

# Socioeconomic Inequalities in Care-Seeking for Children Under Five Before and After the Free Healthcare Initiative in Sierra Leone: An Analysis of Population-Based Survey Data

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## Research

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## Abstract

**Background:** There are real socioeconomic inequalities between and within countries, leading to disparities in the use of health services. In children under five years of age, this could be responsible for child mortality by depriving children of healthcare. By removing healthcare fees, the Free Healthcare Initiative (FHCI) adopted in Sierra Leone can contribute to reducing these inequities in healthcare-seeking for children. This study aimed to assess the socioeconomic inequalities in healthcare-seeking for children under five years of age before and after the implementation of the FHCI.

**Methods:** We included 1207, 2815, and 1633 children under five years of age with fever from the 2008, 2013, and 2016 nationwide surveys database, respectively. Concentration curves were drawn for the period before (2008) and after (2013 and 2016) the implementation of the FHCI to assess socioeconomic inequalities in healthcare-seeking. Finally, concentration indices were calculated to understand the magnitude of these socioeconomic inequalities.

**Results:** We found that before the implementation of the FHCI, there were inequalities in care-seeking for children under five (concentration index (CIn) = 0.168, standard error (SE) = 0.049) in favor of the wealthy households. These inequalities decreased after the implementation of the FHCI but remained in favor of the rich households (CIn = 0.039, SE = 0.040). There were more disparities in the healthcare-seeking between districts before the implementation of the FHCI. After the initiation of the FHCI, these disparities were reduced, and 12 of the 14 districts had a CIn around the value of equality.

**Conclusion:** Our study observed pro-rich inequalities in care-seeking for children under five years of age before the implementation of the FHCI and a decrease in these inequalities after its implementation, even if it remained pro-rich. To continue to reduce wealth-related inequalities, policy actions can focus on the increase of availability of health services in the districts where the care-seeking was pro-rich.

## Background

Social inequality, the organizing principle of hierarchical structure in human society, is manifested in unequal access to goods and services, information, decision making, and power [1]. The right to healthcare services stands as one of the most controversial issues [2]. Health inequalities are systematic differences in health outcomes. They constitute a global issue whose financial costs to societies contribute to slowing socioeconomic development [3].

Globally, half of the world's population do not have access to healthcare, which results in differences in health outcomes [4]. Disparities in access to healthcare exist between countries, but also between communities within the same country [5–7]. According to the World Health Organization (WHO), life expectancy and maternal and childhood mortality are keys indicators for health inequalities [3]. It was estimated that 28.6% of deaths in children under five were related to health inequalities in 2006 [8]. Several factors affect access to healthcare, including sociocultural factors, the geographical accessibility (long distances to health centers, poor road quality, etc.), financial constraints (direct and indirect expenses) and/or contextual constraints (availability of the service at the point of healthcare) [9, 10]. In addition, limited or lack of access to healthcare services is much more blatant in developing countries, related to constrained resources, rampant poverty, etc. [11].

In Africa, people do not have equal access to healthcare services. Indeed, the use of health services is variable and depends on the availability of health centers and services, health staff, the quality of care provided, and the beliefs in societies [12]. An estimated 11 million people fall into poverty every year due to catastrophic health expenditure [13], and less than 30% of children under the age of five do not have access to healthcare [14, 15]. Children under five are a vulnerable group of the population, and many health actions contribute to improving their state of health, notably vaccination campaigns, supply of nutrients and vitamins, and preventive and curative care programs [16–18]. Thus, the use of curative care requires the availability of health services for people who need it without catastrophic out-of-pocket payment [4]. For this reason, the Sustainable Development Goals (SDGs) advocate for universal health coverage to be achieved [19].

In Sierra Leone, the health system has been constrained for a long time by civil war (1991–2002) [20] and then by waves of epidemics of cholera (2012) and Ebola (2014–2016) [21, 22], making access to healthcare problematic for the most vulnerable populations. More than 30% of children under five did not have access to healthcare in 2013 [23], with a mortality rate estimated at 120 deaths per 1000 live births in 2015 [24]. In response, the government of Sierra Leone implemented in 2010 the Free Healthcare Initiative (FHCI) for children under five, pregnant women, and lactating mothers in order to reduce the inequalities in terms of access to healthcare and the high mortality rate [25].

