Health-related financial risk protection in Côte d'Ivoire between 2008 and 2015

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Introduction

Owing to measures taken to improve good governance in recent years, Côte d'Ivoire has an average Gross Domestic Product (GDP) of 9.4%. Accordingly, GDP per capita has risen from 517 704 CFA Francs (CFAF) ($1035.41) in 2008 to 838 104.7 CFAF ($1676.21)[1] in 2015. The poverty headcount, which dropped from 48.9% (2008) to 46.3% (2015)[2], remains high. An estimated 7.8% of the population benefits from having a health insurance mechanism (private, community, civil servant) in 2012[3].

Health financing in Côte d'Ivoire is provided by three sources: the state, private sources (including households) and external partners. The revenues of the Ivorian health system come from a combination of these sources. These are project / program funds, tax revenues, prepayment funds (mandatory / voluntary) or direct funds paid by users. The profile of health financing, however, is dominated by direct payments from households and does not depend on external aid. Nevertheless, funding for the fight against certain diseases such as HIV / AIDS and malaria is highly funded by donors.

Reasserting its commitment towards Universal Health Coverage, the government of Côte d'Ivoire has invested in health facilities and health workers in order to increase the availability of health services by recruiting a high number of health workers at different period during the last year and. Health workforce density is estimated at 5.07 per 10 000 in 2016 against 2.16 per 10 000 in 2011 with 67% of the population living less than five kilometers from a First Contact Health Facility (FCHF) in 2015[4] compared to 65% in 2011[5]. The availability of essential medicines is estimated at 28% in 2015[6], while curative treatment utilization rate is estimated at 44.33% in 2015 compared to 28.75% in 2011.

In the context of free user fees integrated in the health financing since 2011, data from the national health accounts indicate that household out-of-pocket payments decreases from 66.3% to 32.55% of total health expenditure (THE) in 2008 and 2015, respectively.

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[1] National Development Plan 2016 - 2020
[2] Household Living Standards Survey 2015
[3] Monitoring Progress Towards UHC in Côte d'Ivoire: Baseline Situational Analysis – WHO. Côte d'Ivoire, 2015
[4] Annual Health Situation Report 2015
[5] Health Statistics Directory 2011
[6] Essential Health Services Availability and Operational Capacity Survey (SARA) – MSHP, 2015

To reduce direct household expenditure towards financing health care, the government first introduced a subsidy for health interventions and medicines (1994), then made all health interventions to be completely free of charge (2011), before shifting to targeted free-of-charge interventions since March 2012 only in the public sector. Targeted interventions concern pregnant women delivery, children under-5 diseases, diagnosed malaria cases and the first 48 hours of medical and surgical emergencies at different level of the health care system. The law on compulsory national health insurance, known as *Couverture Maladie Universelle (CMU)*, was enacted in March 2014 and become effective from January 2018 for targeting populations (students).

The country benefits also of partners support (Global fund, PEPFAR, GAVI) in vertical program like HIV, malaria and tuberculosis, immunization by funding the treatment access with medecines free of charge for the population. In the private sector, health services are funding by out of pocket and private health insurance.

Although the share of direct out-of-pocket payments in total health expenditure has reduced over the past decade, households still make substantial contributions directly out-of-pocket to finance health services in Côte d'Ivoire. With the significantly high poverty levels in the country, it remains likely that households would be impoverished and/or incur catastrophic health expenditure (CHE) when using health services, especially those that are not exempted from paying fees. Government expenditure rose from 16.4% to 24.4% and donor contributions increased from 12.8% to 27% of THE in the review period. Since 2012, the proportion of the government budget allocated for the health sector has remained steady at an average of 5.58% annually, which is still below the 15% Abuja target (NHA report 2015).

This study seeks to analyze the health-related financial risk protection of households by describing trends in key health-related financial protection indicators and reviewing their equitable distribution based on socioeconomic characteristics.

Methodology

This is a cross-sectional, analytical and descriptive study using data from two household living standard surveys (LSSLSS) for 2008 and 2015. These are nationally representative data containing information on 12 600 and 12 899 households, respectively. A two-staged clustered polling technique was used to collect the LSSLSS data. The area of the survey is made up of all households residing in Côte d'Ivoire. The sampling is a two-stage, first-stage proportional allocation of the Enumeration Zone (ZD) in the study strata, and in the second stage a systematic draw of 12 households by ZD. The size of the sample per stratum varied between 276 and 1188 households, to take into account the demographic weight of certain regions, i.e a total sample of 12 600 households for the 18 strata in 2008 and 12,900 households for the 33 strata in 2015.

LSSLSS data are collected by the National Institute of Statistics (NSI) and the data focus on household living conditions including health expenditure and utilization of health services. The purpose of the LSS is to collect information to improve the planning and evaluation of the country's economic and social policies. It also allows (i) to provide basic data on the level and living conditions of households (health, education, housing, expenditures, activities, transport,

etc.), (ii) to study the evolution of household living standards; (iii) to determine a poverty profile; and (iv) to inform policy makers about the situation of vulnerable groups **(11)**.

From this database, variables required for assessing the indicators of protection from health-related financial risks (CHE incidence and poverty incidence) were developed. The indicators (incidence of CHE and impoverishment) were calculated using two standard methods: the WHO methodology based on the capacity to pay **(12)** and the income methodology **(17).**

Catastrophic health expenditure (CHE) is commonly described as a health care budget share that exceeds a pre-defined threshold **(17)**.

Following the WHO approach, a household incurs CHE if they use at least 40% of their capacity to pay to cover the out-of-pocket health spending. The capacity to pay of an household is the difference between total consumption expenditure and food expenditure of this household or the total household non-food household expenditure. The theoretical basis of this measure is that as household income increases, proportion of household expenditure on food decreases. This means that among the poor, food is their main expenditure item. For one to determine their capacity to pay for other basic needs apart from food, then their total household expenditure less the expenditure on food is considered **(17).**

Following the income methodology, the CHE is defined by the proportion of the population which incurs substantial household health expenditure, relative to the total expenditure or household income between 10 % and 25 % threshold.

