However, these results contrast with those of other studies which show that marital status has no impact on participation in health insurance and that among those covered, the proportions of monogamous and polygamous households are relatively similar [10].

Patterns of health insurance coverage among different socio-economic groups in the population are not similar, as there are many disparities. The coverage found in this study may be at odds with administrative data [22, 28]. There is abundant evidence of disparities between cross-sectional survey data on health insurance coverage and administrative data, which is also a challenge for adequate planning of health insurance coverage in Cameroon and other African countries [4, 28, 29]. The disparity in health insurance coverage data in Cameroon can also be explained by the fact that the social health protection model is based mainly on the civil servant system and the National Social Security Fund (NSSF) system. The civil servants' system, financed by the state budget, looks after civil servants in need of public medical assistance, with limited funding due to its single public source, whereas the NSSF looks after workers governed by the Labour Code, which is compulsory for civil servants and workers in the formal private sector, but not for

workers in the informal private sector. However, statistics on health insurance coverage are not always available or up to date for many workers, who do not recognise health as a priority and often do not participate in their companies' social insurance schemes [45].

5. Limits of the Study

Although this study has provided important information on the socioeconomic determinants of health insurance coverage in Cameroon, it is limited by the fact that it uses only cross-sectional data. This limits our ability to make judgements about changes in health insurance coverage over time. It also limits the causal links between socioeconomic and demographic determinants and health insurance coverage. In addition, data on the cost or prepayment price of different types of insurance at the individual level was not available and could not be included as a determinant of coverage, despite the fact that cost/price is one of the most important determinants of access to health insurance. From a methodological point of view, the sampling frame used in Cameroon's DHS-V is based on 2018 population data and may not reflect actual changes in population distribution that have occurred since that Survey. In addition, the EDS-V excludes women over 49 years of age and our study excludes men over 49 years of age, which may bias our estimates of the true prevalence of health insurance coverage in Cameroon, given the life expectancy of women and men of 58 and 59 years, respectively [26].

6. Conclusion and Suggestions

Health insurance coverage provides a means of financial protection against catastrophic health expenses, particularly for the poor and vulnerable, which are protected in the event of an unexpected illness or health problems and in cases where the financial means available are limited to support full treatment in health facilities. Although five types of health insurance exist across the country, coverage of the population remains low and disparate according to socioeconomic and demographic characteristics. Health insurance in Cameroon, as in most countries in sub-Saharan Africa, remains a challenge for a variety of reasons. The results of this study, although relatively limited, highlight determinants such as area of residence, gender, level of education, quintile of economic well-being in relation to poverty and wealth, employment and type of employment, marital status, religion, and region of residence that positively or negatively influence health insurance coverage in Cameroon. Although these socioeconomic and demographic determinants alone cannot explain the low level of health insurance coverage, they are important factors in gaining a better understanding of the health insurance mechanisms that exist in Cameroon, which can play a crucial role in reducing the burden of paying direct costs for individuals and households and increasing access to quality health services and care. However, more research is needed to clarify the relative weight of the level of acceptable

resources in relation to other factors that determine health insurance coverage, taking into account the heterogeneity of the financial means of the target populations and their willingness and ability to pay for different types of health insurance. Based on our empirical analysis of the socioeconomic determinants of health insurance coverage, the following suggestions are made: (i) given that health insurance considerably minimises the burden of health expenditure for a poor and vulnerable household or individual, public authorities should design comprehensive health service financing strategies that will aim to increase the demand for and supply of health insurance for the target population with pre-payment tariffs that can be compatible with their socioeconomic characteristics and their contributory capacities; and (ii) it is necessary to put in place or strengthen a public policy with strategic priorities for taking account of socioeconomic determinants in order to advance the universal health coverage programme to improve the health of the population in general and maternal, newborn and child health in particular in Cameroon.

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