Since the FHCI was implemented, studies have shown an increase in the utilization of health services, particularly in antenatal and postnatal services [26–28]. Thus, antenatal care visits and institutional delivery increased by 25% from 2008 to 2013 [28], and the proportion of caregivers seeking care for febrile children under five increased from 62% in 2013 to 71% in 2016 [24]. However, this increase in accessibility to healthcare is unevenly distributed between wealth levels, regions, and types of places of residence [28]. To the best of our knowledge, no studies have assessed the impact of free healthcare on inequalities in access to curative healthcare for children under five in Sierra Leone. Such additional knowledge could be used for designing finer investigations to uncover and address the drivers of the inequalities persisting where the FHCI aimed at flattening them, with the ultimate goal of achieving SDG3 in children under five.

The general objective of our study was to describe the use of healthcare for children under five with fever before and after the implementation of the FHCI, while the specific objective was to assess the inequalities in access to healthcare for children under five in terms of quantity and magnitude before and after the implementation of the FHCI in Sierra Leone.

## Methodology

### Data source

This study used data from the 2008 and 2013 Sierra Leone Demographic and Health Surveys (DHS) and the 2016 Malaria Indicator Survey (MIS). These are national representative household surveys in which women aged 15–49 years were interviewed. Details of the complete description of the interview method are available elsewhere [29, 30]. Our study focused on febrile children under five years of age whose caregivers sought healthcare in the two weeks preceding each of the surveys.

**Settings:** Sierra Leone is a 71,740 square kilometers West African country located on the southwest coast with a population estimated at 7,396,000 in 2016 [31]. The population is young in general, with 63% aged less than 25 years and children under five representing approximately 17% of the total population [32]. The climate is tropical with two seasons and vegetation ranging from the savannah in the North to the rainforest in the South. For these surveys, the country was divided into four administrative regions: The northern, eastern, southern, and western regions. Each region was subdivided into districts with a total of 14 districts in the country. The health system in Sierra Leone is organized into three levels. The primary level is made up of peripheral health units (PHUs), of which 229 are community health centers (CHCs), 386 community health posts (CHPs), and 559 maternal and child health posts (MCHPs). Meanwhile, the secondary level is made up of 21 district hospitals [33], and the tertiary level includes regional and specialized hospitals. There are six teaching hospitals and several private clinics and hospitals spread across the 14 districts of the country. The distribution of the wealth index is not equal between the rural and urban areas. Approximately 61% of the population in the urban area are richest and in the rural area, 28% are poorest [30], while the inequality-adjusted human development index was low at 0.266 in 2017 [34].

## Variables

The outcome variable was the proportion of children under five years of age whose caregivers sought care in the two weeks immediately preceding the surveys. We defined the place in which care was first sought for fever (public and private) to construct the care-seeking variable.

The independent variables were chosen based on similar studies [28, 35] and included sociodemographic variables and the determinants of care-seeking for febrile children, as follows: The respondent's age (15–24, 25–34, and  $\geq 35$  years); the level of education of the mother of the child (no formal education, primary education, and secondary education or higher); the total number of children born in the household (1–2, 3–4, and  $\geq 5$  children); the gender of the head of the household; the age of the head of the household (15–24, 25–34, and  $\geq 35$  years); the wealth index (richest, richer, middle, poor, and poorest); the regions (east, north, south, and west); the districts of residence (Kailahun, Kenema, Kono, Bombali, Kambia, Koinadugu, Port Loko, Tonkolili, Bo, Bonthe, Moyamba, Pujehun, Western Area Rural, and Western Area Urban); the types of places of residence (urban or rural); the religion (Christian, Muslim, traditional or other); the gender of the child; the age of the child (< 12, 12–35, and 36–59 months); the child's household size; the child's ethnicity; the type of facility where healthcare was sought (public, private, traditional, or other).