To assess impoverishing expenditure caused by out-of-pocket spending, reference is made to the poverty incidence. The international poverty line of 1.90 USD **(7)** was taken into consideration because the assessed poverty threshold was closed to the one defined at country level, which is $1.32 (661 CFAF) in 2008 **(10)** and $1.48 (737 CFAF) **(11)** in 2015.

We also referred to the poverty gap to represent the depth of poverty which corresponds to the average distance that separates the population from the poverty line, where a zero distance is attributed to the non-poor **(12)**. The poverty gap is a measure that reflects "poverty deficit", i.e. the resources that would be needed to pick up the poor out from their situation through targeted cash transfers. The poverty gap is defined by the formula:

$PG = 1/n \Sigma ((Z-Yi))/Z$ (12);

where PG is poverty gap, Z is poverty line and Yi is the income of an individual i, and the sum only relates to poor individuals (in practice, we often work on household rather than individual income).

Each indicator of health financial protection is analyzed based on different socio-demographic characteristics: residential location, wealth quintile, household size, level of education of the head of the household, and their age.

Lastly, determinants of catastrophic health expenditure are defined by linear regression according to an econometric approach to determine the odds ratio. We recognize the effect of each variable to explain the risk of household exposure to catastrophic health expenditures. The choice of determinants in the regression was based on the significance of the statistical test (P-value <0.05). If the p statistic is less than 0.05 the link is proved between the determinant and

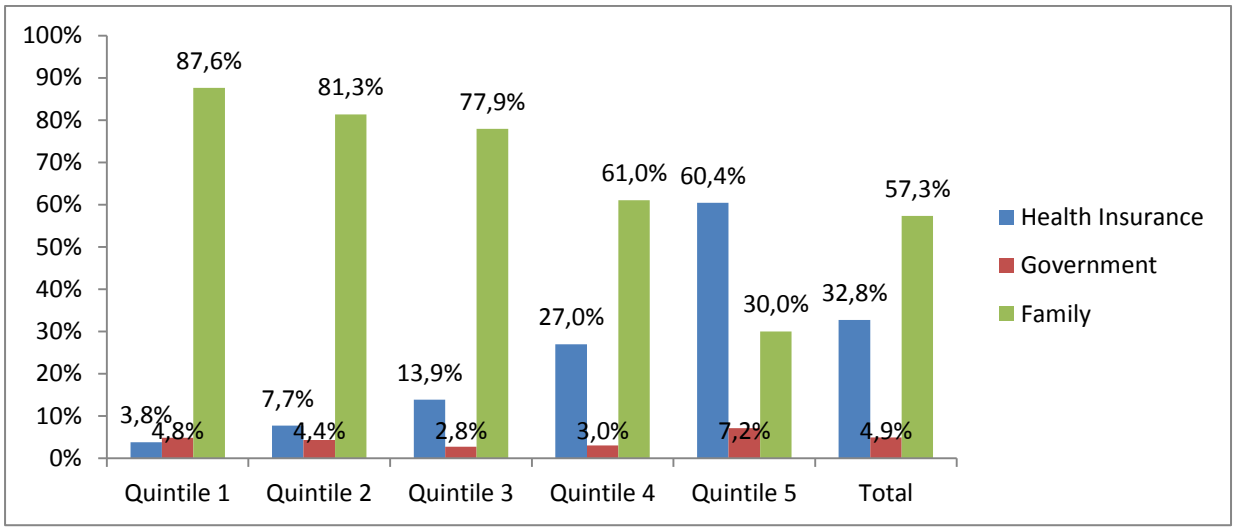
the dependent variable and explains the existence of a risk of exposure to catastrophic health expenditures. If the p is equal to 1 there is no relation and therefore no risk of exposure.

Furthermore, all the determinants for which this condition is verified are likely to explain the phenomenon studied.

Results

- **Financial access to health services**

Fig. 1: Financial accessibility based on type of payment scheme by wealth quintile (LSS 2015data)



Source : LSS 2015 Data

Regarding financial accessibility, in 2015, among those who rely on a payment scheme to access treatment, 57.3% benefitted from a payment scheme mainly covered by parents, 32.8% by private insurers, and to a lesser degree, by the government (4.9%). It is observed that 10% of the richer quintiles (quintile 4 and 5) receive support from government to cover their health expenditure, compared to 4.8% of people in the poorer quintiles (quintiles 1 and 2).

- **Health expenditures and out-of-pocket health spending**

Total Household Expenditure (THE) rose from $12.71 million (6, 356 billion CFA francs) in 2008 to $15.34 million (7 670 billion CFA francs) in 2015, signifying a 21% increase, that is, $652.92 (326 460 CFAF) and $728.53 (364 266 CFAF), respectively per capita for the two years reviewed reference.

