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Healthcare utilization for self-reported fever in Ghana: cross sectional study

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Dedication

To all of you, that motivate me to be here, for supporting me with good wishes, for making me feel that distance does not exist.

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I am particularly thankful to my supervisors Dr. Florian Marks and Dr. Marianne Holm for their priceless contributions, motivation and guidance without which the work would not have been completed.

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Abstract

Background. "Healthcare utilization" is defined as the quantification of use of health services by people for any cause; this concept goes beyond "access" where services are in place whether people use it or not. Large variations in healthcare utilization between and within countries have been associated with features such as household income, education, health insurance, quality of services, living in an urban or rural place and seasonality, but also with underlying chronic or acute illness. Patterns of healthcare utilization can be a powerful instrument to adjust estimations of incidence of diseases in places where sentinel surveillance is the main mechanism of investigation and could face bias due to underestimations when people do not seek for care with qualified professionals. Understanding the factors that influence people to use healthcare services for self-reported fever can help developing strategies to break barriers to utilization. The main objective of this thesis was to describe healthcare utilization for self-reported fever in two different settings (Agogo and Kumasi) and seasons (wet and dry) in Ghana, as well as to explore any association between demographic variables and healthcare utilization.

Methods. Using data from The Health Population Africa (HPAfrica) study that collected data from 2,340 randomly selected households from two different settings (Agogo and Kumasi) in Ghana between May 2017 and January 2019. Self-reported fever was the symptom chosen to evaluate actual and generic health seeking behavior. A descriptive analysis of sociodemographic variables of 360 households were reported fever during last

three months and bivariate logistic regression analyses were used to assess the association between household income, education and geographical location (urban and rural) and healthcare utilization.

Results. Households with fever episodes during last 3 months reported healthcare utilization as follow: a total of 45.2% chose 'other healthcare facility', in 33.1% of cases people chose to visit a 'pharmacy', 'SETA-HCF' (Severe Typhoid Fever in Africa Program-healthcare facilities) were consulted by 12.2%, households that did 'not seek for care' was 5.8%, 'physicians' were consulted in 2.2% of cases and 'traditional healers' were the option for 1.1% of households. About 80% of households that reported typhoid fever visited a 'healthcare facility'. People that seek healthcare from alternative non-qualified healthcare personnel represent 40.2%. Statistically significant association between geographical location and healthcare utilization was seen with people living in urban areas showing lower likelihood of seeking appropriate healthcare for fever during wet season (OR = 0.46, 95% confidence interval 0.22 to 0.93).

Conclusion. Despite considerable efforts to increase access and strengthen health services at community level in Ghana in recent years, still almost half (40.2%) of people are visiting non-qualified health personnel, indicating a need for improvement. Lower likelihood of appropriate healthcare seeking behavior in urban areas during wet season could be potentially explained by higher concentration of healthcare facilities in rural areas when it is comprised with population concentration but, further research with larger samples and more robust assessments of fever episodes are needed to better establish these associations.

Preface

The present oeuvre attempts to be the beginning of a series of further analysis. Estimating healthcare utilization or healthcare seeking behavior can be used to adjust estimations of disease burden conducted through passive surveillance.

Extrapolation of healthcare utilization from one population to another, between or within countries can be challenging since small changes in access to healthcare or sociodemographic features strongly affects people's perception and behavior. Here, we provide an overview of factors affecting healthcare utilization, particularly in developing countries, and targeting infectious diseases and self-reported fever.

Then we describe our study design and sample selection to continue with a descriptive and bivariate logistic regression analysis.

Finally, conclusions and recommendations are provided for future research.

INTRODUCTION

Background

Evaluation of healthcare utilization or healthcare seeking behavior (used interchangeably in this work) has previously been measured using hospital or healthcare facilities reports, but several other options, including seeking advice from non-licensed health providers such as, traditional healers and religious leaders or directly consulting in pharmacies or not seeking healthcare at all cannot be captured in this way. Since it is difficult to surveil all these, disease burden often underestimated given the lack of information of barriers in access to health system.

Therefore, surveys at community level are important to determine health care seeking behavior, as well as understanding which factors affect people's choice to seek care or not. These potentially include sociodemographic characteristics that restrict or enable first contact with qualified providers.

Cross-sectional research is the most common approach in developing countries but studies show large variation among and within countries and results from other countries are difficult to extrapolate because small differences in health systems or health determinants can have a strong influence on utilization.

Demographic variables such as education, living in urban or rural area or income could provide us with the ability to distinguish variations in health seeking behavior between different groups of people within the same community, which is key to understand

particular barriers to utilization that people faces and furthermore, represents a first step in analysis to inform better policies to improve use and distribution of resources.

Severe Typhoid Fever in Africa (SETA) program was designed to investigate healthcare facility (HCF)-based Typhoid fever surveillance in Burkina Faso, the Democratic Republic of the Congo, Ethiopia, Ghana, Madagascar and Nigeria. Data analyzed in this work was performed using information of the Health Population Africa (HPA) study, that was the associated activity to determine healthcare utilization to allow incidence estimates of the SETA program to be adjusted (Pak et al., 2018). Knowing the real burden of typhoid fever in developing countries can help health authorities make decisions whether to implement typhoid fever vaccination while potentially targeting groups with the highest risk and lower rates of utilization of health services.

The work presented here tries to describe the healthcare seeking behavior in the Ghanaian study sites by determining the proportion of appropriate healthcare seeking behavior and by exploring which main features are associated with appropriate healthcare utilization for self-reported fever.

Objectives

Primary objective:

1. Describe, analyze and compare healthcare utilization in two different settings in urban and rural Ghana to:

- Estimate the proportion of the population who seek healthcare
- Estimate the proportion of the population who seek healthcare for typhoid fever at a SETA clinic

Secondary objectives:

- Explain which demographic characteristics are those that influence more healthcare utilization or healthcare seeking behavior.

Hypothesis

It was hypothesized that higher rates of healthcare utilization could be explained by higher income, higher education and living in urban areas.

SUMMARY OF LITERATURE

Infectious diseases

In 2017, infectious diseases represented 8.0% of total deaths globally, in low SDI (sociodemographic index) countries this number was 18.6%, while in high SDI countries this number was 1.5% of total deaths (Institute of Health Metrics and Evaluation, 2017).

According to the Institute for Health Metrics and Evaluation (IHME) website, the situation in Ghana has been changing from communicable diseases and maternal, neonatal and nutritional problems to non-communicable diseases as leading causes of death since 1990. By that time, diarrheal diseases were the cause of 10.2% of deaths and by 2017 this number drop to 3.6%. Malaria had almost no improvement causing 10.1% of deaths in 1990 to

9.3% in 2017 and remain as number one cause of death. On the other hand, HIV/AIDS deaths increased from 3.3% to 6.7%. By 2017, infectious diseases represent five out of ten leading causes of deaths in Ghana (malaria, lower respiratory infections, HIV/AIDS, Tuberculosis and diarrheal diseases) (Institute of Health Metrics and Evaluation, 2017).

