

# Prevalence of Catastrophic and Impoverishing Health Expenditures and Potential Protection against Financial Risks through Subsidies in Guinea

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## Abstract

Universal health coverage initiatives in Guinea have been hampered by insufficient budget allocations and inefficiencies. Nevertheless, data on the extent of catastrophic and impoverishing health expenditures in Guinea are scarce and outdated. The objectives of this study were to (1) identify the drivers of total health expenditures, (2) estimate the prevalence of catastrophic and impoverishing health expenditures, and (3) estimate the drivers of and potential financial risk protection against catastrophic and impoverishing health expenditures through subsidies in Guinea. A retrospective cohort study was conducted using the 2018–19 Guinea Living Standards Measurement Study. All 41,449 individuals in the Study were eligible, but 15 individuals who lacked consumption expenditure data were excluded. Expenditure data were converted to 2019 international dollars. Based on means and medians, the primary drivers of total health expenditures were hospitalizations (\$78 and \$51, respectively) and medications (\$72 and \$61, respectively). Based on the distribution of

total health expenditures by expenditure categories, the primary driver was medications (75 percent). The main driver of hospitalization expenditures was fever and malaria (21 percent of hospitalization expenditures). The prevalences of catastrophic and health expenditures (equal to or greater than 10 percent threshold) and impoverishing health expenditures were 13 and 4 percent, respectively. Subsidizing medications would prevent 46 percent of the cases of catastrophic health expenditures and 73 percent of the cases of impoverishing health expenditures. It is recommended that the Guinean government (1) strengthen the country's pharmaceutical sector by reinforcing existing laws and regulations and the operational aspects of the sector; (2) implement subsidy programs for rational use of medicines (notwithstanding the Bamako Initiative); (3) strengthen the National Malaria Control Program; and (4) establish an evidence-based operational financing strategy for universal health coverage.

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# **Prevalence of Catastrophic and Impoverishing Health Expenditures and Potential Protection against Financial Risks through Subsidies in Guinea**

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**JEL classification:** Health: Other

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## Introduction

Guinea, a low-income country located in West Africa, has a population of approximately 13 million.<sup>[1]</sup> Although it has seen improvements over the past 20 years, health statistics show suboptimal outcomes.<sup>[2-4]</sup> For example, the under-five mortality rate was 99 deaths per 1,000 live births in 2019, which is higher than the sub-Saharan Africa average of 76 deaths per 1,000 live births for the same year.<sup>[3]</sup> In addition, the maternal mortality ratio was 576 deaths per 100,000 live births in 2017, which is also higher than the sub-Saharan Africa average of 534 deaths per 100,000 live births for that same year.<sup>[4]</sup>

Universal health coverage (UHC) is not yet a reality in Guinea. In 2011, a health fee waiver program for children under five and pregnant women, which includes prenatal care and delivery services, such as cesarean sections, and free care for severe malaria cases was introduced.<sup>[5]</sup> In addition, in 2012, a mandatory health insurance scheme was introduced for civil servants.<sup>[5]</sup> However, these initiatives have been hampered by insufficient budget allocations and allocative and technical inefficiencies, among others. Indeed, from 2000 to 2019, not more than 4% of the national budget was allocated to the health sector.<sup>[6]</sup> Over the same period, it was estimated that Guinea could have increased its health budget by an average of 14%, given its macroeconomic characteristics, compared to other low- and middle-income countries.<sup>[7]</sup> In addition, health outcomes could have been achieved with only 69% of the financial resources used.<sup>[7]</sup>

Due to the lack of UHC, a large share of total health expenditures (THE) is borne by households (60% in 2019).<sup>[6]</sup> The substantial proportion of out-of-pocket (OOP) health payments is a huge burden on these households, especially considering the extreme poverty rate that was estimated to be 24% in 2020.<sup>[8]</sup> Nevertheless, data on the extent of catastrophic and impoverishing health expenditures (CHE and IHE, respectively) in Guinea are scarce and outdated.<sup>[9, 10]</sup> OOP health payments are considered catastrophic when their share in an individual's total income or consumption expenditure is equal to or exceeds a defined threshold.<sup>[9]</sup> OOP health payments are considered impoverishing when they cause an individual's total income or consumption expenditure to fall below or further away from a defined poverty line.<sup>[9]</sup> Furthermore, little is known about the drivers of health spending, including those that have the greatest impact on CHE and IHE.

The objectives of this study were to (1) identify the drivers of THE, (2) estimate the prevalence of CHE and IHE, and (3) identify the drivers of and potential financial risk protection (FRP) against CHE and IHE through subsidies in Guinea.

## **Methods**

### **Study design and population**

We conducted a retrospective cohort study based on the 2018-2019 Guinea Living Standards Measurement Study (LSMS).<sup>[11]</sup> This survey is a monitoring and evaluation tool for Guinea's National Economic and Social Development Plan. It was conducted in two phases to take into account variations in consumption related to the country's two main seasons (the rainy season and the dry season). In the first phase, households were interviewed for three months during the rainy season, from July to September 2018, and in the second phase, households were interviewed for three months during the dry season, from April to June 2019. In order to have a nationally representative sample of the population, for both phases, stratified cluster sampling was used and each of the two collection phases involved half of the sample. The strata represented the type of area (urban or rural) in each of Guinea's eight administrative regions. Because the Conakry region was a purely urban area, there were a total of 15 strata. The clusters (enumeration areas) represented specific geographic areas (villages and communities in rural areas and neighborhoods in urban areas). The LSMS was conducted by the National Institute of Statistics of Guinea with technical support from the World Bank's Poverty and Equity Global Practice.

