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Exploring the development of a household cholera-focused health literacy scale in James Town, Accra

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ABSTRACT

Background: Foodborne diseases are significant reasons for in-patient and out-patient morbidity in Ghana. Of the foodborne illnesses reported in the country, cholera incidence and outbreaks have resulted in food-related mortality since the disease was first reported in the 1970s. Cholera is now endemic in the country. This study attempts to develop and pilot a tool to measure household health literacy among the urban poor in James Town, a cholera endemic neighborhood.

Methods: A survey questionnaire was developed based on four of the World Health Organization's (WHO) recommendations on issues for measurement of health literacy in low- and middle-income countries. The instrument was administered to 401 households in the community. We undertook reliability and validity analyses. T-test, Kruskal Wallis test, and Mann–Whitney test were used to examine the association between the health literacy scores of the scale and subscales and the demographic characteristics of households.

Results: The reliability analyses showed that the instrument was internally consistent (Cronbach alpha = 0.762). All the subscales were reliable except the beliefs about health and healthcare subscale. Based on content and construct validity analyses, 13 items were used for further examination of health literacy. We found that majority of households know about the information, education, and communication materials and 52% of households indicated that these materials remind them about the dangers of cholera. About 39% of the households decide together as a unit on steps to avoid getting cholera during an outbreak. Overall health literacy scores and the subscales were significantly associated with sex, age, marital status, and educational level of household head. Specifically, females, being married, increasing age and higher household income had a significant association with higher health literacy scores.

Conclusion: Household units in James Town impacts individual health literacy through: family discussions; access to information, education, and communication materials on cholera; and intentional efforts made to get information on cholera risk factors.

Background

Globally, one of the major public health problems is the cholera disease. Annually, approximately 2.8 million cholera cases occur in endemic countries and about 1.4 billion people are at risk for the disease [1]. Cholera has been christened a disease of inequity because it primarily causes morbidity and mortality among the poorest and most vulnerable population of the world [1,2]. Such populations live in conflict and famine zones as well as places with poor environmental management. Studies have also demonstrated that the main reasons for cholera epidemics are poor environmental conditions including inadequate toilet facilities, inadequate safe water supply, as well as improper water management systems [3–6]. Regarding the impact of conflict on cholera infections, for

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example, Yemen is currently experiencing the world's largest outbreak with an estimated 700,000 cholera cases since April 2017 which has resulted in over 2000 fatalities [2]. With the main mode of transmission of the causative agent of the disease being through fecal contamination of water or food, conflicts zones and poor managed environmental conditions present ripped circumstances for the disease. It is therefore not surprising that incidence of the disease is spatially bias. Between 2010 and 2014, the areas reporting cholera outbreak were predominantly in sub-Saharan Africa, South Asia, and the Caribbean [2].

The global burden of the disease has been disproportionately borne by Africa. Of all the global cholera cases reported to the World Health Organization (WHO) between 1970 and 2011, Africa's contribution to the burden was 46% [7]. In 2011 alone, excluding the epidemic in Haiti, sub-Saharan Africa contributed to 86% of cholera reported cases and 99% of case fatality globally [7]; and more than half of all infections and mortality due to cholera on the continent occur in children 5 years and under [1]. In sub-Saharan Africa alone, approximately 40–80 million of the people live in cholera hotspots and the disease mostly affects people living in poor communities [2]. While sub-Saharan Africa has the highest incidence rate of cholera, there is a geographic and regional variation within the sub-continent. West African countries have relatively lower cholera incidence rate compared to countries in the east [1]. About half of all reported cases between 1970 and 2011 were from seven countries in sub-Saharan Africa alone namely Angola, Democratic Republic of the Congo, Mozambique, Nigeria, Somalia, Tanzania, and South Africa [7].