About 90% of diarrheal diseases occurred in sub-Saharan Africa and South Asia (Kotloff, 2017). Food-borne diseases caused 33 million Disability-Adjusted Life Year (DALY) in 2010 and 420000 deaths. A total of 40.0% of its burden was among children under five years of age and main agents were Norovirus, *Campylobacter spp.*, *Non-typhoidal Salmonella enterica*, *Salmonella* Typhi, *Taenia solium*, Hepatitis A virus and aflatoxin (Havelaar et al., 2015).

Halting high burden infectious diseases using preventive measures such as vaccines and water, sanitation and hygiene (WASH) measures against typhoid fever can help not only to increase available resources allocated to stop rapid increase in chronic diseases, but also to improve children's health status which in turn would lead to a lower risk of chronic diseases in the future (Bygbjerg, 2012).

Some measures could help overcome such problems where an infectious disease facilitates the emergence of a chronic disease *or vice versa*, for instance encouraging breastfeeding was shown to reduce malnutrition and infectious diseases, as well as, screening diabetic patients for tuberculosis symptoms is recommended given the intimate association between both diseases. (Bygbjerg, 2012). The Ghanaian authorities have seen that resources are

unevenly divided between communicable and non-communicable diseases. Findings show that at least 78.0% of Ghana's healthcare facilities had recommended drugs for malaria in stock, while less than 35.0% had essential diabetes and hypertension drugs (Kushitor & Boatemaa, 2018).

Focusing on typhoid fever, it was described that *Salmonella enterica spp. I* is a Gram-negative species that can be divided into typhoidal and non-typhoidal serovars; while typhoidal serovars (Typhi, Sendai, Paratyphi *A*, *B* and *C*) exclusive reservoir is the human host, non-typhoidal *Salmonella* (NTS) has less host specificity (Gal-Mor, Boyle, & Grassl, 2014). Typhoidal serovars cause enteric fever which is an invasive, systemic disease, endemic in low-middle income countries (LMIC), whereas non-typhoidal *Salmonella* causes gastroenteritis and it is spread all over the world and although it causes a larger number of infections, mortality is lower but highly concentrated in LMIC (Gal-Mor et al., 2014). Nowadays, vaccines for humans are only available for typhoidal *Salmonella* and are divided into three groups: live attenuated oral vaccine (Ty21a), parenteral unconjugated Vi polysaccharide capsule-based vaccine (ViPS) and parenteral typhoid conjugate vaccine (TCV) (Park et al., 2019).

Typhoid fever burden was underestimated for a long time in African countries. The challenges in typhoid fever surveillance resulted in inaccurate few reports from this continent in the past century (John A. Crump & Stephen P. Luby, 2004). A few years later Mweu E. reviewed published data from African countries and despite the use of passive case detection and insensitivity of blood culture, the authors reported higher incidence in

urban, rather than rural settings, this was attributed mainly to extensive slum areas with poor access to water and sanitation. Thus improving the surveillance system was recommended to be prioritized in Africa (Mweu & English, 2008).

In 2012, a population-based incidence report published from Kenya suggested that bacteremia in urban areas was 247 cases per 100,000 person-year of observation (PYO) and in rural areas 29 cases per 100000 pyo, as is the case of Asian countries (Breiman et al., 2012).

A study that evaluated incidence of invasive *Salmonella* disease (typhoidal and invasive non-typhoidal *Salmonella* disease) in 10 sub-Saharan African countries found that *Salmonella* was one of the leading pathogens isolated from patients with invasive bacterial febrile illness in both urban and rural areas, affecting more children than adults (Marks et al., 2017). Ghana showed a higher incidence in children living in rural areas. The adjusted incidence rate for *S.* Typhi was as high as 383 per 100,000 PYO and for invasive non-typhoidal *Salmonella* (iNTS) disease it reached 237 per 100,000 PYO in one of the Burkina Faso sites (Marks et al., 2017). Another study conducted in Malawi and South Africa found gender differences; younger women were more likely to get iNTS disease than men, the main risk factor associated with iNTS disease was HIV infection which is consistent with a HIV prevalence 3 fold higher in women 15-24 years of age than men (Feasey et al., 2010).

Surveillance of infectious diseases is usually facility-based or sentinel, but it fails capturing those cases that do not use hospitals (Deutscher et al., 2012). Moreover, estimation of

disease burden should be done in the context of healthcare utilization patterns (Wong et al., 2018). In Azerbaijan, low utilization of hospitals and clinics for treating infectious syndromes contrast with high use of over-the-counter antibiotics (Clark et al., 2011).

Healthcare utilization and access

According to Carrasquillo O., healthcare utilization is defined as "the quantification or description of the use of services by persons for the purpose of preventing and curing health problems, promoting maintenance of health and wellbeing, or obtaining information about one's health status and prognosis" (Carrasquillo, 2013). On the other hand, access to health services means to be able to use health services no matter whether people exercise it or not (Saito et al., 2016). As explained later in this section access to health services plays a key role for healthcare utilization then, health authorities must design a system culturally appropriate, strategically located, covering each population health necessities and ensure affordability.

As health care utilization varies widely between each sociodemographic segment, results of similar surveys are often simplified to better suit policy making strategies, sometimes in detriment to the accuracy of the results (Biehl, 2016).

Factors influencing healthcare utilization are diverse and some models have been developed to try to understand healthcare seeking behavior such as a) a psychological model based on social structure and individual medical orientation, b) the health belief model based on the various perceptions and motivations of the individual and c) utility

driven healthcare seeking decision steps model (Pushpalata & K.B., 2017). A cross-sectional study performed in Vietnam shows that healthcare seeking behavior among adults is significantly associated with age, gender, marital status, education, health insurance coverage, income, region, number of household members with any disease and having children under six (Sepehri, Moshiri, Simpson, & Sarma, 2008).

Although governments in developing countries pursue nationwide undertakings to expand free health services, utilization is still low among the poorest, those who live in isolated areas and minorities, increasing wealth gaps in societies. Cases about healthcare inequalities are well documented, such as in Vietnam, where people requiring healthcare services are the poor and underprivileged yet, services are mainly used mainly by the richest which also constituted the wealthiest group in slum areas (Duy Kien, Van Minh, Bao Giang, Weinehall, & Ng, 2014). Free health services do not guarantee improvements in utilization among the poorest as evident in Nepal (Saito et al., 2016), and tackling underlying reasons for using health services or not, go beyond only increasing government budget or total health expenditure on health, but still out-of-pocket payments are considered one of the main barriers for access.

