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Distinguishing social and cultural features of cholera in urban and rural areas of Western Kenya: Implications for public health

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Urban and rural areas have distinctive health problems, which require consideration. To examine sociocultural features of cholera and its community context, a semi-structured explanatory model interview based on vignettes depicting typical clinical features of cholera was used to interview 379 urban and rural respondents in Western Kenya. Findings included common and distinctive urban and rural ideas about cholera, and its prevention and treatment. The three most commonly perceived causes among urban and rural respondents collectively were drinking contaminated water, living in a dirty environment and lacking latrines. However, a dirty environment and flies were more prominently perceived causes among urban respondents. Rural respondents were less likely to identify additional symptoms and more likely to identify biomedically irrelevant perceived causes of cholera. Oral rehydration therapy was the most frequently reported home treatment. Health facilities were recommended unanimously at both sites. For prevention, rural respondents were more likely to suggest medicines, and urban respondents were more likely to suggest health education and clean food. Findings indicate community priority, demand for and potential effectiveness of enhanced efforts to control cholera in Western Kenya, and they suggest strategies that are particularly well suited for control of cholera in urban and rural areas.

Keywords: cholera; urban–rural comparison; cultural epidemiology; illness explanatory models; Western Kenya

Background

Sub-Saharan Africa bears a large cholera burden due to high levels of poverty and limited access to adequate health care, safe water and sanitation facilities (Gaffga, Tauxe, & Mintz, 2007). In recent years, cholera outbreaks in sub-Saharan Africa have tended to be large and protracted (WHO, 2010a). Repeated and severe cholera outbreaks suggest limitations in the current strategy of control and prevention (Bhattacharya et al., 2009). Notwithstanding the literature on cholera epidemics in the region (Acosta et al., 2001; Birmingham et al., 1997; Shikanga et al., 2009; Shultz et al., 2009), not many of these papers are concerned with *sociocultural* features of

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cholera, and a comparative study of urban and rural settings is lacking. Inasmuch as urban and rural communities and their health systems differ, such research is needed to guide effective cholera control.

Densely populated urban informal settlements in sub-Saharan Africa often lack adequate access to safe water and sanitation (Sclar, Garau, & Carolini, 2005). Residents of such settlements suffer inordinately from waterborne diseases such as typhoid and cholera (Unger & Riley, 2007), suggesting a distinctive set of health problems that an effective health system needs to acknowledge.

The profile and setting of health problems in rural areas differ from that in urban informal settlements, and these social contexts and cultural practices require consideration. For instance, studies in rural Africa show that communal events, such as funerals, may lead to cholera transmission (Gunnlaugsson et al., 1998; Shapiro et al., 1999). In 2010, more of the rural populations of sub-Saharan Africa lacked access to safe water (51%) than those in urban areas (17%); fewer people in rural areas had access to adequate sanitation and, therefore, were more likely to defecate in the open than people in urban areas (WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, 2012).

Western Kenya, which has both urban informal settlements and rural areas, provides good prospects for distinguishing relevant features of urban and rural endemic cholera. Nyanza Province is most severely affected by cholera (Feikin, Tabu, & Gichuki, 2010). The high burden of cholera in the province may be attributed to the proximity to Lake Victoria, which is one of the main sources of contaminated water (Feikin et al., 2010). Other risk factors for cholera in the province include attending funerals and sharing meals with people who have watery diarrhoea (Shapiro et al., 1999). This region was also destabilised by violence after the election in December 2007, which may have contributed to local outbreaks in 2008 and a large and prolonged nationwide outbreak of cholera in 2009. Shikanga et al. (2009) reported case-fatality rates (CFRs) as high as 11.4% in Nyanza in 2008. During the nationwide outbreak in 2009, more than 11,000 cases were reported to the World Health Organization (WHO), with an overall CFR of 2.31% (WHO, 2010b). During cholera outbreaks, cholera treatment centres providing free services are often organised as part of the response efforts.

This research was motivated by the premise that effective cholera prevention and control efforts benefit from understanding community ideas about the meaning of cholera, which affect risk-related and help-seeking behaviour. Our study aimed to explain how differences in social organisation and how cultural features in urban and rural settings may affect cholera transmission, prevention and control. Related sociocultural interests were presented in a complementary report from this fieldwork, identifying the determinants of anticipated vaccine acceptance (Sundaram et al., 2013).

Methods

Study setting

This research was conducted in selected areas of urban and rural Nyanza Province, Western Kenya. The urban site was Nyalenda A, located in the city of Kisumu. The rural site was Kakum Kombewa, a sub-location in Central Alego, in Boro division of

Siaya District. Nyalenda A is a large, crowded informal settlement with an estimated population of 23,700 and a population density of 8,500/km^2 in 1999 (UN-Habitat, 2006). It lacks an adequate water supply, sewage system and health services. From our field observations, poor sanitation and food hygiene are notable at roadside kiosks. At the time of the study, there were no health facilities run directly by the Ministry of Health in this community. However, two health facilities were operating: a dispensary owned by the Kisumu Municipal Council and a private clinic. Other health facilities are also available nearby; the Kisumu District Hospital is located about 4–5 kilometres away and the New Nyanza Provincial General Hospital – now named Jaramogi Oginga Odinga Teaching and Referral Hospital – is located about 5–6 kilometres away.

The rural study site is less densely populated (270/km^2) (Ministry of Public Health and Sanitation, 2009). The main water sources for the 3,700 inhabitants in Kakum Kombewa sub-location are streams and rivers; estimated latrine coverage at the time of the study was 73%, but about 24% were in disrepair and rarely used (District Public Health Office, 2008). Some residents reportedly defecate in nearby bushes and sugar plantations. There was no health facility in Kakum Kombewa at the time of this study, and residents in need of health services were compelled to go to Siaya District Hospital, 15 kilometres away.