Like other countries in sub-Saharan Africa, Ghana experiences its share of the burden of the disease. Cholera is endemic in Ghana and the country experiences episodes of epidemics from time to time. In 1999, over 9000 cases of the disease were reported in the country, which resulted in approximately 250 deaths [8]. Another epidemic a decade later in three administrative regions revealed about 8000 cases and 89 deaths [9]. The Ghana Health Services [10] reported a national cholera outbreak in 2016, which affected seven administrative regions namely Ashanti, Brong-Ahafo, Central, Eastern, Greater Accra, Volta, and Western. The Ghana Health Services has identified hazards that have led to or that have the potential of leading to public health emergencies. Out of 18 deadly epidemics such as cholera, meningitis, yellow fever among others, cholera has been ranked second on the general ranking of hazard risk in the country [10]. In terms of geographic zone, while the northern savannah zone is at high risk of meningitis and the middle forest zone is at high risk of yellow fever, the coastal zone is known to be at high risk of cholera. More so, in the high risk areas, the intensity and frequency of cholera epidemics have been increasing, particularly among the urban poor [11]. Environmental assessment of affected communities reveal improper disposal of garbage, chocked gutters, overflowing refuse dumps, and open defecation practices [11]. Other risk factors for cholera epidemic in the country include unavailability of safe drinking water, contaminated food (particularly vended food), leaking sewage pipes, and overcrowded neighborhoods [12–14]. With cholera outbreak becoming an annual affair in the country, studies have focused on the identification of risk factors, spatial distribution, climate variability and cholera outbreaks, and the economic burden and cost of outbreaks on families [12,15–17]. However, we could not find a study measuring household cholera health literacy. Therefore, we develop and pilot a tool to measure household health literacy (focusing on cholera prevention) among the urban poor who reside in a neighborhood known to be cholera endemic.

This study is important both in practice and scholarship. Apart from this tool being novel, especially in the urban poor and cholera endemic context, it is innovative in the following ways: (1) it attempts to get to the core of household decision-making on cholera by asking questions on frequency of household discussions and decision on cholera prevention in general and during outbreaks in an endemic place; (2) it included questions on accessibility of information, education, and communication materials used in cholera campaign in the sub-metropolitan area; and assessed comprehension as well as the use of these materials for teaching about cholera at home; (3) the tool attempted to illuminate the distinction between education and literacy by including questions that borders on efforts through critical thinking and actions on the dangers of cholera. We did so by asking about *intentionality* regarding accessing cholera information.

Theoretical insight: health literacy and components of the tool

Health literacy is a multifaceted concept that has been defined and operationalized in diverse contexts by different academics, health practitioners, and professional organizations. Despite the multiplicity of definitions, the WHO defines health literacy as "the personal characteristics and social resources needed for individuals and communities to access, understand, appraise and use information and services to make decisions about health" [18]. Enhancing health literacy among a population has the capability to further more knowledge-based decision making, increase preventive care practices, decrease health risks, improve patient care and safety as well as enhance navigation of the health settings thereby improving the quality of life of a people [19]. This is important because lower levels of health literacy have been found to be associated with adverse health outcomes ranging from poor healthcare access, increase hospitalization, and poor medication adherence to increased emergency room visits and higher mortality levels [20–22].

The evolution of health literacy as a concept reveals its constituents in diverse measuring instruments. While early conceptualization focused on reading skills, writing abilities, and numeracy competencies [23–25], contemporary understandings of the concepts additionally emphasize interactive and social skills people need in acquiring and using health information to enhance their well-being and to promote a healthy lifestyle [26–28]. Therefore, the demand for health literacy competencies should be a function of context, that is, the kind of healthcare system as well as public and population health needs of a community [29]. Consequently, pursuant to our goal of developing a tool for understanding household health literacy on cholera prevention in a poor community in the Global South, we draw on the WHO admonition on considerations for measuring health literacy in the developing world [18].

The overarching aim of these considerations is the focus on individual and community contexts. Specifically, these are: the social context of health-related decision-making; access to health information, services, and resources; education and literacy; beliefs about health and healthcare; integration of traditional and modern health approaches; the extent to which health is a priority; and the speed and momentum of development. These issues for consideration are based on studies undertaken in low and middle income countries [30–34]. However, for the purpose of this study, we focus on the first four considerations since we think those are more amenable to measuring at the household level.