Table 1 : Trends in Breakdown of household expenditure based on socio-demographic characteristics in 2008 and 2015

Sociodemographic characteristics	Other expenditures		Food		Health		Total	
	2008	2015	2008	2015	2008	2015	2008	2015
Total Population	51,3%	51,5%	41,7%	43,0%	7,0%	5,5%		
Quintile 1	45,0%	47,0%	50,5%	50,4%	4,5%	2,6%	5,8%	7,3%
Quintile 2	44,0%	42,9%	51,0%	53,9%	5,0%	3,2%	11,0%	12,5%

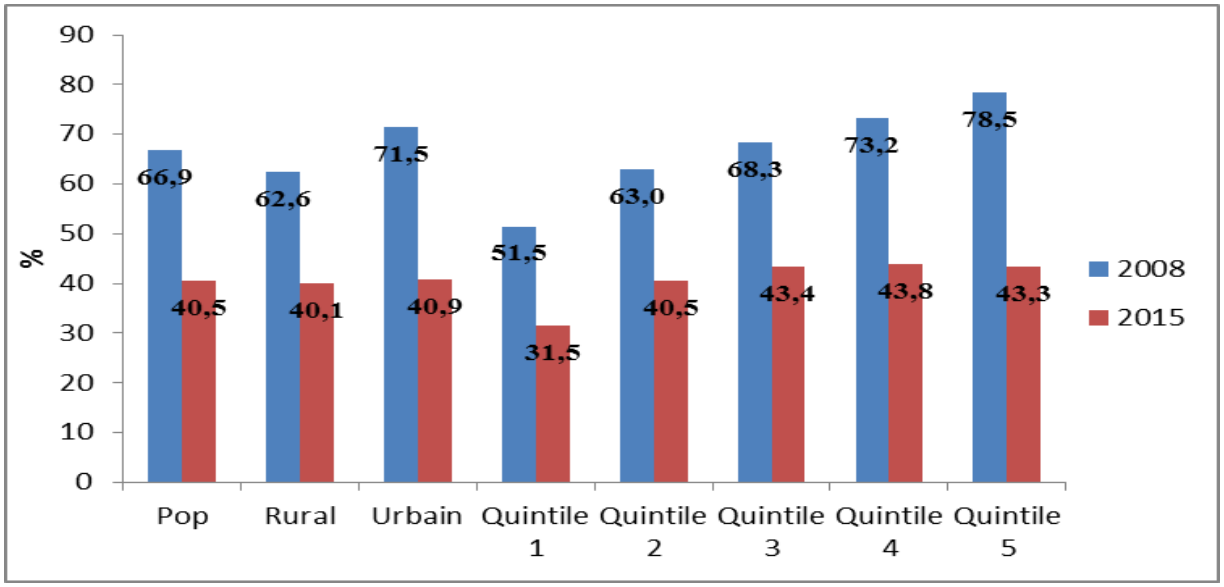
Quintile 3	46,0%	45,6%	48,3%	50,5%	5,7%	3,9%	15,4%	16,2%
Quintile 4	49,1%	47,1%	44,8%	48,4%	6,1%	4,4%	22,2%	22,0%
Quintile 5	56,7%	59,4%	34,7%	32,8%	8,6%	7,8%	45,6%	42,0%
Rural	45,6%	40,7%	47,4%	53,7%	7,0%	5,6%	39,2%	38,4%
Urban	55,0%	58,2%	38,1%	36,4%	6,9%	5,3%	60,8%	61,6%
center	45,5%	45,8%	48,4%	47,8%	6,1%	6,4%	5,8%	5,9%
center east	43,8%	48,7%	50,1%	44,6%	6,1%	6,7%	2,2%	2,2%
Center north	49,0%	48,2%	43,9%	47,5%	7,1%	4,3%	4,0%	5,4%
Center west	47,6%	45,7%	45,3%	49,1%	7,1%	5,2%	8,6%	12,0%
north	53,2%	45,3%	42,0%	49,2%	4,8%	5,5%	2,7%	4,9%
North east	45,6%	40,7%	44,6%	52,3%	9,7%	7,0%	3,1%	3,1%
North west	41,3%	41,9%	51,5%	51,9%	7,2%	6,2%	3,1%	3,3%
west	40,5%	48,9%	52,7%	47,3%	6,8%	3,8%	5,8%	9,5%
south	46,2%	48,1%	45,5%	45,5%	8,3%	6,4%	13,9%	13,0%
South west	45,7%	45,2%	48,3%	49,8%	5,9%	4,9%	8,6%	9,8%
Abidjan city	58,8%	62,9%	34,4%	31,6%	6,8%	5,5%	42,3%	31,0%

Source : Measurement by the authors based on data from LSS 2008 and 2015

This table 1 highlights the predominance of food expenditure: 41.7% in 2008 and 43% in 2015. Household Health expenditure, for its part, dropped from 7% in 2008 to 5.5% in 2015. Rising household food expenditure is followed by decreasing household health expenditure. In per capita terms, health expenditure stands at $1.23 (616.4 CFAF) per day in 2008 compared to $1.43) (715.1 CFAF) in 2015. Health expenditure is 1.7 times higher in urban areas than in rural areas.

Household out-of-pocket spending increased with household income quintile. This is observed in 2008 and in 2015, but also depending on the residential location. However, 40.5% of the population, that is 12 947 185 persons, paid out-of-pocket for health in 2015 compared to 66.5% or 8 527 692 in 2008 as shown by the figure 2 below.

