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Determinants of Utilization of Modern Health Facilities in Côte D'ivoire: Evidence from a National Household Survey.

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Abstract

Background: There are numerous inequalities in access to health care that persist in most countries and that are alarming in sub-Saharan Africa. Access to quality care determines how people use care and how they use modern health services. This article examines the various patterns of use of healthcare and the factors that determine the use of modern health services in the three residential areas of Abidjan, the capital city, urban and rural areas.

Methods: We used data from the national household living standards survey conducted in 2015. Extraction from sociodemographic, economic data, reported morbidity and use of modern, traditional, and mixed care during the 4 weeks preceding the survey have been made. A one-way analysis helped identify the factors associated with the use of modern care as well as a multi-faceted analysis that served for identifying the determinants of such access. Pearson's Chi² Test, Odds ratios, and confidence intervals were calculated and the significance of the tests was set at 0.05.

Findings: Out of a total of 12,899 households and 47,635 individuals interviewed, 3084, 2083 and 609 have reported illness in rural, urban and Abidjan respectively. In rural, urban, and economic capital areas, the majority of people used modern health care (53.8%, 58.5%, and 61.6% respectively). Renunciation to care was 31% overall. Demographic, economic and health characteristics were identified as predicting the use of modern care in the three residential areas. Age was most strongly associated with Abidjan (OR=7.29 for children under 5 years of age and OR= 4.92 for those of 5 to 14 years old). Single people, compared to married people used less modern care with ORs of 0.52, 0.59, and 0.60 in both Abidjan and in urban and rural areas. Compared to the richest quintile, the two poorest quintiles had even less use of modern care in urban (OR=0.43 and 0.53) and rural (OR=0.54 and 0.66) areas. In urban areas and Abidjan, the transfer of insurance costs to an insurance company or a relative (OR=3.41 and OR=2.71), and the existence of a chronic disease (OR=1.85 and OR=2) increased the use of modern care. The long distance to a health facility reduced this use in rural areas (OR=0.71).

Conclusion: This work has highlighted predictors of healthcare use that could serve as a driving force for action against social inequalities of health. It also shows the need to improve the understanding of the social factors at both collective and individual level that determine care utilization behaviors as financial barriers and geographical access difficulties are overcome.

Keywords: Healthcare seeking behavior, Healthcare utilization, Modern health care, Ivory Coast.

Introduction

Access to quality care is a key factor for improving the health status of populations [1]. The World Health Organization estimates that about one-third of the world's population cannot use modern health care services due to economic and geographical barriers [2-4]. A literature review in 2014 showed that in Sub-Saharan Africa, wealth was strongly correlated with health service utilization [5]. Poor populations would defer their use of modern health care, renounce it, or use traditional medicine [6, 7]. Other factors such as socio-demographic and cultural characteristics of populations, the availability and quality care services also determine their use [4, 8-10].

Several initiatives such as the development of mutual health insurance, an insurance system and the exemption of fees for a category of the population have been implemented in most developing countries. These payment exemption measures have increased the use of health services [11, 12] especially among disadvantaged populations [13]. Although an increase in the use of health services has been noted, inequalities in access to care still exist with disparities between residential areas to the disadvantage of the rural area [5, 14, 15]. The use of traditional medicine is an alternative since, according to the WHO, 80% of the population in developing countries uses that medicine [16]. However, the incorporation of this type of practice into the modern health system is insufficient on the ground. Inequalities in access to care have been well documented in both Organization for Economic Co-operation and Development (OECD) countries and some Asian countries [17, 18]. In Sub-Saharan Africa, there have been few studies that have analyzed this

phenomenon and mainly focused on maternal and child health, which represents a segment of the health system for which fee exemption measures generally exist [19, 20]. Besides, the emergence of chronic diseases in this region of the world could exacerbate these inequalities of access [21].

In Côte d'Ivoire, the use of health facilities ranged from 0.1 to 0.25 new contact/inhabitant/year in 2007 [22], below 1 contact/year/adult defined by WHO for sub-Saharan countries [23]. The reasons given pertained to an inequitable distribution of health personnel and insufficient health infrastructure to the detriment of the rural area. To improve access to modern health care, in 2012, after a military-political crisis from 2002 to 2011, the government adopted a measure exempting children aged 0 to 5 and pregnant women from paying medical care fees in public, Para public and accredited community health care institutions. Despite those initiatives, utilization rates for modern health services, although increasing, remained low, at 43% in 2015, compared to 18% in 2012 [24].

The understanding and measurement of inequalities in access are essential for developing effective policies for accessing care. In the context of exemption from health costs and the development of traditional medicine in Côte d'Ivoire, an update of global utilization data will make it possible to analyze the health behavior of populations with respect to the use of health care. The purpose of this work was to assess the use of care and the factors determining the use of modern health care services in the various geographical areas of residence among the African populations living in Côte d'Ivoire.