Regarding the social context of health-related decision-making, measures of health literacy should recognize that, especially in communal societies, health decisions are usually made by families and households [18]. That implies that health outcomes of individuals in a household may be influenced by the health literacy of other members of the same household. Therefore, we developed questions pertaining to the household context of decision-making about

cholera. With respect to access to health information, services, and resources, it is argued that dissimilarity in access influences level of literacy [30]. Places with poor availability of health information and services, or with difficult systems to navigate, individuals require and rely on robust personal and social resources to make informed health decisions and selection of behavioral preferences and options. So, our instrument considers accessibility to cholera information among households in our study community.

On education and literacy, the framework asserts that in view of the tendency of people to adapt and compensate for limitations, educational level and attainment may not always be a useful indicator of health literacy. Consequently, people develop erudite ways to access health information by means of social networks. The framework, therefore, suggests measurement strategies that are "able to detect the different capacities that people have for engaging with health information, allowing for the fact that individuals, families and communities may develop their own effective strategies for engagement." Our study develops questions that attempt to elicit the different capabilities of households through *intentionality* regarding accessing cholera information.

The fourth component is about beliefs about health and healthcare. Conceptually, religious and cultural beliefs of individuals, families, and households influence health decision-making. The different belief systems imply diverse faiths and practices impacting individual and households decisions about health. While the framework acknowledges the difficulty in measuring the impacts of beliefs on health literacy quantitatively, we develop religious and family belief questions for households.

Methods

Study area

This study was conducted in James Town, a community in the Ashiedu Keteke sub-Metropolitan area in Accra, Ghana. The reasons for choosing this community are as follows: first, as a coastal community, it is known to be cholera endemic and other foodborne diseases are frequently reported [34]. Secondly, apart from the place being liable to flooding, the environmental conditions in the community make it ripped for periodic cholera epidemic. The community is characterized by improper disposal of refuse, open and chocked gutters, and insufficient private sources of potable water as well as overflowing refuse dumps. In addition to the overcrowded dwellings in the community coupled with inadequate toilet facilities, open defecation practices are common thereby predisposing residents to a number of health hazards including cholera epidemic. By any stretch of imagination, the community can be described as less hygienic [35,36]. Thirdly, a recent study in the community showed that residents who eat street vended food were more likely to have lower self-rated health [37]; thus given poor environmental conditions and the presence of foodborne diseases in the community as discussed, foodborne diseases may be contributing to the lower health status in the community.

Sample and research instrument

A household questionnaire was administered to 401 households. The Ghana Statistical Service has divided Ghana into Enumeration Areas (EAs), similar to census tracks in the United States, for ease of surveys and censuses administration. James Town has 24 EAs. From a household listing exercise, 414 households were systematically sampled from each of these EAs and a total of 401 household heads or de-facto household heads responded to the survey; thereby achieving a response rate of 97%. We adapted and modified the conventional definition of a household for survey purposes in Ghana. That is, "a group of people who eat from the same pot when food is prepared at home and who get money for street food from the same source" [38]. Based on our previous knowledge of the community and its communal system of living including, for example, the tendency of people to cook and invite other residents to join them at the "table" [38], we needed to modify the definition to minimize coverage errors. Thus, the main differentiating variables are exchange, actual sense of belonging, and a unit with a head who confirms those he/she is responsible for as well as co-obligations in the household rather than simple co-residence. Therefore, smaller household units in compound houses are used. The questionnaire was administered to the household head if he/she was available or the adult in the household who at the time of the survey was acting as the head of household (de facto household head).

The survey instrument consisted of subsections. The first part contained questions on demographic characteristics of household and the household head. These are: age, household size, household income, marital status, employment status, and educational level of household head. The second part consisted of 20 questions on health literacy on cholera with each item having the response options "not at all," "rarely," "sometimes," and "often." We developed five questions each that explored: the social context of health-related decision-making; access to health information; education and literacy; and beliefs about health and healthcare (see Appendix A).