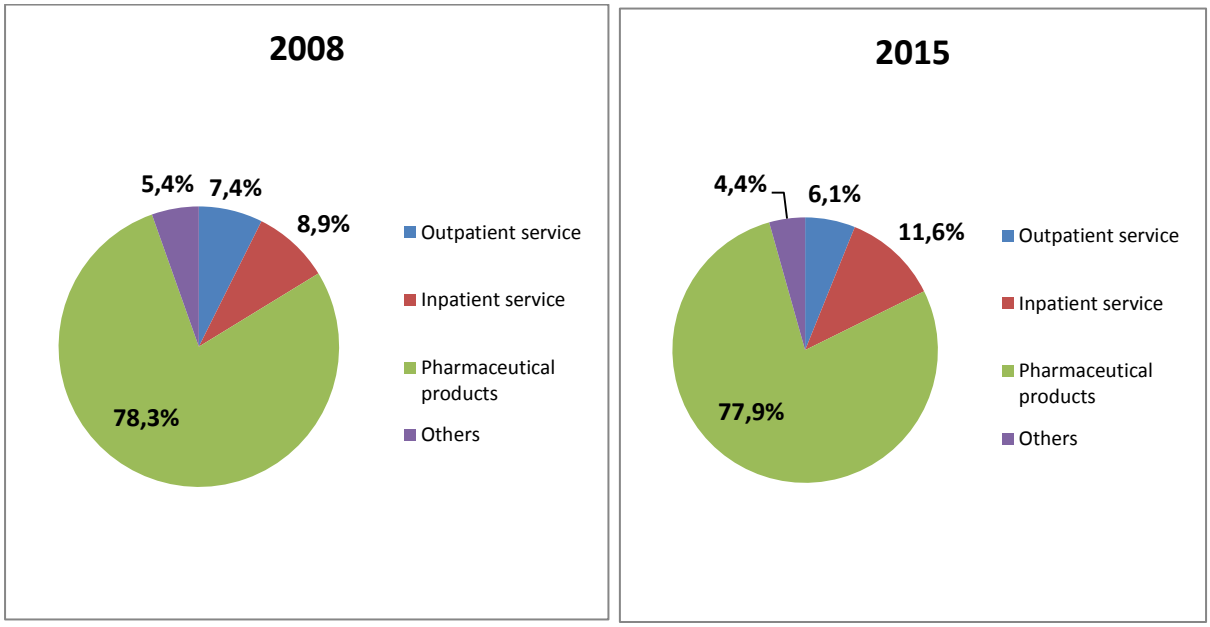
Fig. 2: Breakdown of household out-of-pocket spending based on wealth quintile and residential area



Source: Measurement by the authors using data from LSS 2015

Pharmaceutical products, including traditional homeopathic, are the main reason behind out-of-pocket spending, recording a 78% average share over the two reference years. This is followed by hospitalization fees (10.2%) and consultation fees (6.7%).

Fig. 3: Breakdown of household out-of-pocket spending by expenditure category

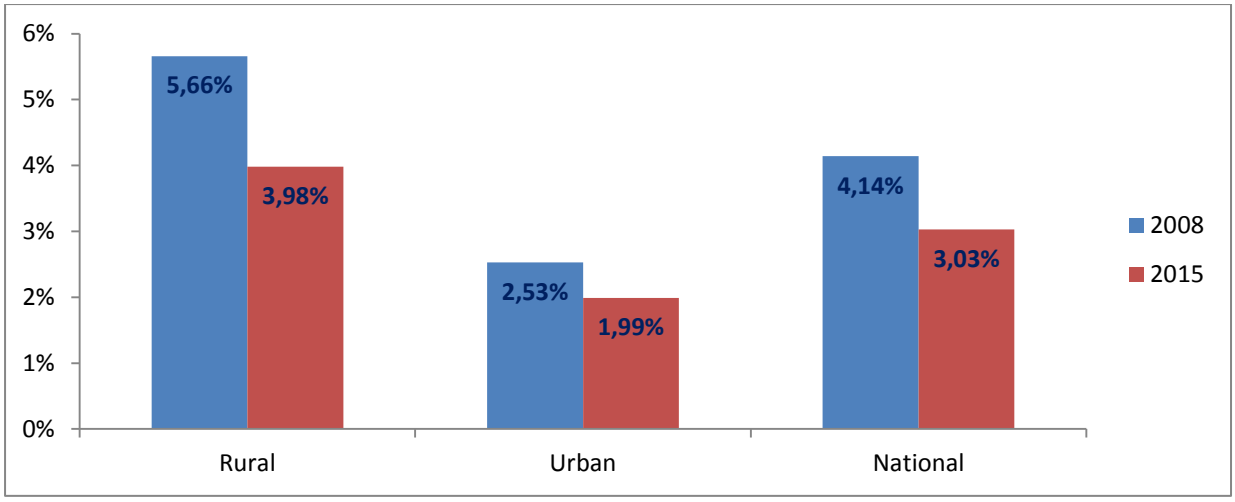


Source: Measurement by the authors using data from LSS 2008 and 2015

The share of out-of-pocket spending as part of capacity to pay helps us to grasp the magnitude of out-of-pocket spending. This share dropped from 8.4% in 2008 to 5.6% in 2015, indicating a slight reduction of the share of health expenditure within capacity to pay.

- **Incidence of catastrophic health expenditure based on capacity to pay**

Fig. 4 : Incidence of catastrophic health expenditure based on residential location in 2008 and 2015



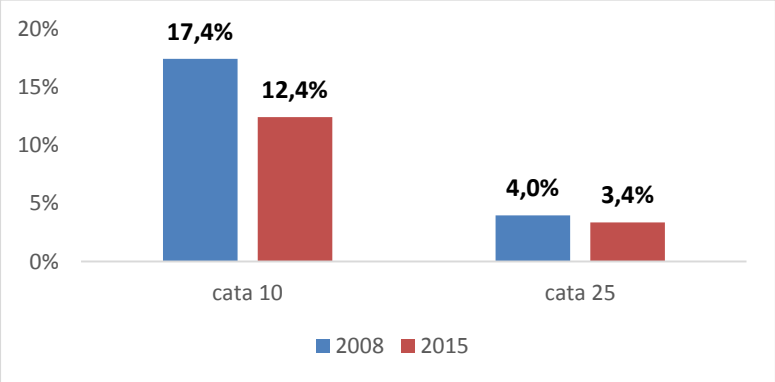
Source : Measurement by the authors using data from LSS 2008 and 2015

According to Fig. 4, 4.14% and 3.3% of households in 2008 and 2015, respectively, experienced CHE. Based on residential location, rural households are twice as more exposed to the risk of CHE than urban households.

- **Incidence of catastrophic health expenditure based on budget share approach at 10% and 25% thresholds**

In reference to figure 5 below, at the 10% threshold, it is observed that 12.4% of households experienced CHE in 2015 compared to 17.4% in 2008. At the 25% threshold, 4% of households in 2008 compared to 3.4% in 2015 experienced CHE.