Methods

The Framework of the Sample Study

Study Framework

Côte d'Ivoire is a West African country located in the Gulf of Guinea and at 7.54 latitude and -5.5471 longitude with a tropical climate. In 2016, it was classified by the World Bank as a low-middle income country. Its population was estimated in 2014 at 22,671,331 inhabitants, 19.4% of whom reside in the economic capital, Abidjan, located in the south of the country, 30.9% in the rest of the urban area and 49.7% in rural areas (RGPH, 2014). The proportion of people living below the national poverty line (269,075 XOF (\$US480.3) per year; \$US1.33 per day; \$US1 = 560,250 XOF, XOF is West Africa CFA currency) was estimated at 46.3% in 2015; 56.8% in rural areas and 35.9% in urban areas. The Gini index was estimated at 0.405 in 2015 (ENV, 2015). Agriculture contributed 24% to the GDP in 2014 [25]. The health system is organized following a public sector, in a pyramidal form, and a private sector that coexists with the traditional medicine [26]. The total health expenditure in 2015, representing 5.86% of the GDP, was estimated at CFAF 49,073 per capita, and households contributed 32.55% [27]. The proportion of the population benefiting from health insurance was 10% in 2014 [25].

Sampling

The data in this study are based on the cross-sectional survey on household living standards (ENV 2015) conducted from January 23 to March 25, 2015, by the Institut National de la Statistique de Côte d'Ivoire (National Institute of Statistics) (INS).

The target population consisted of African households living in Côte d'Ivoire. A 2-stage stratified random sampling was conducted. That 2-stage stratified random sampling was conducted using the results of the 2014 population and habitat general

census as a sampling frame. The national territory has been divided into 33 strata made up of 31 regions and two autonomous districts: Abidjan and Yamoussoukro (political capital). Each stratum is divided into Countable Areas (CAs) corresponding to the census districts. In total, 1,075 CAs estimated at 44.8% from the urban area and 55.2% from the rural area were used to identify households. In the 1st degree, the CAs were randomly drawn with a proportional allocation. Outside of the city of Abidjan, at least 23 CAs were randomly drawn from each stratum. In Abidjan, all 99 CAs were included in the sampling. In the 2nd degree, 12 households were systematically drawn at the level of each counting zone. The minimum size calculated per stratum was made of 192 households ($\alpha=0.05$, the margin of error= 10% and $p= 50\%$). In each stratum, between 276 and 1,188 households were randomly selected to reflect the demographic weight of the districts. Each individual in the household was included in the sample. A total of 12,899 households and 47,635 individuals formed the sample.

Data Collection and Processing

Data Collection

The data were collected by administering a questionnaire that included socio-demographic and economic characteristics, the total household expenditures, housing and access to socio-economic and health infrastructure, morbidity reported by respondents, type of care use in the four weeks before the survey and reasons for using traditional care.

The interviewers were trained by the National Institute of Statistics (INS) for two weeks. The data were recorded using a smartphone device with an instant remote transmission. Data clearance was

performed as the data were collected on the ground and at the central level, which made it possible to reduce the processing time for processing the information collected.

Study Variables

The dependent variable, a type of use of care was defined under three conditions: exclusive use of modern care, exclusive use of a traditional practitioner and mixed-use (modern and traditional).

The use of modern care has been defined as the consumption of health commodities in the modern health care supply chain in the event of morbidity reported during the last four weeks prior to the survey, with the exclusion of any other recourse.

The socio-economic status was used as an objective basis by the households' consumption expenditure since it is more stable than the income data. Indeed, in low- and middle-income countries, income data are unavailable and vary mainly in rural areas [28]. Moreover, in Africa, individuals are reluctant to disclose the exact amount of their income. Household weight was accounted for in the construction of expenditure quintiles by dividing annual household expenditure by the equivalent size of the household [29].

Given the economic scale of household consumption (equivalence scale that specifies the relationship between household consumption and household size), the equivalent size of households is used in preference to the actual size of the household [29].

The expenditures thus calculated were used to determine the quintile levels for all households in the study. Quintile 1 (Q1) corresponds to the poorest level while quintile 5 to the richest level. Finally, each individual was placed in one of the 5

quintiles according to the expenses of his or her home.

Morbidity was reported for chronic diseases such as hypertension or low blood pressure, diabetes, cancer, asthma, and diseases that occurred in the last four weeks prior to the survey.

The age has been categorized into 5 classes corresponding to children under 5 years of age, teenagers and young people, adults and other elderly people.

The level of schooling of individuals of 3 years of age and over has been divided into 4 categories with a subdivision of those not enrolled in school according to literacy.

Assistance to the payment of health care costs was equivalent to health insurance or financial assistance.