Analyses of data

Using Statistical Package for Social Sciences (SPSS version 25.0), the analyses of the data consisted of descriptive statistics, reliability analyses, validity analyses, t-test, Kruskal Wallis tests, and Mann–Whitney tests. First, we present a description of the household socio-demographic characteristics. Second, we proceeded to compute Cronbach Alpha coefficients to measure the internal consistency of the scale of the entire instrument (i.e. 20 questions) used and its subscales (i.e. five questions per subscale). Afterwards, a principal component analysis with varimax rotation was conducted to evaluate the factor structure of the scale. Subsequently, we examined the relationship between the health literacy variables and the household socio-demographic characteristics after computation of health literacy scores.

Results

Descriptive statistics: demographic characteristics of households and percentage distribution of health literacy

Table 1 shows that 54% percent of the household heads or de facto household heads were between the ages of 20–39 and 40% were 40 years and above. The mean age was 37 years and mean household size was 5.2. About 67% of the household had household sizes of 4 and above. The mean monthly income was $154.00 while 74% were gainfully employed. While 12% and 38% have had Primary and Junior High School education respectively, only 40% had Senior High School education or higher. Seventy-three percent and 63% of households had neither discussed cholera two weeks preceding the survey nor six month preceding the survey respectively (Table 2). About a third of the households decide on steps to take to avoid getting cholera while 39% of the households decide on steps to avoid getting cholera during an outbreak in the community. While 42% of households reported that it is not at all easy to get leaflets on the risk factors of cholera, 44% indicated that it is often easy to understand the information on such leaflets. Although 52% of households reported that the information, education, and com-

Table 1
Percentage distribution of household characteristics.

Variables	Valid frequency (N)	Valid percent (%)	Means
Age			
Less than 20	24	6	
20–29	126	31.4	
30–39	93	23.2	
40–49	70	17.5	
50–59	50	12.5	
60 and above	38	9.5	
Total	401	100	
Household size			
1	24	6	
2 and 3	110	27.4	
4 and 5	140	34.9	
6 and above	127	31.7	
Total	401	100	
Sex			
Female	242	60.3	
Male	159	39.7	
Total	401	100	
Educational level			
No education	38	9.5	
Primary	49	12.2	
Junior High School	152	37.9	
Senior High School	132	32.9	
Tertiary	30	7.5	
Total	401	100	
Marital status			
Single	167	41.6	
Consensual union	29	7.2	
Divorced	32	8	
Separated	22	5.5	
Married	151	37.7	
Total	401	100	
Employment status			
Unemployed	105	26.2	
Employed	296	73.8	
Total	396	100	
Religious affiliation			
No religion	96	23.9	
Christian	274	68.3	
Muslim	27	6.7	
Traditionalist	4	1	
Total	401	100	
Mean age			37.4
Mean household size			5.2
Mean monthly household income			GHS 612.81 or $154

munication materials on cholera often remind them of the dangers of cholera, 70% and 74% indicated that they neither intentionally go out to seek such materials nor go to the community hospital in search of information on cholera prevention.

Reliability analyses

We conducted reliability analyses to investigate the internal consistency of the scale. We achieved a very satisfactory Cronbach Alpha value of 0.762 for the total scale of 20 items. We proceeded to assess the internal consistency of the subscales. In this regard, the Cronbach Alpha for the five items measuring "the social context of health-related decision-making" was very satisfactory (0.731), while the value for the five items measuring "access to health information" was also very good (0.720). Although the measures for the "education and literacy" items achieved an adequate value of 0.623, the five items measuring "beliefs about health and healthcare" achieved a poor Cronbach Alpha value of 0.390. Therefore, because the "belief about health and healthcare" measures are not internally consistent, we eliminated them in subsequent analyses.

Validity analyses: content and construct validity

We conducted both content and construct validity assessments. To analyze content validity with regard to the fundamental structure of the major factors, we conducted a principal component analysis (PCA) with varimax rotation using the remaining 15 items. Bearing in mind that the items were measuring the three constituents of health literacy, this analysis was to allow us evaluate whether each instrument item loaded onto factors as desired. The analysis indicated four factor loading that were extracted with eigen values greater than 1. While first component had an eigen value of 4.01, the second, third, and fourth components had eigen values of 1.87, 1.73, and 1.08 respectively. These four components accounted for 58% of the total variance. A closer look at the factor loading showed that while all the items for "the social context of health-related decision-making" and "access to health information" loaded correctly on separate factors, two items of "education and literacy" loaded onto a fourth factor. Therefore, we dropped those two items in subsequent analyses. We proceeded to run another PCA using the remaining 13 items. At this stage, the analyses show three factor loading that were extracted with eigen values greater than 1. The eigen values of the components are: 3.70, 1.76, 1.49 for the first, second and third components respectively accounting for 54% of the total variance. After the rotation, the "access to health information" items all loaded onto factor 1 and "the social context of health-related decision-making" all loaded onto the second factor. The remaining three questions on

Table 2
Percentage distribution of the valid health literacy items (13 Items).