In Bangladesh, the government and non-governmental organizations (NGOs) put efforts to introduce health services in rural areas with the purpose of eliminating inequalities and making essential services available for women and children. However, when disaggregating information by income, those women and children in the lower wealth quintile had the lowest levels of healthcare utilization also, when data was controlled for

immunization and vitamin A consumption, the difference in healthcare utilization was minimal. (Amin, Shah, & Becker, 2010). The case of Bangladesh suggests that expanding health programs to rural areas, often the home of the poorer population, also requires to specifically target the poorest among the poor, to ensure achieving the goal equality in access to healthcare.

Education and income always ranks high when speaking about inequalities, not only health. People faces inequalities in every country but a comparison performed between high-income countries (Sweden, Italy and Norway vs Estonia, Hungary, Romania, Bulgaria and Poland) shows that people with university education have similar life expectancy because people with tertiary education know "how to get good health"(Marmot, 2017). Applicability of this evidence could be somehow limited for low-income countries nonetheless suggest the importance of education in healthcare utilization.

Belonging to a minority group can negatively influence the ability to seek for care and, hence, healthcare utilization. The perceived discrimination among African-American residents in the United States was the main cause that lead to use of alternative instead of conventional healthcare (Bazargan et al., 2005). Considering that minorities are found in all countries, public policies to improve healthcare utilization must consider more vulnerable groups a priority.

Health insurance also plays a major role in health seeking behavior. In Tanzania, a comparison was conducted between people covered through the Community Health Fund

(CHF) which is voluntary and focuses on rural population, and people covered through the National Health Insurance Fund (NHIF) which is compulsory for public sector employees, and people devoid of both schemes. It was found that people with health insurance are more likely to seek for care which reduces delays compared to non-members; however, NHIF members tend to live closer to health facilities and have a wider choice of providers which could explain higher healthcare utilization in this group (Chomi, Mujinja, Enemark, Hansen, & Kiwara, 2014).

Health indicators in Ghana

Healthcare utilization is often based on people's perception of health system performance (quality and access). Based on Global Burden of Disease (GBD) data from 2016, Ghana's health system performance ranked 153 out of 195 countries, with a Health Access and Quality (HAQ) Index of 39.3/100, located in the third decile (Fullman et al., 2018). Access is different from healthcare utilization, but analysis of access could reveal some clues to determine and prioritize areas for improvement.

With a population of almost 30 million people and 28.6% of its population living with less than 1.25 USD per day, Ghana's health system is challenging due to all difficulties that people face to access to healthcare. Ghana's GDP was 47.33 billion dollars in 2017 and only 4.4% was targeted towards healthcare, although big efforts to increase population covered by health insurance, out-of-pocket payments represent 37.8% of total health expenditures (Table 1).

Despite a low number of qualified health personnel (0.096 physicians per 1,000 population and 0.926 nurses and midwives per 1,000 population) utilization of preventive services such as antenatal visits and immunization coverage is high (89.3% pregnant women have at least four antenatal visits and DPT3 coverage reached 99.0%).

Table 1
Ghana's Health Indicators

Category	Indicator	Value
Demography	Population (in thousands; all ages; 2018)	29,767
	Population <15 y (%; 2018)	38.3
	Population >65 y (%; 2018)	3.3
	Life expectancy at birth (both sexes; 2017)	63
Socioeconomics	HDI rank (2018)	140
	HDI value (2018)	0.592
	Population living below $1.25 per day (%; both sexes; all ages; 2006)	28.6
	Poverty headcount ratio at $1.90 a day (2011 PPP; % of population; 2016)	13.3
	Underweight children <5 y (%; both sexes; 2014)	11
	Literacy rate among adults (%; ≥15 y; both sexes; 2010)	71
	People using safely managed drinking water services (%; both sexes; all ages; 2015)	26.8
	People using at least basic sanitation services (%; both sexes; all ages; 2015)	14.28
Communicable diseases	Prevalence of HIV, total (% of population ages 15-49; both sexes; 2017)	1.7
	Adults (ages 15+) and children (ages 0-14) newly infected with HIV (2017)	19,000
	Incidence of malaria (per 1,000 population at risk; 2017)	270.7

Table 1 continued.

Category	Indicator	Value
	Incidence of tuberculosis (per 100,000 people; 2017)	152
Mortality	Neonatal mortality rate (per 1000 live births; both sexes; 2017)	24.2
	Under-5 mortality rate (per 1000 live births; both sexes; 2017)	49.3
	Maternal mortality ratio (modeled estimate; per 100,000 live births; 2015)	319
	Deaths due to HIV/AIDS (per 100000 population; both sexes; all ages; 2012)	46
	Malaria – number of reported deaths (2015)	2,137
Healthcare infrastructure	Hospital beds density (per 10000 population; both sexes; all ages; 2011)	9
	Hospital density (per 100000 population; both sexes; all ages; 2014)	0.45
	Density of healthcare centers and health post (per 10000 population; both sexes; all ages; 2014)	5.1
	Physician density (per 1000 population; both sexes; all ages; 2010)	0.096
	Density of nurses and midwives (per 1000 population; both sexes; all ages; 2010)	0.926
	Density of pharmaceutical personnel (per 1000 population; both sexes; all ages; 2008)	0.071
	Density of community and traditional health workers (per 1000 population; both sexes; all ages; 2013)	0.35
	HIV/AIDS testing and counseling facilities (per 100000 adult population; both sexes; 2014)	10
Healthcare utilization	Antenatal care coverage (%; at least four visits; 2017)	89.3
	Measles immunization coverage second dose (%; both sexes; 2017)	83
	DPT3 immunization coverage (%; both sexes; 2017)	99

Table 1 continued.

Category	Indicator	Value
	HepB3 immunization coverage (%; both sexes; 2017)	99
	Hib3 immunization coverage (%; both sexes; 2017)	99
	Febrile children received antimalarial treatment (%; both sexes; <5y; 2014)	48.5
	Estimated ART coverage (%; both sexes; all ages; 2016)	34 [28-42]
	Tuberculosis case detection rate (%; all forms; both sexes; all ages; 2017)	32
	Tuberculosis treatment success rate (% of new cases; both sexes; all ages; 2016)	85
Healthcare expenditures	General government expenditure on health as a percentage of total expenditure on health (%; both sexes; all ages; 2016)	38.3
	Private expenditure on health as a percentage of total expenditure on health (%; both sexes; all ages; 2016)	61.7
	Out of pocket expenditure as a percentage of total expenditure on health (%; both sexes; all ages; 2016)	37.8
	Private prepaid plans as a percentage of private expenditure on health (%; both sexes; all ages; 2012)	6.3
	Total expenditure on health as a percentage of GDP (%; both sexes; all ages; 2016)	4.4

Note. HDI= Human Development Index; HIV= Human Immunodeficiency Virus; AIDS= Acquired Immunodeficiency Syndrome; ART= Antiretroviral Therapy; GDP=Gross Domestic Product.
Source. (World Bank Group, 2019); (World Health Organization, 2019); (United Nations Development Programme, 2017); (United Nations, 2019).