The commodity score was calculated by adding the presence of drinking water supply, adequate sanitation, and electricity as a source of lighting and gas as an energy source. Adequate sanitation met the following three conditions: household garbage disposal by removal by technical services with or without pre-collection, domestic wastewater disposal in septic tanks or sewers and fecal disposal by wet-water closet type system. The commodity variable was measured and coded using a 5-modality score (0, 1, 2, 3, and 4) corresponding to the number of modalities owned by individuals.

The distance to a primary health care facility (PHCF) was measured according to WHO standards (less than 5 km, 5 - 10 km, more than 10 km).

Statistical Data Analysis

Less than 3% of the data were missing. Those missing data were compensated for by a multiple imputation methods with Stata software version 12.0. The data were

analyzed in Stata 12.0 software (College Station, Texas 77845 USA StataCorp LP). All the variables studied were compared over the three residential areas using the Chi2 test. The Chi2 test was used to study the association between the type of healthcare in the case of reported morbidity and the independent variables on the one hand, and the residence environment on the other hand. The percentages, median, mean, and standard deviation were calculated to describe the distribution of care. The independent variables that were found significantly associated with the 5% threshold dependent variable were used to develop a logistic regression model by residence, based on the conceptual framework for the utilization of care proposed by Andersen [30]. The final model was adopted following a top-down approach at the 5% threshold. The likelihood ratio helped to select the variables in the final model, and Hosmer and Lemeshow's test validated the model. The odds ratio and 95% confidence intervals were calculated and interpreted.

Ethical Issues

Authorizations from the government, political, administrative and military authorities were obtained before the survey began. The surveyors collected the informed consent of the family leaders after the purpose of the survey was presented. The data were anonymized during data processing.

Results

Data from only one household could not be used due to the unavailability of the family leader. A total of 12,899 households and 47,635 individuals were analyzed.

Sociodemographic Characteristics

The sample was distributed in rural and urban areas, and in Abidjan, the economic capital, as follows: 55.2% (7,115), 35.6%

(4,596), 9.2% (1,188) for households and 55.6% (26,488), 34.6% (16,477) and 9.8% (4,670) for individuals, respectively.

The distributions of the socio-demographic characteristics showed that the 3 strata came from different populations (Table 1). Children (0-14 years old) were less prevalent in Abidjan, 3 out of 10 individuals vs. 4 out of 10 in rural areas, while 4 out of 10 people were among adolescents and young people vs. 3 out of 10 in rural areas; the urban area appeared to be intermediate. There were as many men as women in rural and urban areas except in Abidjan where there is an inversion of the sex ratio (0.94).

In rural areas, there was less schooling and literacy. Of the total sample, more than a third of the population was not literate.

The distribution of household spending quintiles was decreasing in rural areas where the percentage of Q5 was one-third of the 30% in Q1. This distribution was increasing in Abidjan, with the percentage of Q1 multiplied by 7 to make up nearly 42% in Q5. In urban areas, this distribution is symmetrical with a mode at nearly 22% in Q3 and extremes at 18%.

No commodity was found for nearly two-thirds of individuals in rural areas and one-fifth in urban areas, where less than one-tenth had 3 commodity. This commodity score 3 was achieved for six-tenths of the individuals in Abidjan, where three-tenths of the individuals were at score 2. Commodity sanitation was the most lacking. In rural areas, four-tenths of the individuals resided in the range of 5 to 10 km and more than 10 km from a PHCF.

Approximately 12% (n=5,776) of respondents reported having been sick, 68.7% (3,968) of whom had used care in the past 4 weeks (Table 2). The distribution of the type of remedy varies according to the area of residence. Renunciation was higher in rural areas (32.5%). The

exclusive use of modern care was predominant in all areas of residence, with more than half in rural areas and about three-fifths in urban areas and Abidjan. Exclusive use of traditional care was more common in rural areas, with nearly one over ten people using it.

Among those who used modern care in cases of declared or undeclared morbidity (4,444), 929 (20.9%) used it mainly for pregnancy follow-up (364 or 39.2%) and vaccination (234 or 25.2% of which 72.8% were children under 5 years of age).

Renunciations of care were reported by about three-tenths of the individuals, ranging from 32 to 30 and 28% of the rural population in Abidjan.

In mixed cases, the first one was more often related to modern care (Rural: 66.9%, Urban (75.5%, Abidjan: 63.6%).

The high cost of modern care was the first cause mentioned for the use of traditional care (Figure 1). Difficulties of access have been reported in rural areas and the need for modern care in rural and urban areas has been raised.