## Sampling method

A two-stage cluster sampling method was used in the three Sierra Leone population-based surveys. The whole country was subdivided into enumeration areas (EAs). Each EA included several households. In the first stage, EAs were selected with stratified probability proportional to sample size. The place of residence (urban or rural) was used to stratify the EAs. In the second stage, from the EAs, households were selected using systematic random sampling. The sampling frames were developed based on the 2004 census for the 2008 and 2013 surveys and on the 2015 census for the 2016 survey [29, 30, 32].

## Statistical methods

Statistical analyses were performed using Stata version 15.0. The characteristics of the children's caregivers and those of the febrile children during the two weeks preceding the survey were described first. The differences between participants' characteristics and between the surveys were assessed using chi-square tests to determine the trend. Analyses were carried out separately for each of the three surveys to evaluate the proportion of caregivers seeking care for their febrile children. The descriptive analyses were weighted for probability sampling and adjusted for stratification and clustering.

For the analysis of wealth related-inequalities, participants were grouped—according to their socioeconomic status—into wealth quintiles, as follows: Poorest (1st quintile), poorer (2nd quintile), middle (3rd quintile), richer (4th quintile), and richest (5th quintile). Concentration curves and the concentration index were used to assess inequalities in the use of healthcare. The concentration curves were used to examine the trend in the pattern of the socioeconomic inequalities in healthcare-seeking, while the concentration index was used to assess the magnitude of the inequalities in healthcare-seeking.

**Concentration curves:** The concentration curves were built using two keys variables: The independent wealth index and the healthcare-seeking for febrile children under five. The concentration curves represent a plot of the cumulative percentage of caregivers seeking care (y-axis) against the cumulative percentage of the households, ranked by the wealth index, beginning with the poorest, and ending with the richest (x-axis) [36].

We compared the concentration curves to the line of equality which is the 45-degree line running from the bottom left-hand corner to the upper right-hand corner, indicating the absence of inequalities in healthcare-seeking between the households ranked in the wealth quintiles. When the percentage of caregivers seeking care takes higher values among poorer households, the concentration curves lie above the line of equality. On the contrary, when it takes lower values among poorer households, the concentration curves lie below the line of equality. The farther the curves are above the line of equality, the more concentrated the health variable is among the poor [36].

## Concentration index

The concentration index estimates the magnitude of wealth-related inequalities in healthcare-seeking. The formula of the concentration index is as follows

$$C = \frac{2}{\mu} cov(h, r),$$

where  $h$  represents healthcare-seeking,  $\mu$  represents its mean,  $r$  is the fractional rank of an individual in the wealth index distribution, and  $cov$  is the covariance between healthcare-seeking and the fractional rank of the wealth index [36]. The concentration index is calculated as twice the area between the curve and the line of equality. The concentration index is bounded between  $-1$  and  $1$ . In absence of wealth-related inequalities, the concentration index is zero. The concentration index takes a negative value when the curve lies above the line of equality, indicating a disproportionate concentration of healthcare-seeking among the poor. It takes a positive value when it lies below the line of equality, indicating a concentration of healthcare-seeking among the richer [36]. QGIS 3.12 software was used to map the concentration indices for healthcare-seeking for children under five at the health district level [37].

## Results

### Descriptive

For the purpose of the present study, 1207 (21.5% of the total of children in 2008), 2815 (23.6% of the total of children in 2013) and 1633 (26.3% of the total of children in 2016) children under five with a history of fever were selected from the 2008, 2013 and 2016 surveys, respectively.

The characteristics of the study participants were described using sociodemographic and healthcare variables, which are summarized in Table 1. In addition, more than 45% of the mothers in the three surveys were aged between 25 and 34 years and were living in the northern region (over 37%). In terms of educational level, the proportion of women without education decreased from 72.5% in 2008 to 68% and 60% in 2013 and 2016, respectively. According to the surveys, most of the women were from rural areas (over 64%) and were Muslims. More than 45% of the children were aged between 12 and 35 months and belonged to families with 6–10 members (over 51%).