Analyses were conducted at the individual level. All individuals included in the LSMS were considered eligible. However, we excluded those for whom there was no consumption expenditure.

### **Study data**

The LSMS included 20 sub-databases, each focused on a specific theme such as health, employment, social nets, and welfare. We obtained the 20 de-identified sub-databases from the West Africa Unit of the World Bank's Poverty and Equity Global Practice, with permission from the National Institute of Statistics of Guinea. We merged them and extracted relevant individual data on prepayment mechanisms for health

services, health conditions (reasons for hospitalization and health problems that did not result in hospitalization), use of medicines and health services, and consumption expenditures.

Consumption expenditures represent the wealth of individuals. It is the monetary value of goods (including durable goods) and services and includes (1) purchased goods and services, (2) gifts, and (3) self-consumption. Health expenditures in the LSMS included only purchased goods and services. Health expenditure data were available for (1) outpatient drugs (referred to as medicines in the remainder of this paper), (2) ambulatory care, (3) hospitalizations, and (4) other health services and tools. For outpatient care expenditures, data were available for visits to general practitioners, specialists, dentists, and traditional healers as well as for outpatient medical examinations and care. For hospitalization expenditures, there was no disaggregation. For other health services and tools, data were available on corrective lenses, therapeutic and orthopedic devices, vaccinations, circumcisions, annual check-ups, and contraceptives. Health expenditures were available at the individual level except for contraceptives, which were at the household level. Total consumption expenditures were also available at the household level. We therefore estimated contraceptive expenditures and total consumption expenditures for each individual by dividing contraceptive expenditures and total consumption expenditures at the household level by household size. We defined socioeconomic quintiles using the individual-level total consumption expenditures we calculated.

### **Estimation of total health expenditures and their drivers**

We accounted for annual THE by including all health-related data that were available in the LSMS;<sup>[9]</sup> that is, data on drugs, ambulatory care, hospitalizations, and other health services and tools. For drugs and ambulatory care, the expenditure data collection covered the three months prior to the survey. We therefore multiplied these expenditures by four to obtain annual estimates. For hospitalizations, only the last health problem in the 12 months prior to the survey and the related cost for each individual were reported, although individuals could report more than one hospitalization. Nevertheless, 99% of individuals who were hospitalized reported three or fewer hospitalizations; 86% reported one hospitalization, 10% reported two hospitalizations, and 3% reported three hospitalizations. We therefore multiplied hospitalization expenditures by the number of hospitalizations to obtain annual estimates. For other health services and tools, expenditure data covered the 12 months prior to the survey. Therefore, for each individual, we used the following formula to calculate annual THE: (drug expenditures x 4) +

(ambulatory care expenditures x 4) + (hospitalization expenditures x number of hospitalizations) + (expenditures on other health services and tools).

We calculated the mean and median annual THE per individual (with standard errors (SEs) and first and third quartiles, respectively) and the distribution of expenditure categories for the entire population and by quintile. By restricting the analyses to individuals who reported a single hospitalization, we calculated the mean and median annual hospitalization expenditures per individual according to reason for hospitalization as well as the share of each health problem in hospitalization expenditures. We could not estimate health expenditures by health problem for ambulatory care because health problems that did not result in hospitalization were reported for the month prior to the survey, whereas expenditures for ambulatory care were reported for the 3 months prior to the survey. In addition, there was no data on the number of times individuals had health problems that did not result in hospitalization. Moreover, data on health problems that did not require hospitalization were missing for 14% of individuals who reported ambulatory care expenditures.

We defined the drivers of THE as (1) the expenditure categories with the highest measures of central tendency (means and medians) and/or shares in annual THE and (2) the reasons for hospitalization with the highest shares in THE.

### **Estimation of the prevalence of CHE and IHE**

Consistent with the international literature, we defined a CHE case as an individual whose OOP health payments are greater than or equal to 10% or 25% of their total consumption expenditure.<sup>[9]</sup> Therefore, we estimated the prevalence of CHE by calculating the proportion of the population with OOP health payments greater than or equal to 10% or 25% of their total consumption expenditure, along with the confidence intervals (CIs). We performed the analyses for THE and by expenditure categories, for the entire population, and by quintile.

In accordance with the international literature, we defined an IHE case as a person whose total consumption expenditure is below or further away from the Guinean poverty line due to OOP health payments.<sup>[9]</sup> Thus, we estimated the prevalence of IHE by calculating the difference between the number of poor people before and after health expenditures (THE and expenditure categories), with CIs. We



estimated the number of poor people by calculating the number of individuals below the 2019 Guinean poverty line of 5,006,362 Guinean francs or \$1,385 international dollars (purchasing power parity (2019); \$) per year.<sup>[12]</sup> We considered total consumption expenditure as the wealth of individuals, and total consumption expenditure minus OOP health expenditure as the impact of health expenditure on the wealth of individuals. We conducted the analyses for the entire population and by quintile. We calculated quintiles before and after health expenditures. For already poor individuals (individuals in quintiles 1 and 2), the change in poverty was equal to their total consumption expenditures.<sup>[9]</sup>

For CHE and IHE, we considered all health expenditures as OOP health payments because of the small proportion (3%) of individuals with some form of prepayment mechanism.