Table 1: Demographic and socio-economic characteristics of the sample (n=47,635)

Characteristics		Rural area (n=26488) (n, %)	Urban area (n=16477) (n, %)	Abidjan (n=4670) (n, %)	p value	
Gender	Male	13,487 (50.9)	82,74 (50.2)	2,262 (48.4)	<0.001*	
	Female	13,001 (49.1)	8,203 (49.8)	2,408 (51.6)		
	<i>Sex ratio</i>	<i>1.04</i>	<i>1.01</i>	<i>0.94</i>		
Age (years)	0 – 4	4,969 (18.8)	2,379 (14.4)	538 (11.5)	<0.001*	
	5- 14	6,355 (24.0)	4,031 (24.5)	918 (19.7)		
	15- 34	8,195 (30.9)	6,064 (36.8)	1,957 (41.9)		
	35- 64	6,025 (22.7)	3,564 (21.6)	1,114 (23.8)		
	≥ 65	944 (3.6)	439 (2.7)	143 (3.1)		
	Mean age ± standard deviation	23.3 ± 19.2	23.1 ± 17.7	25.2 ± 17.2		
Matrimonial status (n=47629)	Median [Min – Max]	20 [0 – 98]	20 [0 – 120]	24 [0 – 105]	<0.001*	
	Single	14,745 (55.7)	10,211 (62.0)	2,925 (62.6)		
	Married or concubine	10,614 (40.1)	5,557 (33.7)	1,579 (33.8)		
	Divorced or widowed	1,127 (4.2)	706 (4.3)	165 (3.6)		
Level of Education (n=42242)	Not educated	<i>Literate</i>	<i>442 (2.7)</i>	<i>389 (5.2)</i>	<i>213 (13.6)</i>	<0.001*
		<i>Not Literate</i>	<i>15,792(97.3)</i>	<i>7,066 (94.8)</i>	<i>1,355 (86.4)</i>	
		sub-total	16,234(70.1)	7,455 (50.4)	1,568 (36.7)	
	Primary	5,263 (22.7)	3,777 (25.6)	1,035 (23.4)		
	Secondary	1,559 (6.7)	3,141 (21.2)	1,195 (27.9)		
	Superior	117 (0.5)	418 (2.8)	430 (10.0)		
Socio- economic status	Quintile 1(Poorest)	8,057 (30.4)	3,089 (18.7)	276 (5.9)	<0.001*	
	Quintile 2	6,128 (23.1)	3,447 (20.9)	521 (11.2)		
	Quintile 3	5,330 (20.1)	3,571 (21.7)	797 (17.1)		
	Quintile 4	3,991 (15.1)	3,339 (20.3)	1,131 (24.2)		
	Quintile 5 (Richest)	2,982 (11.3)	3,031 (18.4)	1,945 (41.6)		
Convenience score	0	16,536 (62.4)	3,304 (20.0)	38 (0.8)	<0.001*	
	1	7,900 (29.8)	5,898 (35.8)	204 (4.3)		
	2	1,926 (7.3)	5,738 (34.8)	1,433 (30.7)		
	3	126 (0.5)	1,413 (8.6)	2,936 (62.9)		
	4	0	124 (0.8)	59 (1.3)		
Distance to PHCF** (km)	0 – 4	9,961 (59.1)	13,515 (87.4)	2,785 (72.9)	<0.001*	
	5 – 10	3,718 (22.1)	1,385 (10.2)	915 (24.0)		
	> 10	3,169 (18.8)	321 (2.4)	121 (3.1)		
Chronic conditions	Reported	707 (2.7)	599 (3.6)	183 (3.9)	<0.001*	
	Not reported	25,781 (97.3)	15,878 (96.4)	4,487 (96.1)		
<u>Insurance or financial assistance for the payment of health services</u>	Yes	285 (1.1)	297 (1.8)	104 (2.2)	<0.001*	
	No	26,203 (98.9)	16,180 (98.2)	4,566 (97.8)		

*p** : statistically significant test; **** : Exclusion of answers « I don't know »

Table 2: Utilization of health care service according to area of residence in case of declared morbidity (n= 5,776)

Type of health care used	Rural (3,084) n (%)	Urban (2,083) n (%)	Abidjan (609) n (%)	Total n (%)	p
Forgo health services	1,003(32.5)	633 (30.4)	172 (28.2)	1,808 (31.3)	<0.001*
Traditional health care	276 (8.9)	145 (7.0)	32 (5.3)	453 (7.8)	
Modern health care	1,660 (53.8)	1,219 (58.5)	375 (61.6)	3,254 (56.3)	
Mixed use	145 (4.7)	86 (4.1)	30 (4.9)	261 (4.5)	