Table 1  
Characteristics of the study participants

Characteristics of the population	2008		2013		2016		p-Value
	N	n (%)	N	n (%)	N	n (%)	
<b>PARENTS</b>							
<b>Age of mother (years)</b>	1207		2815		1633		0.012
15–24		362 (28.6)		781 (26.99)		536 (33.45)	
25–34		587 (47.42)		1319 (47.8)		770 (45.63)	
≥ 35		258 (23.98)		715 (25.21)		327 (20.93)	
<b>Number of family members</b>	1207		2815		1633		0.47
1–5		374 (26.88)		834 (30.46)		525 (31.09)	
6–10		651 (56.07)		1504 (51.89)		848 (52.43)	
> 10		182 (17.05)		477 (17.65)		260 (16.48)	
<b>Total number of children born</b>	1207		2815		1633		0.34
1–2		453 (35.72)		916 (31.78)		496 (31.56)	
3–4		378 (30.75)		866 (31.32)		511 (31.87)	
≥ 5		376 (33.53)		1033 (36.9)		626 (36.05)	
<b>Mother's education level</b>	1207		2815		1633		< 0.001
Secondary or higher		188 (13.59)		479 (17.05)		395 (25.51)	
None		829 (72.49)		1926 (68.14)		986 (59.35)	
Primary		190 (13.93)		410 (14.81)		252 (15.14)	
<b>Gender of the household head</b>	1207		2815		1633		0.03
Male		971 (81.41)		2118 (75.97)		369 (22.45)	
Female		236 (18.59)		697 (24.03)		1264 (77.55)	
<b>Age of the household head(years)</b>	1207		2815		1633		0.63
15–24		36 (2.83)		100 (3.65)		53 (3.35)	
25–34		301 (22.91)		669 (23.75)		336 (21.54)	
≥ 35		870 (74.25)		2046 (72.6)		1214 (75.23)	
<b>Wealth index</b>	1207		2815		1633		0.89
Poorest		237 (21.39)		653 (22.87)		444 (22.79)	
Poor		218 (21.28)		571 (21.16)		413 (23.09)	
Middle		246 (21.26)		574 (20.5)		364 (21.75)	
Richer		260 (18.81)		616 (19.88)		271 (19.02)	
Richest		246 (17.26)		401 (15.58)		141 (19.02)	
<b>Region</b>	1207		2815		1633		0.6
East		296 (18.11)		561 (22.18)		346 (24.51)	
North		396 (45.03)		1250 (41.58)		650 (37.77)	
South		282 (20.19)		741 (23.55)		492 (24.89)	
West		233 (16.68)		263 (12.69)		145 (12.82)	
<b>District</b>	1207		2815		1633		0.001
Kailahum		29 (1.76)		176 (7.19)		118 (9.49)	
Kenema		109 (6.11)		195 (10.34)		75 (5.55)	
Kono		158 (10.23)		190 (4.64)		153 (9.47)	
Bombali		41 (4.18)		166 (6.1)		139 (8.91)	

Characteristics of the population	2008	2013	2016	
Kambia	66 (7.32)	283 (6.14)	116(4.56)	
Koinadugu	103 (10.01)	428 (10.65)	147 (6.89)	
Port Loko	95 (11.98)	228 (12.25)	74 (5.38)	
Tonkolili	91 (11.53)	145 (6.43)	174 (12.03)	
Bo	137 (8.8)	227 (9.26)	126 (10.47)	
Bonthe	16 (1.26)	65 (1.82)	86 (2.5)	
Moyamba	79 (4.88)	182 (5.88)	116 (4.96)	
Pujehun	50 (5.25)	268 (6.58)	164 (6.97)	
Western Area Rural	83 (4.67)	103 (1.77)	102 (7.89)	
Western Area Urban	150 (12.01)	160 (10.92)	43 (4.94)	
<b>Place residence</b>	1207	2815	1633	0.89
Urban	437 (27.49)	851 (26.86)	436 (35.12)	
Rural	770 (72.51)	1964 (73.14)	1197 (64.88)	
<b>Religion</b>	1207	2815	1633	< 0.001
Muslim	914 (79.5)	2346 (84.49)	1246 (74.61)	
Christian	278 (19.17)	467 (15.41)	383 (25.22)	
Traditional/other	15 (1.33)	2 (0.09)	4 (0.17)	
<b>CHILDREN</b>				
<b>Gender of the child</b>	1207	2815	1633	0.62
Male	626 (51.39)	1408 (49.54)	832 (50.12)	
Female	581 (48.61)	1407 (50.46)	801 (49.88)	
<b>Age (months)</b>	576	1368	1633	< 0.001
< 12	155 (27.88)	305 (21.76)	335 (20.55)	
12–35	280 (48.34)	613 (45.76)	753 (45.08)	
36–59	141 (23.78)	450 (32.48)	545 (34.38)	
<b>care-seeking</b>	1207	2815	1633	< 0.001
No	578 (49.08)	741 (28.36)	460 (29.65)	
Yes	629 (50.92)	2074 (71.64)	1173 (70.35)	