METHODS

Study design and data collection

A cross sectional survey of 2,340 households randomly selected from two different settings in Ghana was carried out, spanning almost two years from May 2017 to January 2019. The information of 9,344 people living in the household of all ages was collected. Respondents were asked about health seeking behavior and social determinants of health (income, education and urban-rural location were considered in the present work). Interviews were conducted in two different areas in Asanti Region (Agogo area and Kumasi Metropolitan area) and repeated in two different seasons (wet and dry) to assess seasonal influence on health seeking behavior. Ghana's wet season is from April-July and September-November and dry season is from December-March (Pak et al., 2018). The first survey at the Agogo area was completed from June to July 2017 that correspond to wet season and the second survey took place during January 2018 (dry season). At the Kumasi metropolitan area, the first survey was developed during July 2018 (wet season), and the second during January 2019 (wet season).

The respondent was considered any adult household member at legal age. A household is defined as "a person or group of related or unrelated person living in the same dwelling unit, acknowledging one adult individual as the household head, sharing the same housekeeping arrangements and independently procuring food and other essentials for living"(Pak et al., 2018).

Inclusion criteria were all household members of all ages and gender living in the study area at the day of interview. Exclusion criteria were if respondent declined to participate or was unavailable after three consecutive visits (Pak et al., 2018).

Consent and study forms were translated into country official language. Interviews were conducted by trained personnel.

Sample Selection

Sample size was determined with 0.05 confidence interval. To calculate the sample size, the latest demographic information from census summary data was used. All *strata* or substrata from subsites (smallest administrative unit as published by the census) within a site were included. A household was considered the primary sampling unit (Pak et al., 2018).

Computerized selection of households was done (when sampling frame exist) using SAS (V.9.4, SAS Institute, Cary, North Carolina, USA) applying serial simple random sampling without replacement weighted by strata population proportion. In failed cases, interviewers were instructed to conduct the survey in the nearest household to the left or right side. When sampling frame did not exist, a stratified spatial sampling technique weighted by the strata population proportion was applied (Pak et al., 2018).

For the exploratory bivariate logistic regression analysis, a smaller sample was selected as follows. Out of 2,340 households, 367 reported fever episodes during last three months but only 360 reported their healthcare seeking behavior. Of these respondents, 10 people with

missing information on education status were excluded, so its respective data was omitted from subsequent analysis. Head household income was not reported in 27 cases and was included as a separate "missing" category. Finally, to avoid repeating sampling, it was divided into: first survey (n=197) conducted during wet season and second survey (n=153) that was performed during dry season (Figure 1).

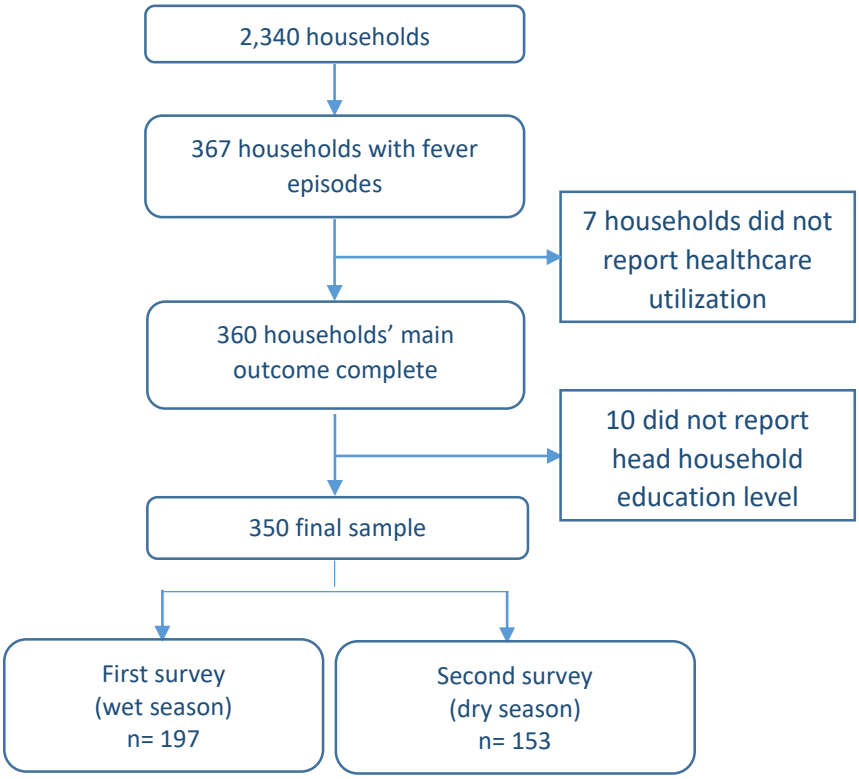

Figure 1 Sample selection for bivariate logistic regression analysis
Source. Health Population Africa (HPAfrica) study, Ghana survey (2017-2019)

Data Analysis

A descriptive analysis of sociodemographic variables for self-reported fever was done using absolute and relative frequencies as well as means, it was used as baseline for further investigation. Descriptive statistics was performed to provide an overview and summary of current data situation.

Bivariate logistic regression analysis was executed as an additional explorative question to test if and which factors are most strongly associated with healthcare seeking behavior. It was performed using 'healthcare facility chosen for fever episodes' as dependent variable, divided into six categories initially (SETA-HCF, other HCF, physician, pharmacy, traditional healer and nowhere/nothing/self-treatment) and transformed into two categories as follows: appropriate health seeking behavior include those people that visited qualified health professionals (SETA-HCF, other HCF and physician) and inappropriate health seeking behavior for those that chose pharmacies, traditional healers and nowhere/nothing/self-treatment.

Dependent variables included: head household income, head household education and geographical location (living in urban or rural areas). Other variables that could have some influence in healthcare utilization, such as ethnicity and availability of health insurance, were not possible to analyze due to its stratification by age and sex and hence too low power in substrata.

Statistical software used was IBM SPSS Statistics 23.0 - August 2014, the level of statistical significance was set at 0.05.

RESULTS

Descriptive analysis

A total number of 2,340 households were interviewed in Ashanti Region. Table 2 and 3 are divided to show Agogo and Kumasi situation during wet and dry seasons. Majority of respondents were women in both locations. They were asked for number of household members by age, head household highest level of education and his/her monthly income.