*p** : statistically significant test

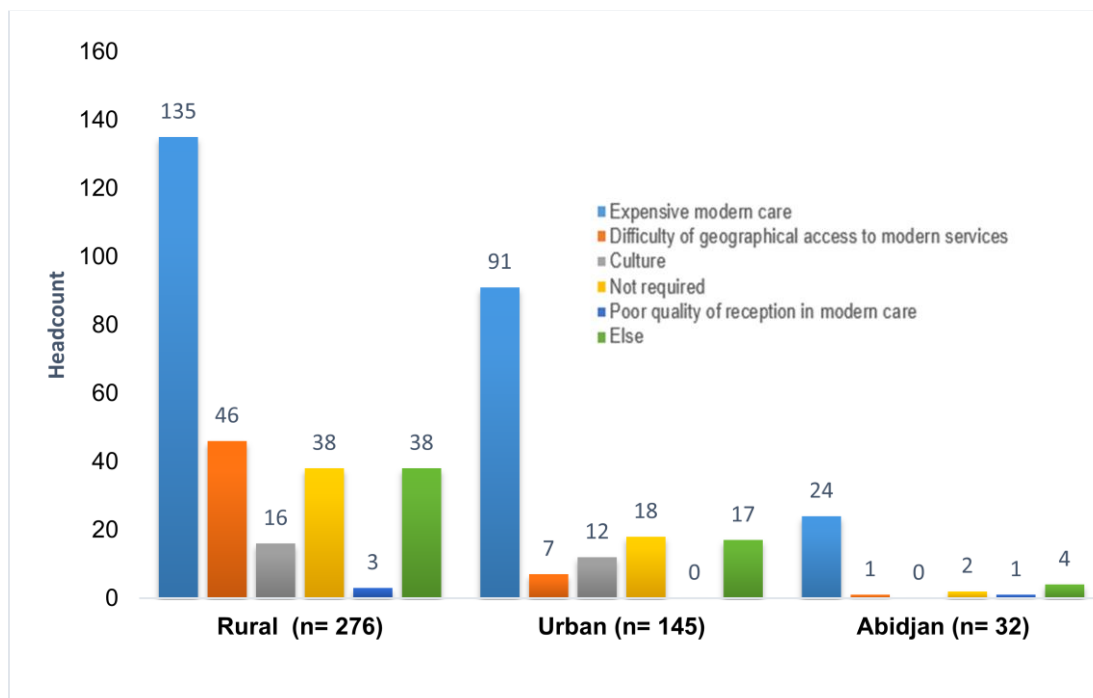


Figure 1: Reasons given for the exclusive use of traditional health care in case of reported morbidity

Malaria was the main reason for seeking care in the 3 residential areas, around 45% in modern care, 30 to 35% in traditional and mixed care (Figure 2). Recourse for digestive symptoms, pain, fracture, and

chronic diseases, except pain, fracture in Abidjan, was more frequent in traditional and mixed care than in modern care in the 3 residential areas. However, the number of claims remained higher for modern care.

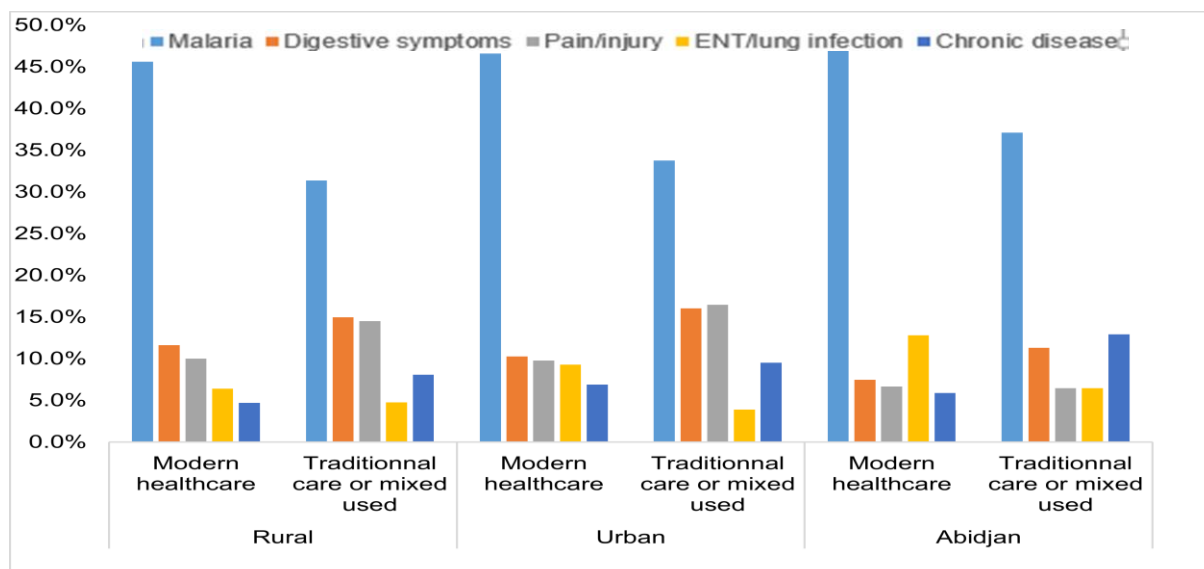


Figure 2: Reasons for seeking health care according to type of health care and residence area.