Figure 1 shows the healthcare-seeking for children under five by the wealth index. Except for children from the richest households, care-seeking was low in the other wealth quintiles in 2008. A subsequent increase in care-seeking was observed globally.

### Socioeconomic inequalities in healthcare-seeking

Healthcare-seeking for children under five with fever increased from 51% in 2008 to 71.6% and 70% in 2013 and 2016, respectively. Figure 2 shows the concentration curves of healthcare-seeking for children under five with fever before (2008) and after (2013 and 2016) the implementation of the FHCI. In 2008, before the initiation of the FHCI, socioeconomic-related inequalities in healthcare-seeking favored the pro-rich households, meaning that care-seeking was concentrated among the wealthy households. With the implementation of the FHCI, the inequalities declined progressively up to the line of equality. An additional 40% of the children from the poor households sought care after the implementation of free healthcare. This is noted from where the concentration curves (in blue and green) of the period after the implementation of the FHCI cross and align on the line of equality. Between 2013 and 2016, there was only a little change in care-seeking, as illustrated by almost superimposable concentration curves. The decrease in socioeconomic-related inequalities is obvious based on the concentration curves, but this does not provide information about the magnitude of said inequalities.

In 2008, the Bonthe, Kailahun, and Tonkolili districts were the places where care-seeking for febrile children favored the poor households. In the Kono, Kenema, Kambia, and Bombali districts, care-seeking was concentrated in the wealthy households (Fig. 3).

In 2013, care-seeking for febrile children was concentrated in the Bo and Western Area Rural districts among the poor households. In the other districts it was in favor of the rich households (Fig. 4).

Figure 5 depicts the wealth-related inequalities in the healthcare-seeking for children under five, stratified by districts in Sierra Leone after the implementation of the FHCI (2016). These results suggest that the inequalities in care-seeking were more concentrated in the Port Loko, Western Area Rural, and Koinadugu districts in favor of the rich households and, on the contrary, were in favor of the poor households in the Western Area Urban district. In the Kono, Bombali, and Kambia districts, equality in healthcare-seeking between the rich and poor households was nearly achieved.

### Concentration index of healthcare-seeking for children under five with fever

To better appreciate the magnitude of the inequalities, we computed the concentration index as reported in Table 2.

The positive concentration index suggests that healthcare was more accessible to the rich households. A decrease in the magnitude of the inequalities was noted after the implementation of the FHCI (2013–2016), as indicated by a 2016 concentration index, close to zero (0.039); however, it remained pro-rich, though not statistically significantly.

Table 2  
The concentration index for healthcare-seeking for children under five by year

Outcome	2008			2013			2016		
	CIn	SE	p-Value	CIn	SE	p-Value	CIn	SE	p-Value
Healthcare-seeking	0.168	0.049	< 0.001	0.061	0.033	0.061	0.039	0.040	0.321
CIn, concentration index;									
SE, standard error.									

## Discussion

Our study showed evidence of wealth-related inequalities in care-seeking for febrile children under five in favor of rich households before and after the implementation of the FHCI. However, these inequalities decreased in favor of poor households following the implementation of the free-of-charge care policy, which increased their access to healthcare services.

The results of this study are consistent with previous studies reporting wealth-related inequalities in favor of wealthy households [28, 35, 38]. Healthcare has a cost for societies [39, 40], and making access to health services possible for everyone remains a major challenge for developing countries. In 2008, healthcare costs were one of the major barriers to accessing healthcare [41], as evidenced by a positive concentration index around 0.168, in favor of wealthy households. With the initiation of free healthcare for pregnant women, lactating mothers, and children under the age of five, we noted a decrease in the inequalities in care-seeking from 0.168 in 2008 to 0.04 in 2016. This could be explained by the reduction of the barrier represented by the costs of care, thereby allowing access to healthcare for a fringe of children under five belonging to poor households. Although a decrease in inequalities in healthcare-seeking for febrile children under five was observed after the implementation of free healthcare, some residual inequalities were still concentrated in poor households.