Items	Not at all	Rarely	Sometimes	Often
How often in the past two weeks have you talked about cholera in your household?	72.6	4.5	9.7	13.2
How often do you or anyone in your household adhere to suggestions from other household members on how to prevent cholera?	31.7	6.2	24.9	37.2
How often in the past six months have you discussed cholera as a household?	62.8	7.2	14	16
How often do you decide as a household on steps to take to avoid cholera?	34.2	14.5	18.5	32.9
How often does your household talk about avoiding getting cholera during an outbreak in this community?	26.4	14.2	20	39.4
How easy is it for you (or anyone in your household) to get/receive leaflets on things (risk factors) that cause Cholera?	42.1	16.5	22.9	18.5
How often do you (or anyone in your household) see posters/flyers on things (risk factors) that make people get cholera in James Town?	18.2	14	25.9	41.9
How easy is it for you (or anyone in your household) to understand the leaflets on things (risk factors) that cause cholera?	19.2	9	27.9	43.9
How often do these materials (posters/leaflets/flyers) remind you (or anyone in your household) of the dangers of cholera?	14	12.5	21.4	52.1
Are you (or anyone in your household) the sort of person who uses the information on the materials (posters/leaflets/flyers) to teach other household members things (risk factors) that cause cholera?	29.4	9.5	27.2	33.9
How often do you (or anyone in your household) intentionally go out to seek (look for) information on things (risk factors) that cause cholera?	69.8	11.7	10.7	7.7
How often do you (or anyone in your household) when you intentionally go out to seek information on cholera you find it?	64.6	12.5	11.5	11.5
How often do you (or anyone in your household) intentionally go to a health center in James Town to get information on how not to get cholera?	74.1	9.7	10	6.2

Table 3
Instrument item scores and principal component analysis factor loadings.

Instrument items	Item scores	Principal component analysis		
	Factor loadings			
	(Means and SD)	Factor 1	Factor 2	Factor 3
How often in the past two weeks have you talked about cholera in your household?	1.6359 (1.10)	−0.097	0.741	0.247
How often do you or anyone in your household adhere to suggestions from other household members on how to prevent cholera?	2.6758 (1.26)	0.353	0.512	−0.14
How often in the past six months have you discussed cholera as a household?	1.8304 (1.17)	−0.012	0.82	0.166
How often do you decide as a household on steps to take to avoid cholera?	2.5012 (1.26)	0.292	0.721	−0.043
How often does your household talk about avoiding getting cholera during an outbreak in this community?	2.7232 (1.23)	0.471	0.488	−0.059
How easy is it for you (or anyone in your household) to get/receive leaflets on things (risk factors) that cause Cholera?	2.1771 (1.16)	0.414	0.209	0.366
How often do you (or anyone in your household) see posters/flyers on things (risk factors) that make people get cholera in James Town?	2.9152 (1.13)	0.674	0.042	−0.025
How easy is it for you (or anyone in your household) to understand the leaflets on things (risk factors) that cause cholera?	2.9651 (1.13)	0.68	0.051	0.117
How often do these materials (posters/leaflets/flyers) remind you (or anyone in your household) of the dangers of cholera?	3.1172 (1.09)	0.744	0.07	0.172
Are you (or anyone in your household) the sort of person who uses the information on the materials (posters/leaflets/flyers) to teach other household members things (risk factors) that cause cholera?	2.6559 (1.22)	0.604	0.202	0.29
How often do you (or anyone in your household) intentionally go out to seek (look for) information on things (risk factors) that cause cholera?	1.5636 (0.96)	0.054	0.074	0.817
How often do you (or anyone in your household) when you intentionally go out to seek information on cholera you find it?	1.6983 (1.06)	0.319	−0.022	0.711
How often do you (or anyone in your household) intentionally go to a health center in James Town to get information on how not to get cholera?	1.4838 (0.90)	0.019	0.053	0.724

Table 4
Bivariate analyses of health literacy scores and household characteristics.