### **Identification of CHE and IHE drivers and estimation of the potential FRP of subsidies**

We defined the drivers of CHE and IHE as the expenditure categories resulting in the highest prevalences of CHE and IHE cases (previously calculated).

We estimated the FRP associated with THE and expenditure categories as the equivalent of the prevalence of CHE and IHE cases they induce. We estimated FRP for the entire population and by quintile. For IHE, quintiles were calculated before and after health expenditures.

Statistical analyses were performed using STATA software (StataCorp LLC, College Station, TX, version 16.1). We report the number of individuals at the national level rather than the number of respondents to the LSMS. Expenditure data were converted to 2019 international dollars using the rate 1 international dollar = 3,614 Guinean francs.<sup>[12]</sup>

## **Results**

### **Characteristics of the study population**

The LSMS included 41,449 individuals. We excluded 15 (0.04%) individuals who reported no consumption expenditures. The study population therefore included 41,434 individuals, representing the 12 million people in Guinea at the time of the LSMS (in 2018 and 2019). Three percent of the total population

(306,164 individuals) had health insurance or other forms of pre-payment mechanisms (Table 1). Seventy-four percent of the population (8,991,923 individuals) reported having a health problem that did not result in hospitalization. In the overall population and across all quintiles, fever and malaria were the most common major health problems that did not result in hospitalization. The prevalence of fever and malaria was 29% in the general population. This was followed by cough, sore throat, cold and flu (13%), and stomach problems (6%). Of those who reported having a health problem that did not result in hospitalization, 55% used health services. Among those who reported a health problem that did not result in hospitalization but did not use health services, self-medication (68%), perceived lack of need for care (14%), and lack of money (13%) were the main reasons. Five percent of the population (553,351 individuals) were hospitalized. Fever and malaria were the main reasons for hospitalization in the entire population and in all quintiles, with a prevalence of 1% to 2%.

**Table 1. Characteristics of the study population**

Characteristics	N (%)					
	Q1	Q2	Q3	Q4	Q5	All
All						12,083,286 (100)
With health insurance	345 (0)	1,903 (0.1)	4,630 (0.2)	8,495 (0.4)	24,558 (1.0)	39,931 (0.3)
With a special pre-payment mechanism*	64,136 (2.8)	49,874 (2.1)	48,201 (2.0)	52,159 (2.2)	51,864 (2.2)	266,233 (2.2)
Main health problem that did not result in hospitalization						
Fever/malaria	622,062 (25.7)	693,685 (28.7)	725,780 (30.4)	742,584 (30.7)	742,825 (30.8)	3,526,947 (29.2)
Diarrhea	100,593 (4.2)	95,594 (4.0)	105,615 (4.4)	94,880 (3.9)	81,392 (3.4)	478,073 (4.0)
Accident/Injury	62,082 (2.6)	63,197 (2.6)	46,862 (1.9)	53,151 (2.2)	46,755 (1.9)	272,046 (2.3)
Dental problem	41,200 (1.7)	41,319 (1.7)	42,948 (1.8)	57,251 (2.4)	47,631 (2.0)	230,348 (1.9)
Skin problem	71,556 (3.0)	73,667 (3.1)	76,436 (3.2)	60,441 (2.5)	54,033 (2.2)	336,132 (2.8)
Eye problem	24,710 (1.0)	19,626 (0.8)	19,694 (0.8)	26,808 (1.1)	19,391 (0.8)	110,229 (0.9)
Blood pressure problem	16,284 (0.7)	26,870 (1.1)	29,736 (1.2)	25,926 (1.1)	32,045 (1.3)	130,862 (1.1)
Typhoid fever	42,963 (1.8)	80,177 (3.3)	83,178 (3.4)	91,501 (3.8)	104,348 (4.3)	402,168 (3.3)
Stomach problems	126,488 (5.2)	133,777 (5.5)	141,517 (5.9)	132,811 (5.5)	143,697 (6.0)	678,290 (5.6)
Cough, sore throat, cold and flu	326,516 (13.5)	345,229 (14.3)	298,317 (12.4)	317,793 (13.2)	328,176 (13.6)	1,616,031 (13.4)
Diabetes	2,952 (0.1)	541 (0)	6,155 (0.3)	5,041 (0.2)	7,684 (0.3)	22,373 (0.2)
Meningitis	8,841 (0.4)	4,230 (0.2)	2,418 (0.1)	4,747 (0.2)	4,945 (0.2)	25,180 (0.2)
Other	185,971 (7.7)	206,160 (8.5)	215,487 (8.9)	264,051 (10.9)	291,586 (12.1)	1,163,254 (9.6)
None	785,176 (32.5)	634,390 (26.2)	621,857 (25.7)	538,767 (22.3)	511,173 (21.2)	3,091,363 (25.6)
Use of health care services for a health problem that did not result in hospitalization**	644,203 (39.5)	911,729 (51.1)	1,028,984 (57.4)	1,130,615 (60.2)	1,252,488 (65.8)	4,968,020 (55.3)