Factors Influencing the Use of Modern Care

In the one-to-one analyses, statistically significant differences in the use of modern care have emerged between the modalities of socio-economic and health characteristics within residential areas and between those areas on a number of modalities of age, marital status, expenditure quintiles and insurance or financial assistance towards care costs, with a rural environment in Abidjan gradient. With regard to the characteristics of gender and chronic disease, there were differences between residential areas, with a gradient in rural Abidjan, but almost not within these areas; whereas with regard to the characteristics of education level and commodity score, the same differences were observed within residential areas, but almost not between such areas. Distance to a PHCF was associated with the use of care for rural areas only (Table 3).

Logistical regression models (Table 4) were carried out separately for each of the residential areas, and three characteristics were identified as predicting the use of modern care in the three areas. Age was the most strongly associated characteristic and this association was strongest in Abidjan with OR=7.29 and 4.92 for children under 5 years and 5-14 years of age, respectively, and then in rural and urban areas with OR=4.37 and 3.69, respectively for children under 5 years of age. The OR was 2.76 for children aged 5-14 years in rural areas and 2.50 for young people aged 15-34 years in Abidjan. The reference recourse, the one aged 65 and over, seemed to be the lowest. Second, marital status and spending quintiles were also associated with the use of modern care. Single people, compared to married people, used less modern care with ORs of 0.52, 0.59, and 0.60 in Abidjan and in urban

and rural areas, respectively. Compared to the richest quintile, the two poorest quintiles had even less use of modern care in urban (OR=0.43 and 0.53) and rural (OR=0.54 and 0.66) areas. In Abidjan, the OR values of the other four expenditure quintiles ranged from 0.49 to 0.59; although these values were statistically significant for the two poorest quintiles.

Also, insurance or financial assistance for care costs (OR=3.41 and 2.71 in urban areas and Abidjan, respectively) and chronic disease (OR=2.00 and 1.85 in Abidjan and urban areas, respectively) were associated with an increase in the use of modern care. The distance of 10 km or more to a PHCF decreased the use of modern care in urban (OR=0.45) and rural (OR=0.71) areas. Female gender (OR=1.24) and commodity score (OR ranging from 0.21 to 0.33 for 0 to 2 commodities, compared to 3 commodities even though 0.21 was the only statistically significant value) were associated with modern care in rural areas only.

Table 3: Distribution of utilization of health services according to socio-economic and health characteristics in the 3 areas of residence in the case of declared morbidity

Variables	Rural Zone			Urban Zone			Abidjan			p
	N	% SM	% Forgo	N	% SM	% Forgo	N	% SM	% Forgo	
Total population	3,084	53.8	32.5	2,083	58.5	30.4	609	61.6	28.2	
Gender										
Male	1,580	52.7	33.5	1,013	58.1	31.4	300	59.3	30.3	0.014*
Female	1,504	55.1	31.5	1,070	58.9	29.4	309	63.8	26.2	0.043*
p	0.398			0.497			0.494			
Age (year)										
0-4	649	66.7	23.1	351	68.7	22.5	108	71.3	17.6	0.695
5-14	423	60.5	31.0	367	55.9	36.5	85	67.1	29.4	0.184
15-34	811	47.3	36.1	665	55.6	32.8	207	57.5	30.4	0.004*
35-64	965	50.1	34.8	573	58.6	27.9	178	60.1	29.8	0.005*
≥65	236	44.1	39.4	127	52.8	33.1	31	48.4	38.7	0.613
p	<0.001*			<0.001*			0.072			
Matrimonial status										
Married	1,428	51	32.6	804	61.7	25.9	237	62.9	26.6	<0.001*
Separated/Widow	251	40.2	45.0	171	48.0	37.4	40	52.5	25.0	0.109
Single	1,404	59.1	30.3	1,108	57.9	32.6	332	61.7	29.8	0.479
p	<0.001*			<0.001*			0.082			
Education level										
Not educated	1,728	49.0	35.6	853	53.3	32.2	234	55.6	28.2	0.084
Primary	600	55.0	32.8	422	55.7	34.4	129	60.5	34.9	0.152
Secondary	256	53.1	34	441	60.8	31.1	132	59.8	31.1	0.203
Higher education	24	70.8	20.8	93	71.0	22.6	47	78.7	19.1	0.748
p	0.063			0.001**			0.002**			
Socio-economic status										
Quintile 1 (Poorest)	592	45.6	38.3	236	47.0	34.7	22	54.5	36.4	0.693
Quintile 2	678	53.8	33.8	350	51.4	36.9	53	62.3	37.7	0.080
Quintile 3	660	57.4	28.3	443	58.2	31.6	103	52.4	31.1	0.196
Quintile 4	605	57.0	29.9	513	62.4	27.5	161	59.0	30.4	0.373
Quintile 5 (Richest)	549	54.8	32.6	541	64.7	26.1	270	67.0	23.3	0.003*
p	0,001**			<0.001*			0.024**			
Convenience Score										
Score 0	1,790	50.1	35.7	322	50.9	35.4	6	33.3	66.7	0.570
Score 1	989	55.0	29.0	718	55.0	29.8	41	63.4	34.1	0.243
Score 2	322	63.4	27.6	745	62.6	29.9	199	53.8	32.7	0.044*
Score 3	23	78.3	13.0	271	64.6	27.3	352	66.2	24.4	0.594
Score 4	0	-	-	27	70.4	29.6	11	63.6	27.3	0.283
p	<0.001*			<0.001*			0.038*			
Distance to PHCF**										
0-4 km	1,379	56.6	30.8	1,586	58.8	30.1	368	63.9	27.7	0.075
5-10km	426	48.1	37.3	160	60.6	26.3	94	56.4	29.8	0.068
≥10km	306	47.1	39.3	34	41.2	38.2	25	64.0	16.0	0.135
p	0.002*			0.163			0.145			
Chronic Disease										
Reported	281	50.9	35.2	238	65.1	23.5	80	65.0	20.0	0.006*
NotReported	2,803	54.1	32.3	1,845	57.7	31.3	529	61.1	29.5	0.003*
p	0.548			0.046*			0.106			
Insurance or financial assistance for the payment of health services										
Yes	126	65.9	23.8	154	79.2	14,9	61	85.2	13.1	0.019*
No	2,958	53.3	32.9	1,929	56.9	31,6	548	58.9	29.9	0.021*
p	0.022*			<0.001*			<0.001*			