This could explain the pro-rich inequalities in the use of care before the adoption of free healthcare, and pro-poor after, since the search for healthcare can have direct costs related to transportation to the health center. The density of health workers increased between 2008 and 2016. Indeed, the density of physicians increased from 0.016 to 0.025 per 1000 people, and that of midwives and nurses increased from 0.162 to 0.224 per 1000 people within the same period [42, 43]. This increase in the density of health staff could explain the fact that, in rural areas and some regions, inequalities in healthcare-seeking showed a considerable reduction, which led to a reversal in care-seeking in favor of vulnerable social strata. A reduction in the inequalities in care-seeking was observed in favor of poor households with the initiation of free healthcare. This concentration index in favor of poor households after free healthcare denotes the efforts made to increase the availability of health services. In order to reduce the inequalities in care-seeking at the regional level, as well as at the urban or rural levels, it is important that the interventions aiming to make health services available be implemented and maintained over time. In contrast, other factors remain contributing to the inequalities in care-seeking for children under five years with fever.

In 2008, healthcare-seeking for fever in children under five was more concentrated in four districts (Kambia, Bombali, Kono, and Kenema) in favor of rich households and also concentrated in another three districts (Tonkolili, Kailahun, and Bonthe) in favor of poor households. These disparities in care-seeking could be explained by the unequal availability of health services in these districts. In 2013 and 2016, the districts experiencing a lack of use of health services were reduced. The CIn was between - 0.030 and 0.038 in seven districts, which denotes an increase in the number of districts where health inequalities were reduced compared to 2008, where there were four districts around this value of equality. The increase in the number of health staff and the implementation of the FHCI could explain the reduction in socioeconomic inequalities in care-seeking for fever in children under five between districts.

We acknowledge that, in our study, some factors that may affect care-seeking such as the quality of health services, the availability of supplies, and the differences in sociocultural conception of illness and its etiology, were not taken into account.

Nevertheless, this study presents, for the first-time, knowledge about the factors contributing to the wealth-related inequalities in care-seeking for children under five years in Sierra Leone.

## Conclusion

Our study pointed out that the inequalities in care-seeking in Sierra Leone, which were globally in favor of wealthy households, were reduced in the context of free healthcare. However, some residual inequalities were still observable following the implementation of the FHCI in favor of wealthy households. Households in districts had unequal access to health services depending on their wealth before and after the implementation of the FHCI. Public health programs could be adjusted to better address these drivers so that inequalities in care-seeking for children in Sierra Leone are brought down further.

## List Of Abbreviations

CHC: Community healthcare

CHP: Community health post

CIn: Concentration index

DHS: Demographic and Health Surveys

EAs: Enumeration areas

FHCI: Free Healthcare Initiative

ICF: International Coach Federation

MCHP: Maternal and child health post

PHC: Primary healthcare

PHU: Peripheral health unit

SDGs: Sustainable Development Goals

SE: Standard error

SSA: Sub-Sahara Africa

WHO: World Health Organization

## Declarations

**Ethical approval and consent to participate in the survey:** For the three surveys, the Sierra Leone National Ethics Committee and the International Review Board of the International Coach Federation (ICF) approved the tools to be used and the participants' consent was obtained before data collection. Authorization was given by the DHS Program to access data on <https://dhsprogram.com/data/new-user-registration.cfm>.

**Consent for publication:** Not applicable.

**Availability of data and materials:** The datasets analyzed during the current study are available from the Demographic and Health Surveys program repository and are accessible after written request: <https://dhsprogram.com/data/new-user-registration.cfm>.

**Competing interests:** The authors declare that they have no competing interests.

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**Authors' contributions:** K.S.F. and S.S. contributed to the study conceptualization; K.S.F., O.M., and B.J.D. contributed to developing the study design; B.J.D. analyzed the data and wrote the first draft of the manuscript; K.S.F., S.S., H.T., and C.V.M. contributed to the intellectual content of the manuscript. All authors read and approved the final version of the manuscript.