Reason for not using health care services for a health problem that did not result in hospitalization***						
Self-medication	562,507 (56.9)	610,695 (70.0)	538,596 (70.4)	517,511 (69.3)	503,896 (77.3)	2,733,206 (67.9)
Lack of money	187,125 (18.9)	99,996 (11.5)	91,680 (12.0)	85,391 (11.4)	37,082 (5.7)	501,274 (12.5)
Perception that care is not required	154,116 (15.6)	110,522 (12.7)	102,694 (13.2)	102,898 (13.8)	91,762 (14.1)	561,992 (14.0)
Health center too far away	61,885 (6.3)	30,564 (3.5)	19,636 (2.6)	15,273 (2.1)	4,959 (0.8)	132,316 (3.3)
Other	1,451,760 (2.3)	1,566,686 (2.4)	1,663,394 (1.6)	1,694,678 (3.4)	1,777,980 (2.2)	95,014 (2.4)
Reason for hospitalization						
Fever/malaria	38,458 (1.6)	28,774 (1.2)	30,055 (1.2)	31,222 (1.3)	37,801 (1.6)	166,311 (1.4)
Diarrhea	3,726 (0.2)	4,353 (0.2)	1,012 (0)	1,652 (0.1)	2,406 (0.1)	13,149 (0.1)
Accident/Injury	4,967 (0.2)	6,105 (0.3)	4,430 (0.2)	5,605 (0.2)	10,707 (0.4)	31,814 (0.3)
Dental problem	1,440 (0.1)	439 (0)	946 (0)	973 (0)	904 (0)	4,702 (0)
Skin problem	3,226 (0.1)	1,366 (0.1)	2,912 (0.1)	4,186 (0.2)	1,428 (0.1)	13,118 (0.1)
Eye problem	808 (0)	1,911 (0.1)	50 (0)	1,492 (0.1)	2,639 (0.1)	6,900 (0.1)
Blood pressure problem	3,504 (0.1)	6,888 (0.3)	6,114 (0.3)	4,412 (0.2)	7,599 (0.3)	28,516 (0.2)
Typhoid fever	11,696 (0.5)	21,120 (0.9)	17,875 (0.7)	19,026 (0.8)	20,374 (0.8)	90,091 (0.8)
Stomach problems	15,540 (0.6)	12,309 (0.5)	15,796 (0.7)	12,265 (0.5)	15,243 (0.6)	71,152 (0.6)
Cough, sore throat, cold and flu	2,747 (0.1)	2,073 (0.1)	1,463 (0.1)	2,381 (0.1)	2,786 (0.1)	11,450 (0.1)
Diabetes	181 (0)	759 (0)	1,369 (0.1)	667 (0)	186 (0)	3,162 (0)
Meningitis	1,408 (0.1)	398 (0)	2,703 (0.1)	1,302 (0.1)	1,100 (0.1)	6,912 (0.1)
Other	13,439 (0.6)	19,496 (0.8)	17,944 (0.7)	23,045 (1.0)	32,151 (1.3)	106,075 (0.9)
None	2,316,253 (95.8)	2,312,472 (95.6)	2,313,645 (95.8)	2,307,524 (95.5)	2,280,040 (94.4)	11,529,935 (95.4)