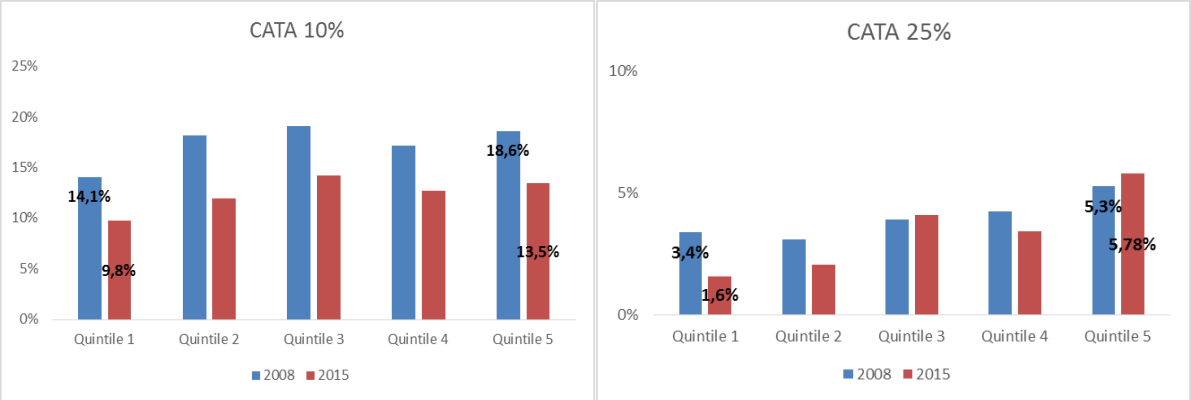
Fig. 5: Trends in the incidence of catastrophic health expenditure in the population in 2008 and 2015



Source: Measurement by the authors using data from LSS 2008 and 2015

This reduction in incidence of CHE is correlated with the reported drop in out-of-pocket health spending. Furthermore, households belonging to the richest quintile incur more catastrophic expenditure than the poorest households, irrespective of reference year and income threshold.

Fig. 6: Trends in the incidence of catastrophic health expenditure by wealth quintile of household income in 2008 and 2015



Source: Measurement by the authors using data from LSS 2008 and 2015

- **Incidence and depth of impoverishment from out-of-pocket spending**

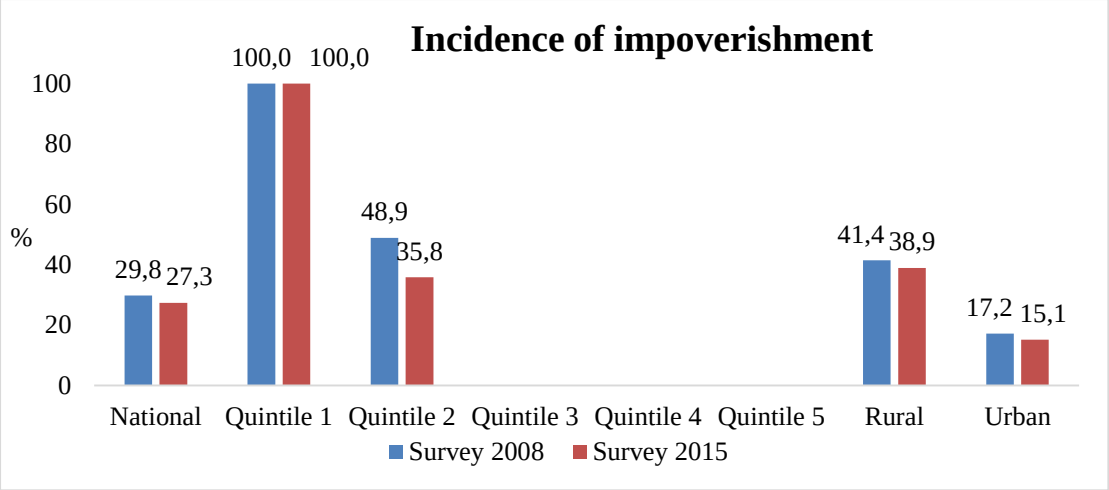
Table 2: Poverty incidence and the depth of poverty in 2008 and 2015

$1.90	Survey 2008		Survey 2015	
	Head Count %	Poverty Gap	Head Count %	Poverty Gap
National	29,8	3,1	27,3	1,7
Quintile 1	100,0	0,0	100,0	0,0
Quintile 2	48,9	12,4	35,8	8,2
Quintile 3	0,0	2,7	0,0	0,2
Quintile 4	0,0	0,4	0,0	0,1
Quintile 5	0,0	0,1	0,0	0,0
Rural	41,4	3,8	38,9	2,3
Urban	17,2	2,5	15,1	1,1

Source: Measurement by the authors using data from LSS 2008 and 2015

The incidence of poverty reportedly reduced from 29,8% in 2008 to 27,3% in 2015. However, in terms of absolute numbers, roughly 5 801 897 people in 2008 were poor compared to 5 748 297 people in 2015 (an decrease of 53 600). The impact of out-of-pocket spending due to service utilization has resulted in the proportion of households living below and as a result, the intensity of impoverishment fell from 3.1% in 2008 to 1.7% in 2015. This drop in impoverishment is more significant in quintile2 and for rural households.

Fig. 7: Breakdown of poverty incidence by socio-demographic characteristics



Source: Measurement by the authors using data from LSS 2008 and 2015

On average, households in rural areas are growing 2.5 times poorer than those in urban areas. In 2008 and 2015 all poorest households are further impoverished because of out-of-pocket spending. Thereby revealing the considerable vulnerability of these households, which have no other means of protecting themselves from financial risks.

- **Determinants of catastrophic health expenditure**

The incidence of catastrophic expenditure (cata) at the 10% and 25% household income threshold for the 2008 and 2015 reviewed is tested based on key socio-demographic characteristics. At the 25% threshold, the results are less statistically significant at the 5% level of significance for many variables.