p*: statistic significant test N : Headcount

Table 4: Factors Associated with the Use of Modern Health Care: Logistic Model

Variables	Rural area (n=2,111) OR, IC _{95%}	Urban area (n=1,780) OR, IC _{95%}	Abidjan (n=542) OR, IC _{95%}
<u>Gender</u> (Reference : male)			
Female	1.24*[1.03 – 1.49]	-	-
<u>Age (year)</u> (Reference : ≥65)			
0-4	4.37* [2.61 – 7.32]	3.69* [2.03 – 6.75]	7.29* [2.53 – 21.01]
5-14	2.76* [1.63 – 4.66]	1.74 [0.98 – 3.09]	4.92* [1.70 – 14.24]
15-34	1.27 [0.85 – 1.90]	1.44 [0.87 – 2.39]	2.50 [1.00 – 6.27]
35-64	1.26 [0.88 – 1.83]	1.16 [0.72 – 1.86]	1.77 [0.75 – 4.18]
<u>Matrimonial Status</u> (Reference : Married)			
Separated/ Widow	0.73 [0.50 – 1.06]	0.54* [0.37- 0.81]	1.02 [0.46 – 2.27]
Single	0.60* [0.44 – 0.82]	0.59* [0.44 – 0.80]	0.52* [0.31 – 0.86]
<u>Socio-economic status</u> (Reference : Quintile 5)			
Quintile 1	0.54* [0.39 – 0.73]	0.43* [0.30 – 0.62]	0.59 [0.23 – 1.52]
Quintile 2	0.66* [0.49 – 0.88]	0.53* [0.38 – 0.72]	0.58 [0.30 – 1.10]
Quintile 3	0.94 [0.71 – 1.26]	0.78 [0.58 – 1.05]	0.49* [0.30 – 0.80]
Quintile 4	0.80 [0.60 – 1.08]	0.94 [0.71 – 1.26]	0.59* [0.38 – 0.91]
<u>Convenience Score</u> (Réf : Score 3)			
Score 0	0.21* [0.06 – 0.74]	-	-
Score 1	0.29 [0.09 – 1.01]		
Score 2	0.33 [0.09 – 1.16]		
<u>Distance to a PHCF</u> (Reference : 0-5km)			
5 - 10 km	0.88 [0.69 – 1.10]	1.03 [0.72 – 1.45]	-
Above 10 km	0.71* [0.54 – 0.92]	0.45* [0.22 – 0.90]	
<u>Chronic Disease</u> (Reference : Not reported)			
Reported	-	1.85* [1.30 – 2.63]	2.00* [1.08 – 3.72]
<u>Insurance or financial assistance for the payment of health services</u> (Reference : No)			
Yes	-	3,41* [2,08 – 5,57]	2,71* [1,23 – 5,95]
Pseudo R2	0,0442	0,0541	0,0603
Log of likelihood ratio	-1372,4649	-1110,2357	-364,92356

*: OR significant

Discussion

The use and predictors of uses of modern health care varied in rural, urban areas and Abidjan, the economic capital of Côte d'Ivoire in 2015. The use of modern health care was low in all residential areas, although higher than the 43% reported by the health system in 2015 [24]. This difference could be explained by having addressed the reported data and not the actual usage data. Indeed, Ancelot's study showed differences between these two modes of information collection, although weak [31]. However, our results are essentially the same as those observed in Uganda, 65% of the use of health centers [32] but well below Rwanda, with a 92% recourse [3]. Lower rates (41.8%) were