	Total health literacy scores	Social context of health decision-making	Access to information	Education and literacy
Sex	1.175	1.983*	0.261	0.019
Age	7.114	16.835*	6.165	1.55
Household size	5.155	6.812	0.545	4.929
Educational level	10.809*	8.165	8.496	13.184*
Marital status	15.918*	18.519**	11.107*	2.504
Employment status	1.241	1.403	1.639	1.154
Household income	0.133**	0.100*	0.150**	0.014

* $p < 0.05$.
** $p < 0.005$ (We investigated the relationship between the health literacy scores and sex, employment status using t-test. Kruskal Wallis test was used to assess trends across groups for age, household size, and marital status. Pearson correlation was used for household income).

"education and literacy" loaded onto factor 3 (Table 3). Regarding construct validity, the relationship of subscales scores to each other was examined. Scores on "the social context of health-related decision-making" items were significantly related with "access to health information" items ($r = 0.401$, $p < 0.001$) and significantly associated with "education and literacy" items ($r = 0.169$, $p = 0.001$). We also found a statistically significant association between "access to health information" and "education and literacy" items ($r = 0.349$, $p = 0.001$).

Bivariate analyses: health literacy scores and household characteristics

There was no statistical significance between household size, employment status and the health literacy scores (total and subscales) (Table 4). Although there was no difference in total health literacy, "access to information," and "education and literacy" scores between male and female household heads, sex was associated with "social context of health-related decision-making" with females having a higher mean score than males. Age was only associated with "social context of health-related decision-making." To ascertain the exact pattern of the association, we run series of Mann–Whitney tests for age and "social context of health-related decision-making" scores. Household heads aged 20–29, 30–39, 40–49, 50–59, and 60 years and over had significantly higher score than households with heads aged less than 20. Household heads aged 50–59 years had higher score than those aged 20–29 ($z = -2.887$; $p = 0.004$). Those aged 60 and above also score higher than household heads aged 20–29 ($z = -2.281$; $p = 0.023$). Higher education was significantly related to total health literacy scores and the "education and literacy" subscale. The Mann–Whitney tests revealed that households with head having tertiary education scored higher on "education and literacy" subscale than those with no education ($z = -2.675$; $p = 0.007$). Those with Primary education, Junior High School education, and Senior High School education scored higher than those with no education on the same subscale ($z = -3.388$; $p = 0.001$; $z = -2.313$; $p = 0.021$; $z = -3.024$; $p = 0.002$). But there was no statistically significant difference between the scores for: Junior High and Senior High; Primary and Tertiary; and Junior High and Tertiary. Regarding total health literacy score and educational level, the only observed difference was between Junior High School and Senior High School groups. The Senior High School group had a statistically significant higher mean rank scores compared to those with Junior High School level ($z = -2.676$; $p = 0.007$). Marital status was associated with total health literacy, "social context of health-related decision-making" scores, and "access to information" scores. Series of Mann–Whitney tests showed that the married group scored higher in all the scales though not all were significant. The married group scored significantly higher than the single and consensual union groups on "the social context of health-related decision-making" ($z = -3.738$; $p < 0.000$; $z = -2.456$; $p = 0.014$). The married group scored higher in "access to health information" than the consensual union group ($z = -3.191$; $p = 0.001$) and the divorced group also score higher than the consensual union group ($z = -2.207$; $p = 0.027$). On the total health literacy scores, while the married group had significantly higher mean scores than the single and consensual union groups ($z = -2.627$; $p = 0.009$; $z = -3.635$; $p < 0.000$), the single groups had significantly higher mean rank than the consensual union group ($z = -2.249$; $p = 0.025$).