Table 2
Household's Characteristics

	Wet season		Dry season	
	Agogo N°(%)	Kumasi N°(%)	Agogo N°(%)	Kumasi N°(%)
# Of household interviewed	601 (25.7)	584 (24.9)	601 (25.7)	554 (23.7)
Respondent sex				
Male	181 (30.1)	186 (31.8)	176 (29.3)	172 (31.0)
Female	400 (66.6)	394 (67.5)	418 (69.6)	381 (68.8)
N/A	20 (3.3)	4 (0.7)	7 (1.2)	1 (0.2)
Respondent age Mean (SD)	42.58 (17.4)	38.20 (15.8)	43.63 (17.8)	40.54 (16.2)
# House members by age groups				
<2y	108 (4.2)	84 (3.7)	116 (4.8)	55 (2.2)
≥2y to <5y	226 (8.8)	162 (7.2)	162 (6.7)	155 (7.4)
≥5y to <15y	624 (24.2)	466 (20.7)	619 (25.6)	486 (23.1)
≥15y	1,621 (62.9)	1,536 (68.3)	1,518 (62.9)	1,406 (66.9)
Head of household education				
No education	103 (17.1)	73 (12.5)	134 (22.3)	75 (13.5)

Table 2 continued.

	Wet season		Dry season	
	Agogo N°(%)	Kumasi N°(%)	Agogo N°(%)	Kumasi N°(%)
Primary school	321 (53.4)	218 (37.3)	296 (49.3)	245 (44.2)
Secondary school	81 (13.5)	127 (21.7)	78 (13.0)	130 (23.5)
Higher than secondary school	77 (12.8)	134 (22.9)	74 (12.3)	93 (16.8)
N/A	19 (3.2)	32 (5.5)	19 (3.2)	11 (2.0)
Head of household monthly income				
No income	88 (14.6)	89 (15.2)	56 (9.3)	46 (8.3)
<150 USD	284 (47.3)	262 (44.9)	304 (50.6)	350 (63.2)
≥150 to <250 USD	90 (15.0)	74 (12.7)	46 (7.7)	30 (5.4)
≥250 USD	56 (9.3)	28 (4.8)	24 (4.0)	9 (1.6)
N/A	83 (13.8)	131 (22.4)	171 (28.5)	119 (21.5)

Note. N/A= no answer, USD= United States Dollars.
Source. Health Population Africa (HPAfrica) study, Ghana survey (2017-2019)

Assessment of health seeking behaviors: Respondents were asked for fever episodes during previous three months (Table 3) and where they sought for care (actual health behavior/ primary measure of outcome). The total number of people that answer both questions was 360. Households reporting fever episodes seems to be higher during wet season (203) than dry season (157). The most visited place was ‘other healthcare facility’ for 45.6% households. In 33.1% of cases people chose to visit a pharmacy. Sentinel hospitals (SETA-HCF) were consulted for 12.2% of fever episodes. Households that did not seek for care was 5.8%. Physicians were consulted in 2.2% of cases. Finally, traditional healers were the option for 1.1% of households (Figure 2).

Table 3
Healthcare Utilization for Fever During Last 3 Months

	Wet season		Dry season		
	Agogo N°(%)	Kumasi N°(%)	Agogo N°(%)	Kumasi N°(%)	TOTAL
SETA-HCF	16 (13.6)	3 (3.5)	22 (24.2)	3 (4.5)	44 (12.2)
Other HCF	52 (44.1)	48 (56.5)	36 (39.6)	28 (42.4)	164 (45.6)
Physician	5 (4.2)	2 (2.4)	0 (0.0)	1 (1.5)	8 (2.2)
Pharmacy	35 (29.7)	27 (31.8)	28 (30.8)	29 (43.9)	119 (33.1)
Traditional healer	1 (0.8)	1 (1.2)	1 (1.1)	1 (1.5)	4 (1.1)
Nowhere/ nothing/ self-treatment	9 (7.6)	4 (4.7)	4 (4.4)	4 (6.1)	21 (5.8)
Total	**118 (100)**	**85 (100)**	**91 (100)**	**66 (100)**	**360 (100)**

Note. SETA= Severe Typhoid Fever in Africa Program, HCF= healthcare facilities.
Source. Health Population Africa (HPAfrica) study, Ghana survey (2017-2019)

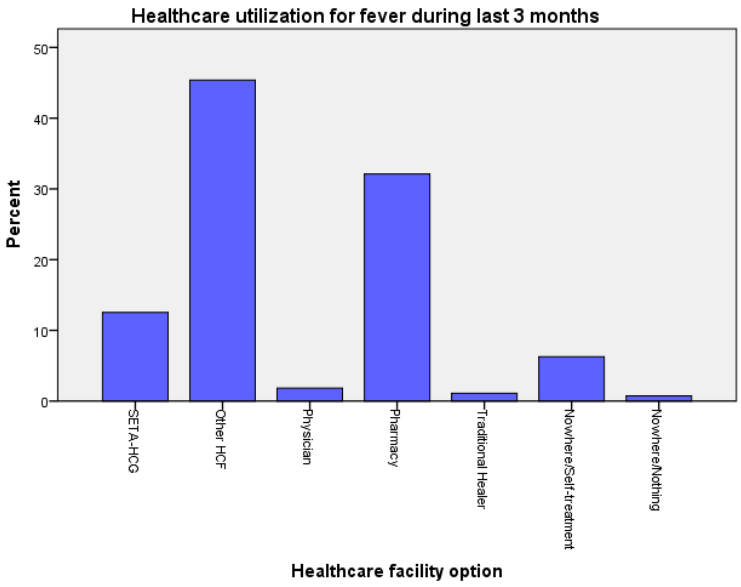

Figure 2 Healthcare utilization for fever during last 3 months
Source. Health Population Africa (HPAfrica) study, Ghana survey (2017-2019)

Table 4 provides an analysis of actual health seeking behavior in the context of typhoid fever. Respondents were asked for episodes of typhoid fever in the household, the diagnostic test used and the healthcare facility chosen. Out of 2,340 households interviewed 153 (6.5%) reported at least one episode of typhoid fever. Agogo area showed had higher case number during the wet season, Widal test was used as diagnostic test in 86.1% of cases and 81.0% chose appropriate healthcare providers as point of care.

Table 4
Household Diagnosed with Typhoid Fever Last 3 Months

	Wet season		Dry season	
	Agogo N°(%)	Kumasi N°(%)	Agogo N°(%)	Kumasi N°(%)
Diagnostic test				
Blood culture	2/79 (2.5)	12/25 (48.0)	5/22 (22.7)	8/22 (36.4)
Stool culture	0/79 (0.0)	0/25 (0.0)	0/22 (0.0)	1/22 (4.5)
Blood/Widal test	68/79 (86.1)	8/25 (32.0)	8/22 (36.4)	6/22 (27.3)
Other	1/79 (1.3)	0/25 (0.0)	1/22 (4.5)	1/22 (4.5)
Don't know, no response	8/79 (10.1)	5/25 (20.0)	8/22 (36.4)	6/22 (27.3)
Place				
Healthcare facility	64/79 (81.0)	21/25 (84.0)	17/22 (77.3)	17/22 (77.3)
Physician	4/79 (5.1)	1/25 (4.0)	0/22 (0.0)	1/22 (4.5)
Pharmacy	4/79 (5.1)	2/25 (8.0)	2/22 (9.1)	3/22 (13.6)
Traditional healer	1/79 (1.3)	1/25 (4.0)	0/22 (0.0)	1/22 (4.5)
Nowhere	1/79 (1.3)	0/25 (0.0)	1/22 (4.5)	0/22 (0.0)
Other	3/79 (3.8)	0/25 (0.0)	1/22 (4.5)	0/22 (0.0)
Don't know/no response	2/79 (2.5)	0/25 (0.0)	1/22 (4.5)	0/27 (0.0)
Total	**79 (100)**	**25 (100)**	**22 (100)**	**27 (100)**