N: number (population); Q1-Q5: quintiles 1, 2, 3, 4, and 5

\*Community insurance plans and fee waiver programs

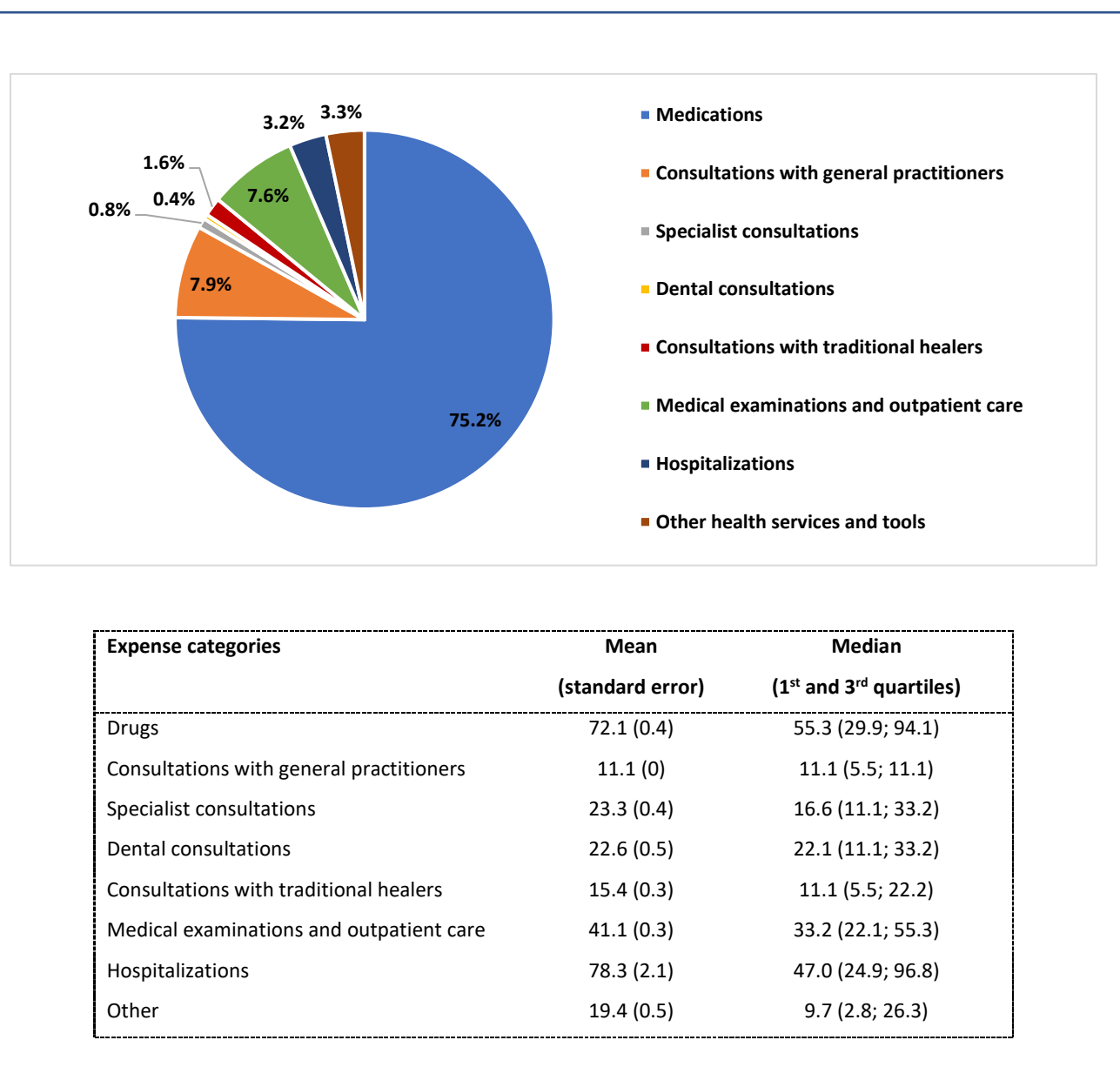
\*\*Among those who reported such conditions

\*\*\*Among those who reported such conditions but did not use health services

## **Total health expenditures and drivers**

In the overall population, the mean and median annual THE were \$95 (SE = 0.5) and \$72 (first and third quartiles = 33 and 128), respectively. (Appendix 1 presents mean and median annual THE in the overall population and by quintile, overall and among CHE cases.) Mean annual expenditures were higher for hospitalizations (\$78 (2)), medications (\$72 (0.4)), and medical tests and outpatient care (\$41 (0.3); Figure 1). Median annual expenditures were highest for drugs (\$55 (30; 94)), hospitalizations (\$47 (25; 97)), and medical tests and outpatient care (\$33 (22; 55)). Expenditure on drugs accounted for the largest share of health expenditure (75%), followed by general practitioner visits (8%) and medical examinations and outpatient care (8%). This distribution was similar to that obtained in all quintiles.

**Figure 1: Distribution of total health expenditures and measures of central tendency by expenditure category**



In the overall population, fever and malaria accounted for the largest share of total hospitalization expenditures (21%), followed by stomach problems (15%), typhoid fever (15%), and accidents and injuries (8%; Table 2). This distribution was similar to that obtained in the quintiles.

**Table 2. Hospitalization expenditures in the general population**

Reasons for hospitalization	Average (SE)	Median (1 <sup>st</sup> and 3 <sup>rd</sup> quartiles)	Min; Max	Share (%)
Fever/malaria	49.9 (2.3)	33.2 (19.4; 68.3)	0.4; 221.4	21.1
Diarrhea	43.1 (5.8)	33.2 (22.1; 55.3)	11.1; 138,4	1.5
Accident/Injury	87.6 (7.4)	47.0 (33.2; 138.4)	2.8; 290.5	8.2
Dental problem	24.8 (6.5)	13.8 (12.5; 24.9)	8.3; 62.3	0.3
Skin problem	72.0 (15.3)	45.7 (27.7; 66.4)	12.5; 221.4	1.9
Eye problem	113.1 (14.2)	96.8 (45.7; 138.4)	19.4; 276.7	2.1
Blood pressure problem	76.6 (6.8)	60.9 (27.7; 110.7)	8.3; 276.7	5.5
Typhoid fever	55.5 (4.8)	41.5 (22.1; 69.2)	4.2; 332.0	14.7
Stomach problems	76.0 (4.8)	49.8 (33.2; 96.8)	4.2; 276.7	14.9
Cough, sore throat, cold and flu	74.4 (21.6)	41.5 (13.8; 69.2)	2.7; 276.7	1.3
Diabetes	133.2 (34.8)	101.7 (58.1; 179.9)	13.8; 276.7	1.0
Meningitis	89.1 (21.3)	45.7 (19.4; 138.4)	16.6; 332.0	1.8
Other	92.3 (4.6)	58.1 (45.4; 166.4)	2.8; 415.1	25.6
All	68.3 (1.7)	45.67 (41.5; 138.4)	0.4; 415.1	100

SE: standard error; Min: minimum; Max: maximum

### Prevalence of CHE and IHE

THE accounted for 4% (CI = 4.4; 4.5) of individuals' total consumption expenditures in the overall population (4% to 5% by quintiles). Based on the threshold of  $\geq 10\%$  and  $\geq 25\%$ , the prevalences of CHEs were 13% (CI = 12.3; 13.0) and 1% (CI = 0.8; 0.9; Table 3), respectively.