Discussion and conclusion

This study attempted to develop a tool to measure cholera-focused health literacy among the urban poor. The tool, which

drew on the World Health Organization's consideration for measuring health literacy in the Global South, initially focused on four dimensions of health literacy in the disease prevention domain.

The study area, James Town, Accra, is cholera-endemic. Irrespective of such status, majority of households had not discussed cholera in the past six months preceding the survey while just about a little over a third of households discusses cholera during an outbreak. This suggests while cholera may be a serious public health problem, households may not be ranking it as a top priority. However, nearly three-quarters of households adhere to suggestions from household members on how to prevent cholera. Further principal component analysis suggests that two main construct underlie the "social context of health-related decision-making" items. These are: "communication skills" and "suggestion assessment." This confirms the idea that, in collectivist cultures, the household impacts the individual's actions and decision-making [18]. In these group oriented cultures, there is a strong emphasis on family connection as a source of identity and parents' or elders' usually define all social practices, including health care. Probably, as a result of the idea of the "larger good" in perspective, household members decide on what is good and in some cases the ultimate decision is deferred to the oldest, eldest son, or head of household [30].

Regarding "access to health information" on cholera, although posters and flyers on cholera education are ubiquitous in the community, at the time of the survey, about a fifth of the households had neither seen them nor understood the contents. Specifically, while 18% reported that they do not often see such materials, another 19% reported that they do not easily understand the materials. This finding is not surprising because of the variety of posters in the community, particularly posters on funeral announcements as well as movies. But nearly three-quarters of all household use the information available through posters and flyers, education, and communication materials to teach household members about cholera risk factors; such a level of access and use of information materials is expected to lower the burden of poor health literacy among people [18] thereby empowering individuals to act on the information and make informed health choices [26–28]. In an attempt to explore the dissimilar competences that people have for engaging with health information coupled with the idea that people develop their own strategies for effective deciphering of such information, we asked questions that examined *intentionality* to acquire information on cholera. This is particularly important because people have different levels of education that impacts various forms of health literacy. Meanwhile, health literacy and general literacy does not automatically move hand in hand [31] and, accordingly, people develop acculturated ways to access health information [18]. About a third of households do intentionally go out to seek information on cholera including from the clinic and during outreach programs made by the Usher Polyclinic in the area. This suggests that some households recognize the risks of cholera infection and are taking steps to ensure that the disease does not come to their door step; a quintessential characteristic of health literacy. Notwithstanding the fact that general literacy does not necessarily positively correlate with health literacy, we found that household that had heads with higher educational level had higher mean ranks on health literacy although the relationship is complex. While all educational groups scored higher than the group with no education, for example, on the "education and literacy" score, there was difference between the other levels. This suggests that although household with heads having no education may require more attention regarding cholera literacy, no assumptions should be made about focusing more or exclusively on households with lower education levels.

We found associations between other household characteristics and the scores of the subscales. Marital status, sex, age, and household income were associated with health literacy scores. Females, being married, increasing age and higher household income had a significant association with higher health literacy scores. These findings re-echoe previous findings about the need to understand heterogeneity of patients' backgrounds [29] and, thus, suggest the need for cholera education campaigns not to treat James Town residents as a homogenous group but to appreciate the complexities in the health literacy competencies, which differ among community households and by extension individuals. Females scored higher on "social context of health-related decision making". While we speculate that females may have scored higher because they are the primary preparers of food in the home in this cultural context and may be more likely to discuss foodborne diseases with the household, further research is required to understand the sex differentials. Future research may like to delve deeper into understanding, for example, why married household heads scored higher across all scale than their single headed household counterparts. Higher income was associated with higher health literacy. Future research may examine its relationship with general literacy, type of employment, and objective health assessment.