Source. Health Population Africa (HPAfrica) study, Ghana survey (2017-2019)

Differentiation between SETA healthcare facility and Other healthcare facility was not done in this question. 82.1% of population with diagnostic of typhoid fever sought for care in any healthcare facility. Pharmacies was the place chosen by 7.6% of population diagnosed with typhoid fever (Figure 3).

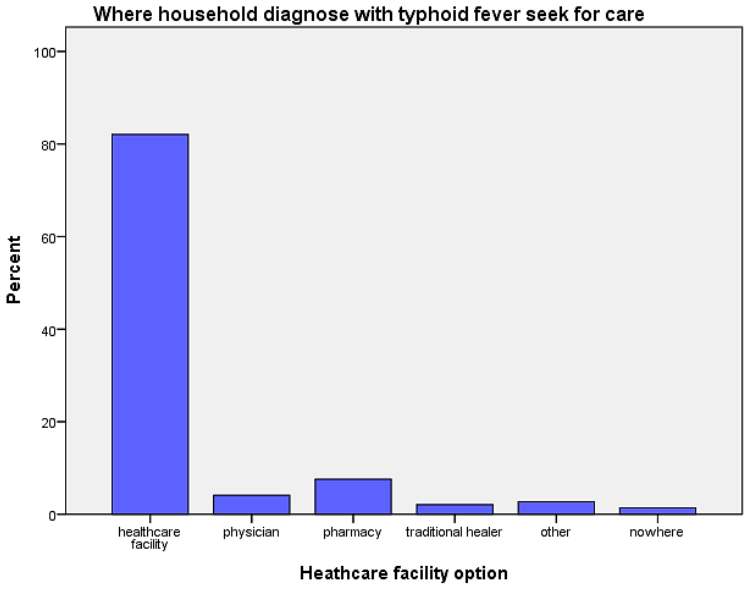

Figure 3 Healthcare facility used by people diagnosed with typhoid fever
Source. Health Population Africa (HPAfrica) study, Ghana survey (2017-2019)

Generic health behavior is the second way to measure outcome. Here, people answer what would do in case of fever. Out of 2340 households interviewed, 1239 ranked as first choose for any fever one out of eight options, being other healthcare facility the first option for 461 (37.2%) households. SETA healthcare facility was chosen for only 4 (0.3%) households.

Table 5
Health Seeking Behavior for Fever at any Time

	Frequency	%
SETA HCF	4	0.3
Other HCF	461	37.2
Physician	5	0.4
Pharmacy	271	21.9
Traditional healer	4	0.3
Nowhere, Self-treatment	188	15.2
Nowhere, Nothing	8	0.6
Don´t know	298	24.1

Source. Health Population Africa (HPAfrica) study, Ghana survey (2017-2019)

Figure 4 have been ordered by frequency. Other healthcare facility, Don´t know, Pharmacy and nowhere (self-treatment) represents 98.4% of cases.

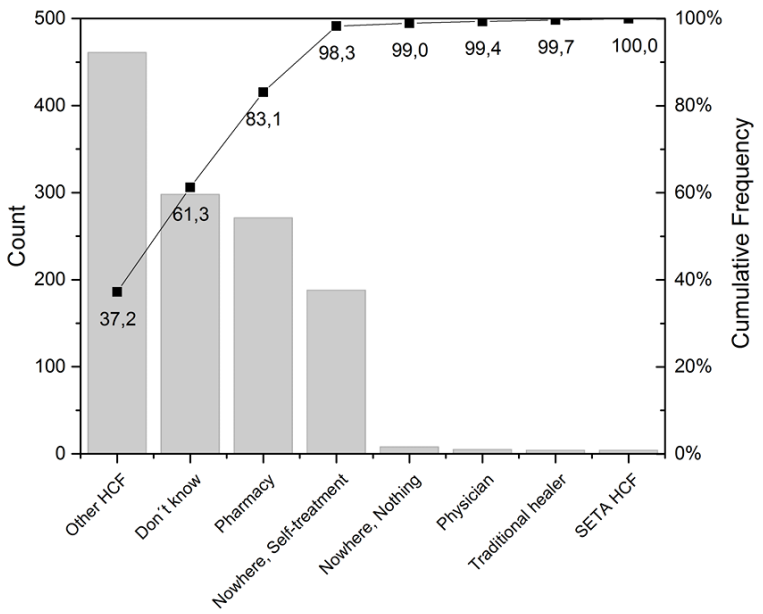

Figure 4 Cumulative frequency for healthcare seeking behavior for fever at any time
Source. Health Population Africa (HPAfrica) study, Ghana survey (2017-2019)

These categories were grouped into three strata to provide a better visualization of the situation. The first category was designated as ‘qualified healthcare’ and it contains those who visited SETA-Healthcare facilities, other healthcare facilities and physicians. The second category was called ‘non-qualified healthcare’ and it contains those who visited traditional healers, do nothing, decide self-treatment or do not know what they would do. Finally, the last group contains those people that decided to visit pharmacies (Figure 5). Those people that chose ‘qualified healthcare’ represents 37.9%, ‘non-qualified healthcare’ 40.2% and ‘pharmacy’ 21.9%.

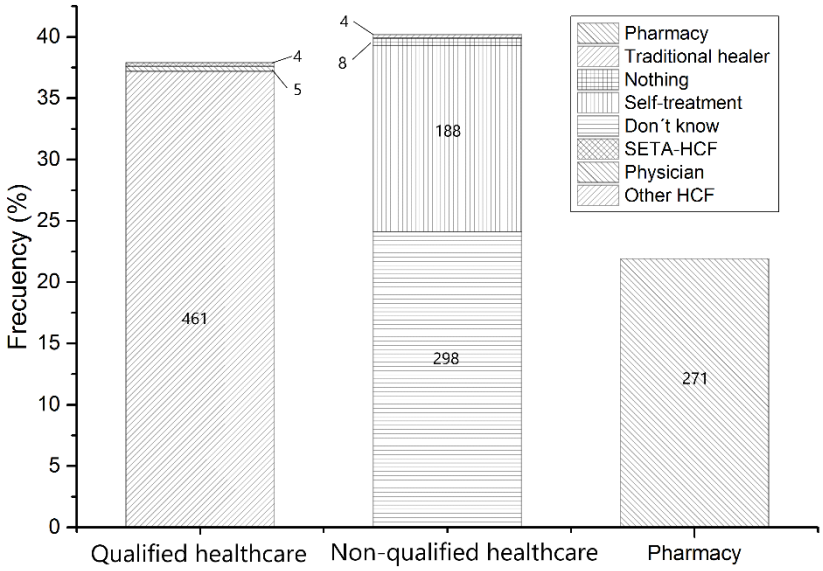

Figure 5 Qualified and non-qualified health seeking behavior for fever at any time
Source. Health Population Africa (HPAfrica) study, Ghana survey (2017-2019)

For people that healthcare facility is first option when someone within household got fever age-stratified and sex-stratified questions were done to compare travel time, cost and distance (table 6). Most people that chose healthcare facility live less than an hour from facilities, pay less than 3 dollars and walk less than 2 km.