Table 3: Regression test results for cata variable on 10% and 25% threshold (2008 and 2015)

Cata 10	Odds Ratio	Standard Error	P value	95% Conf. Interval	
Survey 2008					
Rural	**1,286**	0,073	**0,000**	1,150	1,437
Gender (fem)	0,947	0,069	0,453	0,808	1,092
Primary	1,004	0,066	0,951	0,882	1,142
Secondary	1,079	0,086	0,334	0,923	1,262
Superior	0,883	0,176	0,535	0,597	1,306
Quintile 2	**1,176**	0,105	0,069	0,987	1,399
Quintile 3	**1,262**	0,110	**0,008**	1,063	1,498
Quintile 4	**1,183**	0,105	0,058	0,994	1,409
Quintile 5	**1,361**	0,125	**0,001**	1,136	1,631
Employment status	1,003	0,058	0,965	0,895	1,123
Presence of <5	1,073	0,061	0,211	0,961	1,199
Presence of <60	**1,855**	0,125	**0,000**	1,626	2,116

Results for cata 10% in 2008

Cata 10	Odds Ratio	Standard Error	P value	95% Conf. Interval	
Survey 2015					
Rural	**1,325**	0,092	**0,000**	1,155	1,518

Gender (fem)	1,151	0,095	0,087	0,979	1,353
Primary	1,260	0,114	0,011	1,056	1,505
Secondary	1,179	0,102	0,056	0,996	1,397
Superior	0,710	0,131	0,063	0,496	1,085
Quintile 2	**1,404**	0,158	**0,002**	1,127	1,750
Quintile 3	**1,557**	0,177	**0,000**	1,246	1,946
Quintile 4	**1,425**	0,162	**0,002**	1,140	1,780
Quintile 5	**1,949**	0,218	**0,000**	1,567	2,427
Employment status	0,875	0,065	0,070	0,757	1,011
Presence of <5	**1,549**	0,106	0,000	1,354	1,772
Presence of <60	**2,049**	0,167	**0,000**	1,747	2,404

Results for cata 10% in 2015

Cata 25	Odds Ratio	Standard Error	P value	95% Conf. Interval	
Survey 2008					
Rural	**1,832**	0,196	**0,000**	1,486	2,260
Gender (fem)	0,944	0,124	0,663	0,729	1,222
Primary	1,036	0,126	0,771	0,817	1,314
Secondary	1,050	0,153	0,740	0,789	1,397
Superior	1,250	0,473	0,555	0,595	1,625
Quintile 2	0,863	0,154	0,407	0,608	1,223
Quintile 3	1,002	0,170	0,993	0,718	1,396
Quintile 4	1,041	0,175	0,813	0,748	1,447
Quintile 5	**1,540**	0,241	**0,006**	1,133	2,093
Employment status	1,177	0,124	0,120	0,958	1,446
Presence of <5	0,855	0,089	0,133	0,697	1,049
Presence of <60	**2,728**	0,302	**0,000**	2,195	3,389

Results for cata 25% in 2008

Cata 25	Odds Ratio	Standard Error	P value	95% Conf. Interval	
Survey 2015					
Rural	**1,408**	0,182	**0,008**	1,092	1,814
Gender (fem)	0,875	0,140	0,403	0,639	1,197
Primary	1,507	0,241	0,010	1,102	2,060
Secondary	1,295	0,207	0,107	0,946	1,771
Superior	0,365	0,170	0,031	0,146	0,912
Quintile 2	**1,158**	0,300	0,572	0,696	1,926
Quintile 3	**2,087**	0,485	**0,002**	1,324	3,290
Quintile 4	**2,358**	0,521	**0,000**	1,529	3,638
Quintile 5	**4,154**	0,873	**0,000**	2,752	6,270
Employment status	0,811	0,108	0,115	0,626	1,052
Presence of <5	1,087	0,138	0,511	0,848	1,393
Presence of <60	2,444	0,338	**0,000**	1,863	3,206

Results for cata 25% in 2015

Source: Measurement by the authors based on results of the incidence of catastrophic health expenditure

In this section, we analyze the factors that determine CHE using logistic regression. Table 3 provides the logistic regression results for threshold levels ranging from 10% to 25% at the two years reference.

At 10% threshold and, rural households were 1.3 times more exposed to CHE than urban households in 2008 and 2015. At 25% threshold, the exposure risk at CHE increase and household who lived in rural area are more exposed respectively 1.8 and 1.4 times in 2008 and 2015.

Households in quintile 3 and 5, whose head of household have a secondary level education and households living with elderly persons were 1.4 times, 1.3 times and 1.8 times, respectively, more prone to CHE than the other categories.

In 2015, rural households are 77% more likely to suffer from CHE than urban households. Belonging to the other socio-economic quintiles, outside of quintile 1, increase the risk of exposure to CHE from 51.6% of poorer to 71.4% of richer households.

The rural area and to be a richer household are the main determinant of the CHE in Cote d'Ivoire.

Discussion

This study aims to assess the extent of protection against financial risks in Côte d'Ivoire. Financial risk protection findings show that while catastrophic payments and impoverishment have shown an improvement in the scope of financial risk protection over the two periods analyzed, protection against financial risks is still lacking because of the expenditure on drugs, which is the largest item of household health expenditure.

The analysis shows a decline in the incidence of catastrophic expenditures and impoverishment between 2008 and 2015. This decrease is likely due to the implementation of payment exemption policies for health goods and services. These results are in line with an improvement in equity and correspond to trends in the Gini index, which went from 0.432 in 2008 to 0.417 in 2015, which represents a 3% improvement.

The study also reveals that at the national level, even though the incidence of DCS has reduced rural households (4%), they remain twice as exposed as urban households (2%). And the ever-increasing health care costs of households are still at the origin of catastrophic health expenditures. In fact, when health expenditures account for more than 10% of household income, a majority of these households would forego health services.