This study, although adopts robust methodology and yielded useful results, has a number of limitations worth noting. First, the study adopted self-reporting of household health literacy. As it is with all self-reporting, respondents' immediate circumstances and self-consciousness may impact responses; this is a limitation inherent to the method of choice. Secondly, the objective of the study limited the instrument to the conceptual framework adapted. Consequently, we did not venture into disease management domain of health literacy. More so, other dimension of the same conceptual framework can be assessed. For example, regarding the "social context of health-related decision-making," the study did not assess decision-making process in the households, which is key to this framework [18], and how final decisions are made on cholera prevention. While these limitations do not jeopardize this study, it is worth mentioning that, for example, understanding the decision-making process may illuminate our understanding of power dynamics in the household with ramifications for health decision-making; as well as explain the demographic differentials which are beyond the scope of this paper. Also, the study did not examine households' health literacy on specific causes and symptoms of cholera. Thirdly, given the complexity of our findings and the framework used, quantitative analyses alone is insufficient to unravel the nuances in the three typologies assessed. Therefore, combining with qualitative methods would have enabled us to supplement and complement our quantitative data. For example, the use of participatory research methods such as mental models and participatory ranking may elicit data on household priorities about health and cholera for that matter. Fourthly, health literacy is a complicated concept which is evolving over time. While this study adopted specific constructs to examine household cholera literacy in the context of the selected WHO framework, we do not claim that our approach encapsulates all the complexities inherent to desired health literacy competencies.

We investigated the relationship between the health literacy scores and sex, employment status using t-test. Kruskal wallis test was used to assess trends across groups for age, household size, and marital status. Pearson correlation was used for household income.

Finally, this study is the first such attempt to developing and piloting a cholera-focused health literacy tool that draws on key elements on WHO consideration of measuring health literacy in the developing world. Household units in James Town have bearings on individual health literacy through: family discussions; access to health; information, education, and communication materials on cholera; and intentional efforts made to get information on cholera risk factors. We suggest that this scale should be tested

among households with previous cholera cases exclusively and may be refined through consultations with health practitioners in the major hospital in the community. Future refining of the instrument should consider mixed-methods, especially ethnography and other participatory methods, that may help develop more appropriate and robust questions and measures for each subscale.

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Competing interests

None declared.

Ethical approval

Not required.

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Appendix A.

The questions we developed based on the health literacy consideration framework suggested by the WHO are as follows:

The social context of health-related decision-making:

- How often in the past two weeks have you talked about cholera in your household?
- How often do you (or anyone in your household) adhere to suggestions from other household members on how to prevent cholera?
- How often in the past six months have you discussed cholera as a household?
- How often do you decide as a household on steps to take to avoid cholera?
- How often does your household talk about avoiding getting cholera during an outbreak in this community?

Access to health information:

- How easy is it for you (or anyone in your household) to get/receive leaflets on things (risk factors) that cause Cholera?
- How often do you (or anyone in your household) see posters/flyers on things (risk factors) that make people get cholera in James Town?
- How easy is it for you (or anyone in your household) to understand the leaflets on things (risk factors) that cause cholera?
- How often do these materials (posters/leaflets/flyers) remind you (or anyone in your household) of the dangers of cholera?
- Are you (or anyone in your household) the sort of person who uses the information on the materials (posters/leaflets/flyers) to teach other household members things (risk factors) that cause cholera?

Education and literacy:

- How often do you (or anyone in your household) intentionally go out to seek (look for) information on things (risk factors) that cause cholera?
- How often do you (or anyone in your household) when you intentionally go out to seek information on cholera you find it?
- How often do you (or anyone in your household) intentionally go to a health center in James Town to get information on how not to get cholera?
- Are you the sort of person (or anyone in your household) who can easily interpret (easily explain the meaning of) information (drawing) on materials (posters/leaflets/flyers) about things that cause cholera?
- Are you the sort of person (or anyone in your household) who can easily interpret (easily explain the meaning of) information (words) on materials (posters/leaflets/flyers) about things that cause cholera?

Beliefs about health and healthcare:

- How often do you (or anyone in your household) solely rely on what an older family member told you about how to avoid the causes of cholera?
- How often do you (or anyone in your household) use information that an older family member/community leader suggested is the traditional way to avoid the causes of cholera?
- How often do you (or anyone in your household) believe that because of your belief in God you do not have to care about the things that cause cholera?
- How often do you (or anyone in your household) believe that due to the protection of your ancestors you do not have to care about the things that cause cholera?
- How often do you (or anyone in your household) believe that because of the food you eat there is no way cholera can affect you?

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