Table 6
Travel to Healthcare Facility[a]

	FEMALE				MALE			
	<2y	2 to <5y	5 to <15y	≥15y	<2y	2 to <5y	5 to <15y	≥15y
Travel time N°(%)								
<30min	24 (63.2)	20 (42.6)	72 (54.5)	240 (55.7)	17 (56.7)	29 (54.7)	62 (52.5)	155 (55.6)
≥30min <1h	8 (21.1)	21 (44.7)	42 (31.8)	132 (30.6)	12 (40.0)	20 (37.7)	38 (32.2)	90 (32.3)
≥1h <2h	5 (13.2)	4 (8.5)	10 (7.6)	40 (9.3)	0 (0.0)	3 (5.7)	12 (10.2)	22 (7.9)
≥2h	1 (2.6)	2 (4.3)	6 (4.5)	13 (3.0)	1 (3.3)	1 (1.9)	3 (3.5)	9 (3.2)
No answer	0 (0.0)	0 (0.0)	2 (1.5)	6 (1.4)	0 (0.0)	0 (0.0)	2 (1.7)	3 (1.1)
Travel cost N° (%)								
<1USD	24 (63.2)	27 (57.4)	60 (45.5)	233 (54.1)	16 (53.3)	32 (60.4)	46 (39.0)	143 (51.3)
≥1 to <3USD	8 (21.1)	14 (29.8)	43 (32.6)	117 (27.1)	10 (33.3)	17 (32.1)	41 (34.7)	73 (26.2)
≥3 to <5USD	2 (5.3)	4 (8.5)	9 (6.8)	32 (7.4)	3 (10.0)	4 (7.5)	9 (7.6)	24 (8.6)
≥5USD	1 (2.6)	2 (4.3)	5 (3.8)	15 (3.5)	1 (3.3)	0 (0.0)	4 (3.4)	11 (3.9)
No answer	3 (7.9)	0 (0.0)	15 (11.4)	34 (7.9)	0 (0.0)	0 (0.0)	18 (15.3)	28 (10.0)

Table 6 continued.

	FEMALE				MALE			
	<2y	2 to <5y	5 to <15y	≥15y	<2y	2 to <5y	5 to <15y	≥15y
Travel distance N° (%)								
<1km	27 (71.1)	33 (70.2)	102 (77.3)	308 (71.5)	21 (70.0)	37 (69.8)	79 (66.9)	200 (71.7)
≥1 to <2km	4 (10.5)	5 (10.6)	13 (9.8)	54 (12.5)	3 (10.0)	7 (13.2)	18 (15.3)	37 (13.3)
≥2 to <3km	2 (5.3)	5 (10.6)	7 (5.3)	20 (4.6)	3 (10.0)	8 (15.1)	6 (5.1)	12 (4.3)
≥3km	3 (7.9)	4 (8.5)	3 (2.3)	27 (6.3)	3 (10.0)	1 (1.9)	4 (3.4)	14 (5.0)
No answer	2 (5.3)	0 (0.0)	7 (5.3)	22 (5.1)	0 (0.0)	0 (0.0)	11 (9.3)	16 (5.7)
Total	38 (100)	47 (100)	132 (100)	431 (100)	30 (100)	53 (100)	118 (100)	279 (100)

[a] For those that said that healthcare facility was first option for fever at any time, not only for the last 3 months
Source. Health Population Africa (HPAfrica) study, Ghana survey (2017-2019)

Logistic regression analysis

Table 7 shows logistic regression results for health seeking behavior during wet season. Sample size was 153 cases, 64 sought for inappropriate health services and 89 for appropriate health services. Predicted probability was calculated for appropriate health seeking behavior. Higher income and education showed no statistical correlation with appropriate health seeking behavior. People living in urban areas were less likely to look for appropriate seeking behavior compared with those living in rural areas (OR = 0.46, 95% CI 0.22 to 0.93) during wet season.

Table 7
Logistic Regression for Health Seeking Behavior During Wet Season

		Inappropriate *n*=64	Appropriate *n*=89	OR (95% CI)	*p*-value
Monthly income	<100 USD	38	50		
	≥100 USD	13	14	0.95 (0.38 to 2.34)	.91
	No Answer	13	25	1.51 (0.67 to 3.41)	.31
Education	≤Primary school	23	29		
	≥Secondary school	41	60	1.03 (0.51 to 2.09)	.92
Location	Rural	18	41		
	Urban	46	48	0.46 (0.22 to 0.93)	.03

Source. Health Population Africa (HPAfrica) study, Ghana survey (2017-2019)

Table 8 shows the logistic regression results for health seeking behavior during dry season. Sample size was 197 cases, 74 sought for inappropriate health services and 123 for appropriate health services. Predicted probability was calculated for appropriate health seeking behavior. None of the variables showed any association with appropriate health seeking behavior.

Table 8
Logistic Regression for Health Seeking Behavior During Dry Season

		Inappropriate *n*=74	Appropriate *n*=123	OR (95% CI)	*p*-value
Monthly Income	<100 USD	37	54		
	≥100 USD	30	53	1.11 (0.58 to 2.09)	0.74
	No Answer	7	16	1.46 (0.54 to 3.97)	0.44
Education	≤Primary school	25	26		
	≥Secondary school	49	97	1.80 (0.92 to 3.53)	0.08
Location	Rural	33	46		
	Urban	41	77	1.22 (0.67 to 2.24)	0.50

Source. Health Population Africa (HPAfrica) study, Ghana survey (2017-2019)

DISCUSSION

In order to evaluate health seeking behavior, the survey consisted of two parts. Firstly, respondents were asked to recall details regarding fever onsets and the care they sought from a period of around three months prior to the interview, asking people to remember past events could create some noise, given that people's tendency to forget about mild diseases, while having strong memories about procedures that disrupt daily life such as hospitalization (memory bias), this could lead to over or underestimations of self-reported fever that further studies should consider. Regarding self-reported fever there is also another fact to consider, that any definition of fever was provided in advance, so, all subjective knowledge of fever among population was accepted and recorded in the survey, hence there is no certainty if fever episodes registered are in fact related to body temperature or other symptoms that could be misunderstood among population. Being that sentinel hospitals (SETA-HCF) are in charge of surveillance of typhoid fever, they should adjust their estimations of burden of typhoid fever considering that only 12.2% households that report fever episodes sought for care in these places. The number of people that choose pharmacies for treatment of fever remains high (33.1%) in Ghana.