The prevalence of IHE was 4% (CI = 3.9; 4.2), representing 477,288 individuals. While there was no IHE in quintiles 4 and 5 (among the rich and richest), their prevalence in quintile 3 was 20% (Table 4).

**Table 3. Prevalence of catastrophic health expenditures and impact of drug and hospitalization expenditures**

		Total health expenditures	Drug expenditures	Hospitalization expenses
<b>≥ 10%</b>				
Q1	N	418,252	239,776	17,923
	% (CI)	17.3 (16.4; 18.2)	9.9 (9.2; 10.6)	0.7 (0.5; 0.9)
Q2	N	383,758	185,115	22,651
	% (CI)	15.9 (15.1; 16.7)	7.6 (7.1; 8.2)	0.9 (0.7; 1.2)
Q3	N	319,463	156,832	10,979
	% (CI)	13.2 (12.5; 14.0)	6.5 (6.0; 7.0)	0.3 (0.2; 0.4)
Q4	N	257,135	86,972	7,774
	% (CI)	10.6 (10.0; 11.3)	3.6 (3.0; 4.0)	0.3 (0.2; 0.4)
Q5	N	148,993	47,220	6,422
	% (CI)	6.2 (5.7; 6.7)	2.0 (1.7; 2.2)	0.3 (0.2; 0.4)
All	N	1,527,601	715,915	65,749
	% (CI)	12.6 (12.3; 13.0)	5.9 (5.7; 6.2)	0.5 (0.5; 0.6)
<b>≥ 25%</b>				
Q1	N	53,096	12,299	4,532
	% (CI)	2.2 (1.9; 2.5)	0.5 (0.3; 0.7)	0.2 (0.1; 0.3)
Q2	N	24,438	4,058	2,614
	% (CI)	1.0 (0.8; 1.2)	0.2 (0.1; 0.3)	0.1 (0; 0.2)
Q3	N	13,369	1,563	830
	% (CI)	0.6 (0.4; 0.7)	0.1 (0; 0.1)	0.03 (0; 0.1)
Q4	N	7,379	0	461
	% (CI)	0.3 (0; 0.2)	0	0.01 (0; 0.04)
Q5	N	2,672	0	780
	% (CI)	0.1 (0; 0.2)	0	0.03 (0; 0.07)
All	N	100,954	17,920	9,217
	% (CI)	0.8 (0.8; 0.9)	0.1 (0.1; 0.2)	0.1 (0; 0.1)

CHE: catastrophic health expenditures; Q1-Q5: quintiles 1, 2, 3, 4, and 5; N: number (population) CI: confidence intervals



## **FRP of potential grants**

Subsidizing all health services would prevent 13% (CI = 12.3; 13.0) of the population (1,527,601 individuals) from spending  $\geq 10\%$  of their total consumption expenditures on health care and 4% (CI = 3.9; 4.2) of the population (477,288 individuals) from falling or being pushed further into poverty (Tables 3 and 4). Subsidizing drugs alone would prevent 6% (CI = 5.7; 6.2) of the population (715,915 individuals) from spending  $\geq 10\%$  of their total consumption expenditure on health care and 3% (CI = 2.7; 3.1) of the population (349,940 individuals) from falling or being pushed further into poverty. Subsidizing hospitalizations alone would prevent 0.5% (CI= 0.5; 0.6) of the population (65,749 individuals) from spending  $\geq 10\%$  of their total consumption expenditure on health care and 0.1% (CI=0; 0.2) of the population (15,701 individuals) from falling or being pushed further into poverty.

**Table 4. Prevalence of impoverishing health expenditures and impact of drug and hospital expenditures**

		<b>Total consumption expenditures</b>	<b>After total health expenditures</b>	<b>IHE cases</b>	<b>After spending on drugs</b>	<b>IHE cases</b>	<b>After hospitalization expenses</b>	<b>IHE cases</b>
Q1	N	2,417,393	2,417,393	0	2,417,393	0	2,417,393	0
	% (CI)	100	100	0	100	0	100	0
Q2	N	2,418,463	2,418,463	0	2,418,463	0	2,418,463	0
	% (CI)	100	100	0	100	0	100	0
Q3	N	440,216	917,212	476,996	787,396	347,180	455,582	15,366
	% (CI)	18.2 (17.4; 19.1)	38.5 (37.5; 39.6)	20.3	32.8 (31.8; 33.8)	14.6	18.9 (18.0; 19.7)	0.7
Q4	N	0	0	0	2,760	2,760	335	335
	% (CI)	0	0	0	0	0	0	0
Q5	N	0	292	292	0	0	0	0
	% (CI)	0	0	0	0	0	0	0
Total	N	5,276,072	5,753,360	477,288	5,626,012	349,940	5,291,773	15,701
	% (CI)	43.7 (43.2; 44.1)	47.7 (47.2; 48.2)	4.0 (3.9; 4.2)	46.6 (46.1; 47.0)	2.9 (2.7; 3.1)	43.8 (43.3; 44.3)	0.1 (0; 0.2)