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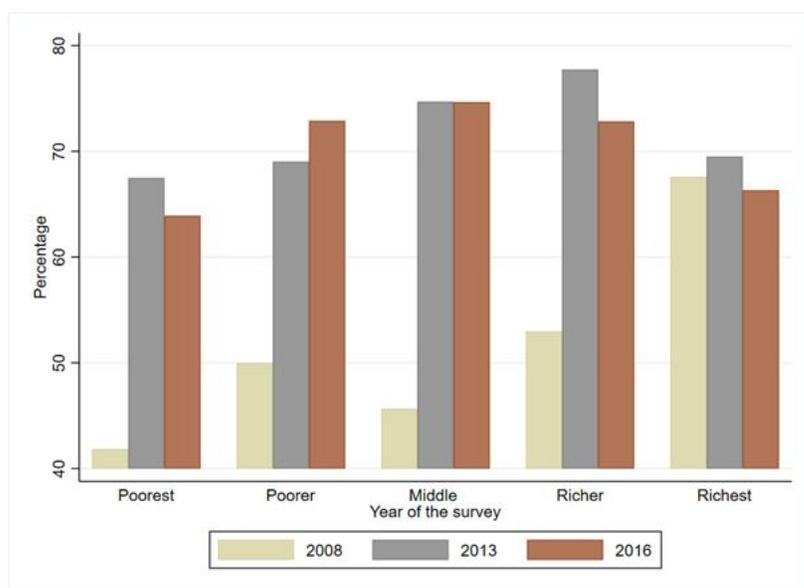
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## Figures



**Figure 1**

Distribution of health care-seeking for children under five by wealth index and by year.

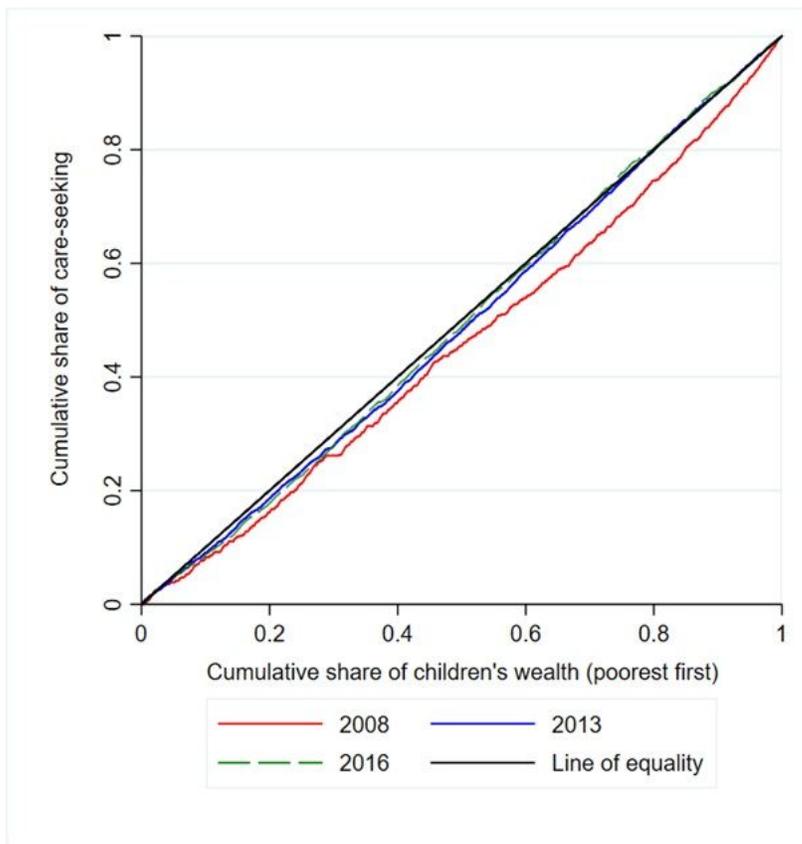


Figure 2

Concentration curves for healthcare-seeking for children under five.