observed in one region in Ethiopia [33]. These differences in the use of modern health care are due to several parameters, including the existence of a financial protection system in countries [2]. Thus, in 2015, given the low rate of insured populations, many renunciations of care had been observed. A study on the causes of care renunciation in Rwanda found that 41.7% of the population surveyed mentioned costs as a major barrier to care use [3]. In our surveyed population, about 11% of individuals had reported morbidity in the 4 weeks before the survey, 44% of whom had given up modern care. This high rate of renunciation is often observed in countries where direct payments remain high [2, 34]. The use of trade-practitioners is one of the consequences of the high costs of modern care. Thus, the causes

mentioned for the use of a trade-practitioner were financial and cultural. The relevance of health services mentioned in position 3 calls into question the commitment of populations to the health system and the quality of health services often criticized in developing countries [1]. Rural populations used trade- practitioners more for chronic diseases or fractures more than modern care, which is more used for infectious diseases. Our results suggest that the modern health care system is most in demand for acute diseases for which curative treatments are available.

The sample analyzed in this study was not overlayable with the 2014 General Population and Housing Census results in which Abidjan represented 22.7% of households and 19.4% of individuals, with a sex ratio of 0.98. The urban population excluding Abidjan accounted for 30.9% and the rural population 49.7%. Moreover, the differences in the distribution of socio-economic variables justified the search for predictors of the use of health care in separately constructed logistic regression models. Furthermore, the data used were not collected specifically to study the use of health care, on the one hand and information biases cannot be excluded because of the 4-week recall period, on the other hand. However, our data can be generalized to the Ivorian population because of the random sampling method that was used. The possible information bias introduced by the 4-week recall period was minimized by the significant nature of the disease event measured. Besides, most studies of this type use the same recall period for a comparison of the parameters studied or a longer period of twelve months [33, 35]. The presence of many covariates in the household living standards survey allowed us to explore several suggested dimensions for modeling health care use [36].

Our study showed that socio-demographic factors such as age, gender, marital status, income, insurance coverage, financial assistance, health coverage and chronicity of illness were associated variously with modern care use. Choices in the use of care generally vary according to the geographical area of residence, the severity of the disease, socio-demographic and economic characteristics as well as the availability and cost of health services [2, 34].

With respect to monetary factors, our results are similar to those of Bonfrer, who identified economic criteria as a major factor in the use of health services in Africa [5]. The populations prioritized the use of public health facilities, which have more accessible costs. In urban areas, the benefit of insurance was associated significantly with the use of modern services. Indeed, the benefit of financial risk protection increases the use of care [2, 12, 15].

Non-monetary parameters were associated variously with the use of modern health services. Age was the major factor determining the use of modern care in our study. This use of care was highest among children of 0 to 5 years of age in all three residential areas. These results could be explained by the health fee exemption policy in place in public institutions for children under 5 years of age. Indeed, several studies have shown that the elimination of health care costs significantly increases the use of health services [11]. Gender was also positively correlated with this use, particularly in rural areas. In rural areas, women used health services more, as observed in a region in Ethiopia where women used modern services 4 times more than men [33]. In the city, the existence of chronic diseases was positively associated with this use, although traditional medicine was more in

demand for this type of pathology. People's perceptions of their illness could guide people's choices in their recourse. Indeed, the perception of the severity of the disease increased the use of care in Ethiopia by 21 times [33]. This recourse in the event of chronic disease can also be explained by the high level of education in the city, which guarantees access to health information. The cultural factors materialized by the level of schooling do not appear in our study as barriers to access, unlike the reasons given for not seeking care. In Africa, such factors usually have an impact when there is a policy of financial protection for the population, and are more significant among the poor [13]. Geographical accessibility to public institutions was an aggravating factor in the lack of access to modern health care, especially in rural areas. A study in Rwanda showed that 75% of households located near public health facility areas used them as a priority [5]. In Kenya, 85 to 95% of mothers used clinics located in their neighborhood [14].

Conclusion

The study found that the establishment of national insurance mechanisms for funding health through the removal of socio-economic barriers, would improve access to modern health care, particularly in rural areas. Combined with the reduction of the distance from first contact health facilities, such socialized health funding would help reduce inequalities in access to modern health care in rural and urban areas, and even in large urban areas. This work has highlighted predictors of care use that could serve as a leverage for actions to reduce social inequalities in healthcare. It also shows the need to improve understanding of the social factors at the collective and individual level that determine care consumption behaviors as financial barriers and geographical access difficulties are overcome.

Abbreviations

PHCF: Primary Health Care Facilities; INS: National Institute of Statistics of Côte d'Ivoire; OECD: Organisation for Economic Co-operation and Development.

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Competing Interests

None declared.

Authors' contributions

Attia Konan AR, Kouadio KL, and Oga ASS conceived the study design, data analysis and interpretation. TA contributed to conception, design, and acquisition of data. Attia Konan AR conducted the data analysis. Attia Konan AR and Oga ASS drafted and critically revised the early version of the manuscript. All authors read and approved the final manuscript for submission to the journal.

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