IHE: impoverishing health expenditures; Q1-Q5: quintiles 1, 2, 3, 4, and 5; CI: confidence interval

Note: CIs could not be calculated for IHE cases by quintile because quintiles were calculated before and after health expenditures

## Discussion

Based on means and medians, the primary drivers of annual THE were hospitalizations (\$78 and \$51, respectively) and medications (\$72 and \$61, respectively). Based on the distribution of THE, the primary driver of annual THE was medications (75%). The main driver of hospitalization expenditures was fever and malaria (21% of total hospitalization expenditures). In addition, although we were unable to estimate health expenditures by health problem for outpatient care, fever and malaria were the most common health problems that did not require hospitalization. The prevalences of CHE (based on the  $\geq 10\%$  threshold) and IHE were 13% and 4%, respectively. Subsidizing medications alone would prevent 46% of CHE and 73% of IHE cases. Subsidizing medications alone would have a greater impact on CHEs and IHEs than subsidizing hospitalizations alone, which would prevent 4% and 3% of these cases, respectively.

In this study, we showed the importance of medication in Guinea. First, among individuals who had a health problem that did not result in hospitalization, 68% did not use health services because of self-medication, and these health problems affected 74% of the population. Second, drug expenditures accounted for the largest share of THE and had a higher median cost than hospitalizations. Third, drug expenditures was the most important driver of CHE and IHE.

Since Guinea ratified the Bamako Initiative in 1988, drug costs have been borne by households, despite the implementation of a number of fee exemption programs in recent years.<sup>[13]</sup> One of the objectives of the Bamako Initiative was to minimize the cost of medicines by ensuring access to generic drugs.<sup>[14]</sup> However, the Guinean health system is currently unable to provide its population with adequate access to medicines and to ensure that the population has access to good quality medication.

The pharmaceutical sector in Guinea comprises a public sub-sector, a legal private sub-sector, and an informal and illegal private sub-sector.<sup>[5]</sup> In the public sub-sector, pharmaceutical products are supposed to be supplied by the Central Pharmacy of Guinea (CPG), which was set up in 1992.<sup>[15]</sup> However, stock-outs are frequent and significant, even for essential medicines.<sup>[14, 15]</sup> According to 2016 data, only 39% of public health facilities' orders from the CPG were filled.<sup>[15]</sup> In 2017, the antibiotics ampicillin and amoxicillin and oral rehydration salts were available in only 38%, 28%, and 26% of public health facilities, respectively.<sup>[14]</sup> This situation forces health facilities to seek supplies from the private sector. The challenges of the PCG stem from, among other things, a lack of adequate tools and procedures to quantify

the country's needs throughout the supply chain and down to the last mile, and very little government funding (in 2014, the CPG received only US\$571,000 for all the country's needs).<sup>[15, 16]</sup> In the informal and illicit private subsector where products escape the registration system and the control of the National Drug Quality Control Laboratory, it is estimated that 70% of the drugs sold there could be falsified.<sup>[5]</sup> In addition, providers have the right to establish their own prices, increasing the vulnerability of households.<sup>[5]</sup>

The Guinean government, in collaboration with its development partners, should give priority to the pharmaceutical sector. A first strategic action would be to strengthen existing laws and regulations in the pharmaceutical sector. In 2015, Guinea was the first African country to ratify the MEDICRIME Convention, the first international legal tool against counterfeit medicines.<sup>[16]</sup> In addition, the 24-year-old regulatory law on medicines was updated in July 2018. The new law requires quality control of all health products at all stages - production, registration, importation, and post-marketing surveillance. Nevertheless, this law is not yet effective. A second strategic action would be to strengthen the operational aspects of the pharmaceutical sector's supply, storage, and distribution systems. Finally, the government and development partners should consider establishing subsidy programs for the rational use of medicines. Studies should be conducted on the feasibility of full or partial subsidization, based on priority diseases such as fever and malaria and priority groups such as the poor.

The Guinean government and its development partners should also give priority to malaria control. In this study, fever and malaria were the leading causes of hospitalization and the leading health problems that did not result in hospitalization. In 2018, the prevalence of fever in Guinea was 17% among children under 5 years of age alone.<sup>[2]</sup> In 2021, the prevalence of malaria among children under 5 years of age, estimated on the basis of blood testing, was 17%.<sup>[17]</sup> Guinea has a National Malaria Control Program.<sup>[18]</sup> Some components are aimed at the general population while others target children under five and pregnant women. The program provides long-lasting insecticidal nets (LLINs) to the general population in mass campaigns every three years, and to pregnant women and children under one year of age in routine activities. The program also includes free screening and treatment of minor cases for the general population, intermittent preventive treatment during pregnancy, and treatment of all severe cases in pregnant women and children under five. Yet, we found that only 3% of the population received some form of prepayment mechanism, including all health fee waiver programs in Guinea, during the LSMS. Furthermore, in 2018, only 44% of households had at least one LLIN, and of those households, 56% of

children under five and 59% of pregnant women used LLINs.<sup>[2]</sup> By 2021, 63% of households had at least one LLIN and of these households, only 39% of children under five and 38% of pregnant women used LLINs.<sup>[17]</sup> The National Malaria Control Program should be strengthened.