The study confirms that the expenses borne by households remain a source of impoverishment. When considering the international poverty line at US $ 1.90, 2.3% of households making direct payments became poorer in 2015, compared with 3.1% in 2008. This proportion is higher in rural areas. because of the low purchasing power and households belonging to the third and fifth quintiles of wealth. This study is consistent with that of Hilaire Houeninvo (2014) **(6)**, who argues that the expenses borne by households increase poverty in Benin and more severely among rural households.

More analytically, the secondary analysis of the results of the LSS on financial accessibility to health services shows that financial accessibility to health services remains problematic for a part

of the population, mainly because of the high cost of these health services. In fact, less than 10% of the population benefits from medical coverage. Similarly, in a context of free admission introduced since 2011, the results of this analysis indicate that about 10.2% of rich households have benefited from state care for their health care against 4.8% the poorest households for whom public policies of financial accessibility to care are in defined priorities. This sharply explains the fact that the entire population of 40.5% in 2015 still makes significant direct health payments when using services compared to 66.8% in 2008 and partly explains the fact that part of the population has refused or even renounced the use of health services. Indeed, according to Xu Ke al **(21)**, there is a negative correlation between the incidence of financial disasters and the extent to which countries finance their health care system by using prepayment in one form or another and, conversely, CHE is positively correlated with the relative importance of direct payments in total health expenditure.

However, this decline in direct health payments observed over the period is confirmed by the results of the 2015 health accounts, which shows that the share of direct health payments of households in total health expenditure at the national level has increased from 66, 8% in 2008 to 32.8% in 2015, a decrease of 50.9%. This decline is linked to an increase in public health expenditure over the period of approximately 41.6% as well as the contribution of private expenditure excluding households and that of donors.

Despite this change in the profile of health financing, it remains dependent on the direct payments of households which unfortunately constitute the first major contributor to health financing in Côte d'Ivoire in a context where according to the 2015 LSS the rate of poverty has risen to 46.3% in 2015 from 48.9% in 2008, or almost one in two people.

These direct health payments continue to expose populations to catastrophic health expenditures, although their impact according to the ability of households to contribute has declined at the national level, from 4.3% in 2008 to 3.2% in 2015 with a greater large exposure of rural households (4%) that is 2 times more than households living in urban areas (2%). When considering total household incomes, at the 10% threshold in 2015, 12.4% of households suffered catastrophic health expenditures and at the 25% threshold, 3.4%.

Thus when considering income, at higher thresholds, fewer households made catastrophic health expenditures compared to the ability to pay method. This could conclude in the sensitivity of the methods used compared to the results. This portion of the results is also consistent with those presented by Steven Buigit et al (2015) **(17)** in his study on the determinants of catastrophic health expenditures in Kenya that states the calculation of the incidence of CHE is sensitive to the method and at the thresholds used. In fact, using the WHO method, a lower incidence of CHE is obtained.

By observing this distribution by socio-economic level, it appears that the richest households are more exposed to the appearance of catastrophic health expenditures when they use the services. In addition, these results also indicate that when health expenditure strikes more than 10% of household income, a large part of these households would be forced to give up the health service. This highlights issues of equity in the affordability of household care.

With regard to direct payments, it is also noted that they are a source of impoverishment, since considering the international line of poverty at US $ 1.90, it is in particular 2.3% of households

making direct payments that have in 2015, compared with 3.1% in 2008. This proportion is higher in rural areas due to low purchasing power, and among households belonging to the second and third wealth quintile. In addition, the largest items of household expenditure by direct payments are drugs. The reverse trends observed from 2008 to 2015 are likely due to the decision to introduce free health interventions since 2011-2012, resulting in an increase in the number of visits for consultation services and free medical and surgical emergencies within 48 hours, as well as drug applications. Hospitalization is not free. However, an evaluation of the free targeted interventions conducted by the Ministry of Health and Public Hygiene in 2012 revealed significant patient expenses due to drug shortages as well as informal payments requested by service providers.

The main determinants of catastrophic health expenditures are the rural and wealth quintile because of the constant impoverishment of this area of residence and the types of services used by the highest wealth quintile populations.

The rural areas and the richest quintile are the main determinants of catastrophic health care costs due to the constant impoverishment of this area of residence and the types of services used by the wealthiest quintile. Similarly, having a person over the age of 60 living in a household increases the incidence of CHE by 2.4 times because of its vulnerability.

The poorest quintiles experience catastrophic health expenditures at 100%, which is consistent with observations made in all similar studies in Africa as reported in the study by Olumide Adisa (2015) on the determinants of catastrophic expenditures among the poor in Nigeria **(16)**.

Finally, the results indicate that, despite the efforts made by the State through the increase in public health expenditure, and the implementation of measures to improve accessibility to health services (construction, rehabilitation of health facility) and the financial protection of the population (free of charge), the health services are still financially inaccessible for many households because of the costs considered high. In addition, the redistribution of the wealth of sustained growth in recent years is not inclusive enough to sufficiently reduce existing inequalities, although generally between 2008 and 2015, we note a slight improvement in all indicators of financial protection in health. The fact remains, however, that the financial protection of the population must remain a principal objective and that current public measures and policies must take these realities into account in order to be better adapted or even adjusted.

Regarding affordability, among those who rely on a payment system to access treatment in 2015, 57.3% benefited from a payment system mainly covered by parents, 32.8% by private insurers and, to a lesser extent, by the government (4.9%). It can be seen that 10% of the richest quintiles (quintiles 4 and 5) receive government assistance to cover their health costs, compared to 4.8% of the poorest quintiles (quintiles 1 and 2). This favors existing inequalities and is probably due to poor targeting of the most vulnerable people. This may partly explain the findings of secondary analysis of LSS data on service utilization. Indeed, the LSS 2015 reveals that 5.7% of the population does not use health care against 14% in 2008. The main reasons for not using it were as follows: cost of services deemed high (24, 9%), tradition (20.5%) and distance from services (6.4%) **(11)**.