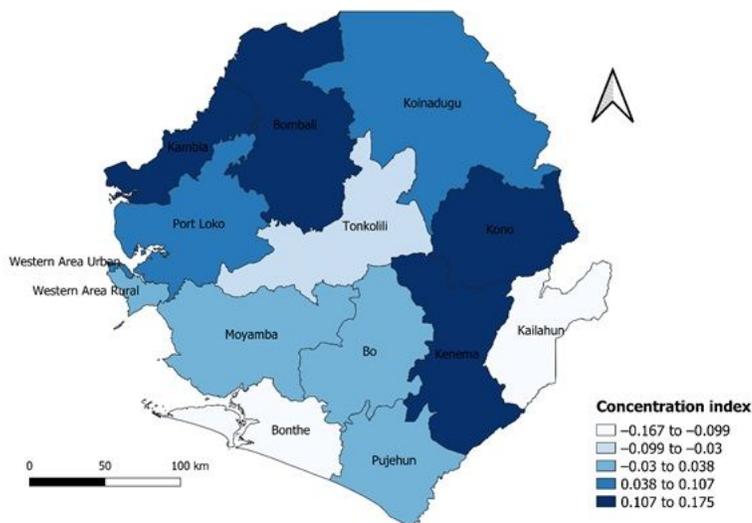


Figure 3

Map of the wealth-related inequalities in healthcare-seeking by district in 2008.

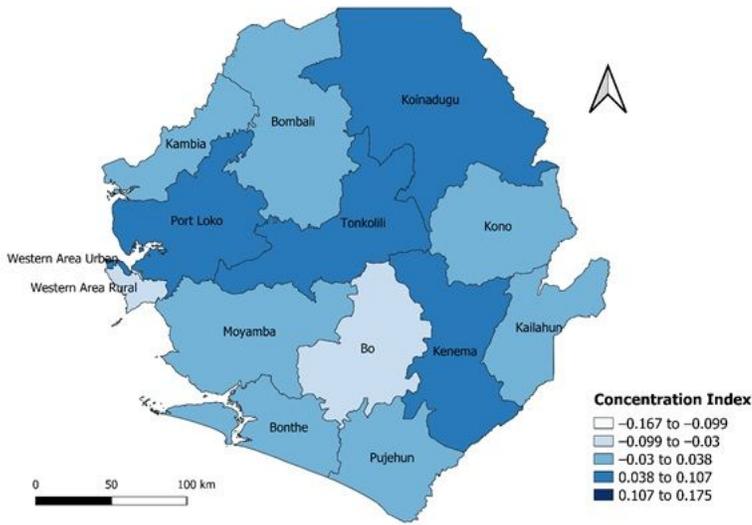


Figure 4  
Map of the wealth-related inequalities in healthcare-seeking by district in 2013.

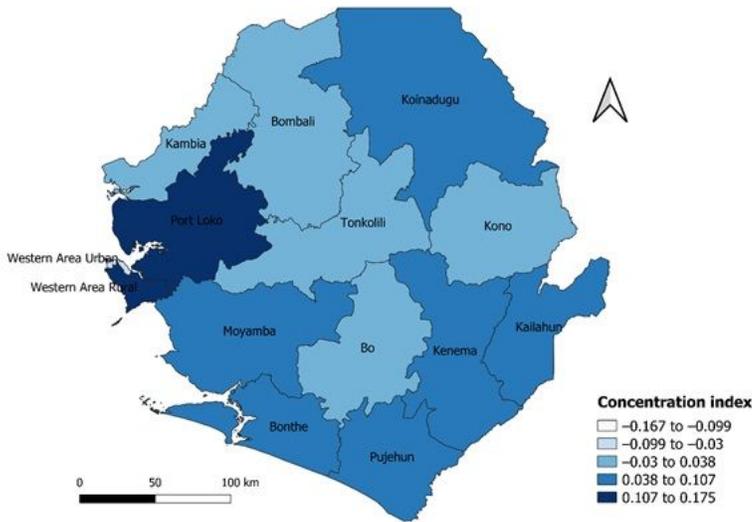


Figure 5  
Map of the wealth-related inequalities in healthcare-seeking by district in 2016.