All of these interventions should be carried out within the framework of the implementation of UHC. In 2014, the Ministry of Health developed a "Strategy for Health Financing Towards Universal Coverage in Guinea;" however, this strategy is not operational.<sup>[5]</sup> The overall objective of this strategy was to "ensure that the entire population, especially the poorest, have access to geographically and financially accessible and culturally acceptable quality health services." This strategy mainly presented the axes of the strategy and the roles of the different actors. In addition, it recommended the development of (1) a roadmap or operational plan and (2) a monitoring and evaluation framework to accompany the next National Health Development Plan, as well as studies to inform these two documents. However, to date, these two key documents and the underlying studies have not yet been developed. There is therefore an urgent need to establish an operational, evidence-based financing strategy for achieving UHC in Guinea.

### **Limitations**

The study has four main potential limitations. First, there may be a social desirability bias that would have caused respondents in the LSMS to over-report their consumption levels for fear of the stigma associated with being poor. However, this is unlikely since one of the objectives of the LSMS was to generate evidence to inform the development of interventions to increase Guinea's economic level and reduce poverty levels. This objective was communicated to respondents. In addition, the interviewers reassured respondents that the survey was confidential.

Second, because of how the LSMS data were collected, we estimated annual hospitalization expenditures by multiplying expenditures for the last health condition that resulted in hospitalization by the number of hospitalizations. However, respondents could report more than one hospitalization for different reasons, and each reason may be associated with a specific expenditure. Therefore, our estimates of hospitalization expenditures, THE, the share of hospitalization expenditures in THE, and the prevalences of CHE and IHE cases may be inaccurate. Nevertheless, 99% of respondents who were hospitalized reported one to three hospitalizations; 86% reported one hospitalization, 10% reported two hospitalizations, and 3% reported three hospitalizations. In addition, only 5% of respondents reported

having been hospitalized. Therefore, our estimates of hospitalizations may be slightly over- or underestimated. However, this is unlikely to impact our estimates of THE, the share of hospitalization expenditures in THE, and the prevalence of CHE and IHE cases. For mean and median annual hospitalization expenditures per individual by reason for hospitalization and the share of each reason in hospitalization expenditures, we limited the analyses to individuals who reported a single hospitalization, which minimizes estimation error.

Third, the "other" category of health problems that did not result in hospitalization was significant (10%). Therefore, in terms of morbidity, we may not have identified important health problems that were included in this category. However, this does not change the fact that fever and malaria are important health problems in Guinea that require the attention of the government and its development partners. Furthermore, in terms of expenditures, all health problems (including those in the "other" category) that did not result in hospitalization were included in our estimates of THE and their distribution by expenditure category. In addition, we did not estimate health expenditures by health problem for ambulatory care.

Fourth, we considered all health expenditures as OOP health payments. Because the proportion of individuals with some form of pre-payment mechanism was small (3%), this is unlikely to have an impact on our results.

## **Conclusions**

In this study, the most important drivers of THE in Guinea were drugs and hospitalizations. In addition, fever and malaria were the most important reasons for hospitalizations, the most important drivers of hospitalization expenditures, and the most prevalent health problems that did not result in hospitalization. The prevalences of CHE (based on the threshold of  $\geq 10\%$ ) and IHE cases were 13% and 4%, respectively. Drug expenditures were the most important driver of CHE and IHE cases; their subsidization would prevent 46% and 73% of these cases, respectively. It is recommended that the Guinean government (1) strengthen Guinea's pharmaceutical sector by reinforcing existing laws and regulations as well as the operational aspects of the sector's supply, storage, and distribution systems; (2) implement subsidy programs for rational use of medicines (notwithstanding the Bamako Initiative); (3)

strengthen the National Malaria Control Program; and (4) establish an evidence-based operational financing strategy for UHC in Guinea.

## Appendix 1. Average and median annual total health expenditures

	Q1	Q2	Q3	Q4	Q5	All
<b>All</b>						
Average (SE)	60.4 (0.85)	78.2 (0.9)	91.0 (1.0)	104.2 (1.0)	131.9 (1.3)	95.1 (0.5)
Median (1 <sup>st</sup> and 3 <sup>rd</sup> quartiles)	47.0 (18.8; 83.0)	60.9 (27.7; 105.1)	72.5 (38.7; 121.7)	88.5 (44.3; 144.9)	105.1 (55.3; 177.1)	71.9 (33.2; 128.4)
<b>Catastrophic expenditure (≥10%)</b>						
Average (SE)	126.2 (1.6)	179.9 (2.0)	216.1 (2.3)	216.1 (2.6)	381.4 (5.1)	206.1 (1.5)
Median (1 <sup>st</sup> and 3 <sup>rd</sup> quartiles)	110.7 (88.5; 149.4)	166.0 (132.8; 199.2)	193.7 (166.0; 232.4)	235.7 (210.3; 287.8)	348.6 (296.1; 442.7)	182.6 (132.8; 246.3)

Q1-Q5: quintiles 1, 2, 3, 4, and 5; SE: standard error



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