In terms of limitations, the absence of certain data, especially on unit costs by type of provider and more specific data on the use of health services by individuals at different levels of the health

pyramid, did not allow to extend the study towards a benefit incidence analysis. This would have shown to what extent each wealth quintile benefits from public spending on health. In other words, who benefits most from public spending on health, if there is real equity in their allocation for services used most by the poor.

Overall, these results thus express that a large part of the population is not protected against catastrophic health expenditures and which is due to weaknesses in health financing that do not promote equity for all categories of the population, as described by Adam Leive and Ke Xu (2008). In addition, health spending is a burden on households and limits their access to health services.

In view of these results, stronger commitments must be made to accelerate the implementation of compulsory health insurance, which will enable the most vulnerable to access health services without the risk of falling in catastrophic expenses.

Moreover, it is up to the Government to continue its efforts to increase public health spending in the light of the commitment made in Abuja to reverse the trend of dependence of financing on household contributions.

In addition, in view of the key determinants of catastrophic health spending, namely rural and wealth quintile, more specific actions to reduce the effect of these factors need to be taken. Thus, in view of the important role played by the rural (agricultural) sector in GDP growth, the State must strengthen its measures aimed at improving the living conditions of rural populations. A better redistribution of the fruits of economic growth coupled with a reform of the rural development policy can improve the standard of living of the populations.

Conclusion

Côte d'Ivoire, with the support of its development partners, is demonstrating its commitment to making its health financing system more effective. It has developed and implemented policies to support populations, especially the most vulnerable groups, through the provision of health services and the implementation of major reforms.

These reforms have helped to change the profile of funding, although they still depend on direct payments by households, which have been significantly reduced by a slight increase in public and donor spending. There is also a slight improvement in equity between 2008 and 2015 in access to health services.

In spite of rising health-related public expenditure and measures taken to increase availability of health services and lift financial barriers (free-of-charge targeted interventions), in a context of poverty, with a level of 46.7% still important, health services are still inaccessible financially for many households because of costs considered too high and some households continue to be exposed to catastrophic health expenses, with consequent impoverishment or the renunciation of the use of services. In addition, the redistribution of the wealth gained from sustained growth in recent years does not seem sufficiently inclusive to effectively reduce existing inequalities, even if generally between 2008 and 2015, there was a slight improvement in the overall financial protection in health. The fact remains, however, that the financial protection of the population

must remain a principal objective and that current public measures and policies must take these realities into account in order to be better adapted or even adjusted.

This study therefore recommends the strengthening of existing policies on free-of-charge interventions with a better targeting of the vulnerable populations while acting on population coverage through pre-payment arrangements. This will provide better access to health services for the population when they need it and also protect them against CHE, thus reducing further the impact of out-of-pocket spending and poverty on the country.

The effective implementation of the national compulsory health insurance should contribute to this, and improve the use of services if the resources generated by the contributions are used to improve the availability and quality of services.

Key messages

- The increase in public health expenditure has been a major effort by the state, which has contributed to the reduction of direct household health payments, thus reducing the exposure to catastrophic health care costs and the impoverishment of households;
- The high financial risk associated with health contributes to the fact that health, although essential to maintain the economic level of a country, does not constitute the item of priority expenditure of households in Côte d'Ivoire. As a budget item, it is far behind the food that is the first.
- Although poverty has declined slightly at the national level, the rural area is still an area of vulnerability and household exposure to catastrophic expenditures and impoverishment

List of abbreviations

CHE: Catastrophic health expenditures

CFAF : Côte d'Ivoire currency (CFA Franc)

GDP : Gross Domestic Product

NHA : National Health Account

THE: Total health expenditures

LSS: Living Standard Survey

Declaration

- Ethical approval and consent to participate in this study

The Ministry of Health and Public Hygiene and the Ministry of Planning and Development through the National Institute of Statistics provided their consent to participate in this study. This resulted in the designation of focal points for financial risk protection indicators for households.

- Consent for publication

The authorship of this publication is the result of collaboration between the Ministry of Health, the National Institute of Statistics and the World Health Organization working together in the implementation of the National Health Financing Strategy towards UHC and monitoring the country's progress towards UHC. The organizations involved agreed to conduct this study and the

professionals concerned acted with full knowledge of the facts. As a result, there is no correlation between the source of funding and the results obtained. Therefore there are no conflicts of interest. The work is a result of technicians doing their job as part of their devolved skills. In any case, an article on statistics highlighting the financial risk protection of households cannot discredit the participation of these technicians in a scientific journal.

- Availability of data and other materials

The LSS 2008 and 2015 databases used belong to the National Statistics Institute and are also part of the arsenal of poverty monitoring tools at the national level.

The provision of data included in the LSS database is the responsibility of the National Statistics Institute and must formally be requested. All data extracted from the database and analyzed in this study are available on request from the corresponding author. Similarly, all data generated or analyzed in this study is included in this published article as well as in the source documents.

- Competitive interests

The authors declare that there are no competitive interests

- Financing

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- Author contributions

GKC analyzed and interpreted the data related to health expenditures to health financing and policy implications.

CA constructed health expenditure data and interpreted data on the determinants of catastrophic health expenditures.

LM contributed to the construction of the necessary variables

LN constructed all the variables for the study needs from the LSS databases using STATA statistical software, and did the regression statistical tests for the determination of catastrophic health expenditure factors. He also contributed to the analysis of financial protection data.

BLT provided support throughout the study, including analysis and interpretation of data related to health service utilization, interpretation of health expenditures, and indicators of financial protection. She led with the other authors, the discussion based on the data produced.

All authors read and approved the final manuscript.

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