The second part of the survey asked respondents about their actual health seeking behavior in relation with typhoid fever episodes. Considerations must be done because people that went to a healthcare facility would be over represented in this sample. In other words, people that probably got typhoid fever but didn't attend to a healthcare facility were not able to answer this question. This is further supported by the fact that households that

sought for care in healthcare facilities for typhoid fever were 82.1%, over 20.0% higher than for self-reported fever episodes. So even though this could potentially be because people with typhoid were more sick and hence more likely to attend hospital, it is likely also a result of reverse causation. Widal test was widely used as diagnostic test for *S.* Typhi in Ghana and given that it was recently establish high incidence of typhoid fever in Sub-Saharan Africa (Marks et al., 2017), it could remain an option for its low cost in resource limited settings (Mweu & English, 2008), however blood culture is the gold standard (Sanjeev et al., 2013).

Generic health behavior was not related with onsets; hence, people answer what they would do if a fever episode happens in the future. Because the survey asked about possible actions (health seeking behavior) during a hypothetical case (fever), more people answered this question than they did for actual health seeking behavior. Surprisingly, people that would have a non-qualified health seeking behavior is higher (40.2%) than those that would choose a qualified health provider (37.9%). Given that data about generic health seeking behavior was collected in a separated file, it was unfortunately not possible to correlate this finding with household demographic information and investigate associations further.

Evidence from Ghana suggest that utilization of traditional medicine is high (86.0%), even though traditional healers are not consulted before its acquisition (Gyasi, 2014). Our findings show that less than 5.0% of population consulted a traditional healer for fever episodes in both actual and generic health seeking behavior, however, this data is not completely reliable as people tend to hide information about traditional medicine usage

from conventional doctors due to fear of disapproval (Gyasi, 2014); although interviewers were not doctors, respondents could associate them with healthcare workers and try to please them, which is a disadvantage for cross-sectional studies. Main sources of traditional medicine were self-preparations and chemical shops (Gyasi, 2014), suggesting that respondents who mentioned self-treatment and pharmacy as their main options for healthcare, could have higher rates of utilization of traditional medicines even if they did not go to traditional healers, but further evidence is needed to support this hypothesis.

Logistic regression analysis was performed to evaluate correlation between actual health seeking behavior for fever and 3 demographic variables (head of the household's income, head of the household's education and geographic location). These three independent variables were chosen because evidence suggest that people with less education, lower income and living in rural areas have less access and utilization of health services (Liu et al., 2016; Vásquez, Paraje, & Estay, 2013)(Liu et al., 2016; Vásquez et al., 2013; Yunus et al., 2017). People living in urban areas had statistically significant lower likelihood of appropriate health seeking behavior during wet season (OR = 0.46, 95% CI 0.22 to 0.93). This finding is contrary to the evidence that suggest that people living in urban areas have higher healthcare utilization rate than those living in rural settings mainly because higher concentration of health services and providers in urban areas (López-Cevallos & Chi, 2010). It could be explained due to the particular location of healthcare facilities in Ghana where 50.0% are situated in rural areas, 34.0% in urban areas and 15.0% in peri-urban areas (Kushitor & Boatemaa, 2018), while 56.0% Ghanaians lived in urban areas by 2018 (World

Bank Group, 2019). But this association disappears when dry season was analyzed. However, due to the overall very low sample size (and even lower power as a result of stratification), the association tested in the regression analysis can generally not be considered robust. It would be helpful if this variable could be divided into three categories (urban, peri-urban and rural areas) to study its relationship with healthcare facilities distribution.

Head of household's income data was categorized into: No income to <100USD, ≥ 100USD and No Answer. The amount of people that did not answer and the possibility of a fraction of respondents who misreported their income (as higher or lower than their real income) need consideration as a source of noise in the results. No relationship was found between income and healthcare utilization in this project. A better analysis could be done with out-of-pocket payments and health insurance status. As evidence from a study in Tanzania suggests, having health insurance is a factor associated with appropriate health seeking behavior (Chomi et al., 2014). In the last published report of National Health Insurance System (NHIS) situation in Ghana, 38.0% of its population was an active member, but further analysis is needed to evaluate the influence of health insurance in people's healthcare utilization.

Head of household education data was categorized as No Education and Primary School Education and Higher than Primary School Education. No association was found between education level and healthcare utilization despite evidence suggesting that more educated

people tend to use health services more than those with lower education (Vásquez et al., 2013).

One study done in China showed that differences between healthcare utilization of urban and rural residents could be explained mainly by income and education (Liu et al., 2016), but none of these variables were proven to be statistically significant during dry season in our model.

Variables such as Income and Level of Education were recorded as categorical variables in HPA survey and it was difficult to reduce the number of categories and still been able to compare our findings with other studies, for better analysis these variables must be registered as continuous variables to facilitate analysis.

Caution and implementation of our suggestion for future studies are needed before generalization of these findings.

CONCLUSIONS

Analysis of actual health seeking behavior showed that only 12.2% of people went to SETA-HCF in case of fever and for 33.1% of the respondents, pharmacies were their first choice of healthcare. Kumasi people have lower utilization of SETA-HCF (4.0%). If the finding of highest typhoid fever burden in Agogo is confirmed from the passive surveillance reports in SETA program, this area should be a priority for future interventions such as water, sanitation, hygiene and vaccines.

To estimate burden of infectious diseases, SETA hospitals must consider that only 12.2% of households chose sentinel hospital for fever episodes. However, the uncertainties associated with the assessment of this adjustment factor should also be taken into consideration when estimating adjusted incidence rates.

Generic health seeking behavior data revealed that 40.2% of people chose to seek care from non-qualified health personnel, although big steps have been taken to increase access and strengthen health services at community level in Ghana, which shows needs for improvement. People that would have inappropriate health seeking behavior must be targeted for future research to evaluate the underlying barriers to seeking care from qualified health personnel.

People living in urban areas had statistically significantly lower likelihood of appropriate health seeking behavior during wet season (OR = 0.46, 95% CI 0.22 to 0.93), it could

potentially be explained by higher concentration of healthcare facilities in rural areas when it is comprised with population concentration, but it needs further analysis.

Geographical distribution of healthcare facilities must be considering for future research which should also consider larger samples and better assessments of disease symptoms to allow for more robust comparison of potentially contributing demographic factors.

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