Instrumentation

Integrated quantitative and qualitative methods of cultural epidemiology used a locally adapted interview based on the framework of the explanatory model interview catalogue (EMIC) (Weiss, 1997, 2001). Semi-structured EMIC interviews have been useful in clarifying illness-related experiences, meaning and help-seeking behaviour among patients and the general population for a wide variety of health problems.

An EMIC interview for the general population was drafted in English for the study of illness with essential features of cholera, based on previous research in Zanzibar (Schaetti et al., 2010). Public health professionals from the urban and rural areas who are involved in cholera control provided input that informed the development of the instrument and study design. After translation into local languages, Kiswahili and Dholuo, the interview was pilot-tested and refined. Interview questions focused on an adult from the local area who was suffering from typical cholera symptoms and had a history of cholera infection, portrayed in a clinical vignette presented at the outset (see text box). This vignette was developed from an instrument used in a previous study in Zanzibar, after revision and piloting for local comprehensibility. Sex and area of residence (urban or rural site) of the person in the vignette were matched with sex and site of the respondent to enhance the empathic connection and make the vignette more engaging.

The illness was described by its features without mentioning the local term for cholera, and the respondents were asked to name the condition presented to them in the vignette. They were also asked about the associated symptoms and patterns of distress and perceived causes, including biological, behaviour-related and social and traditional magico-religious causes. Respondents were asked to identify health care providers that would be appropriate to consult for treatment or help, including allopathic and traditional practitioners. Options for self-treatment and prevention were also considered.

Text box: Example of a clinical vignette for cholera used to introduce EMIC interviews among adults from the general community.

Male
Otieno from Nduru, who is 40 years old, did not feel like going out to work one morning last week. All of a sudden he had to run to the latrine. He became more and more concerned after the second and third time of running to the latrine because he was passing lots of stool, which looked like rice water. It was as if he were urinating instead of defecating. He also felt very miserable because he was vomiting terribly, and the muscles in his arms and legs were very painful.

Female
Atieno from Nduru, who is 40 years old, did not feel like going out to the market one afternoon last week. All of a sudden she had to run to the latrine. She became more and more concerned after the second and third time of running to the latrine because she was passing lots of stool, which looked like rice water. It was as if she were urinating instead of defecating. She also felt very miserable because she was vomiting terribly, and the muscles in her arms and legs were very painful.

Study design and sampling

This cross-sectional survey was conducted concurrently in the two study communities between March and May 2010. The population sample included adult residents, age 18 to mid-60s. Systematic probability sampling was carried out at the urban site based on a population estimate. Household lists were available through community health workers at the rural site. Specific households, proportional to the total number of households in each village, were identified through random selection from these household lists. Only one willing individual per household was interviewed. The sample was stratified by site and sex. Calculation of the sample size was based on the non-parametric Wilcoxon test to compare the prominence of variables for categories of distress, perceived causes, self-treatment, help-seeking and prevention between both sites (see calculation of prominence below) (Schaetti et al., 2009). At least 328 respondents were needed to detect differences in prominence with 80% power at a level of 95% significance. An additional 10% were added as an adjustment for possible missing data. Further details on sampling are described elsewhere (Sundaram et al., 2013).

A 10-day training workshop on interviewing and data entry was held for the research teams. A total of 16 interviews were piloted over two days during the workshop and in the following week. Each team consisted of an interviewer who also coded response categories and a note-taker who wrote down narrative responses. Interviews were digitally voice-recorded for consenting respondents. Written narratives were translated into English and typed using a word processor by the research teams. To enhance the qualitative content, answers to selected questions were transcribed verbatim from voice recordings. Quantitative data were double-entered using Epi Info 3.5.1.

This study was approved by the Kenya Medical Research Institute and the WHO Research Ethics Review Committee. Interviews were conducted after obtaining written informed consent.

Approach to analysis

MAXQDA 10 was used for managing and analysing textual data. Automatic thematic coding used features of the software to link topics of questions to thematically coded content. Narratives were analysed using the quote matrix facility of MAXQDA for comparative, contextual, site-specific and gender-based analysis of the sociocultural features of cholera in urban and rural areas.

Quantitative data were analysed using SAS 9.2 for comparing the frequencies of reported categories. Mean prominence of response categories was computed based on whether a category was reported in response to an open-ended question without the interviewer prompting or naming the category (an assigned value of 2), or reported only after prompting (an assigned value of 1), and in any case taking into account whether the category was identified as superlative (e.g., most troubling category of distress, most important perceived cause, etc.) among all reported categories (an additional value of 3) (Sundaram et al., 2013). Categories not reported were assigned a value of 0. This approach enabled urban–rural comparison considering not only just the frequency of responses but also their prominence based on how they were reported.

Results

Sample characteristics

A randomly selected sample of 379 adult community residents (190 urban and 189 rural) was studied. The refusal rate (eligible people approached who did not wish to be interviewed) was 18.7% at the urban site and 6.8% at the rural site. Rural respondents were on an average older than urban respondents (median age 36.8 vs. 28.9 years, $p < 0.001$). Self-employment (i.e., small business owner, street vendor, trader or skilled labourer) was the most frequently reported occupation at the urban site, while agriculture predominated at the rural site. The urban sample was better educated. Economically, urban respondents were better off than rural respondents, reporting a higher personal monthly income (median KES2500 vs. KES1000) and being more likely to regard their household income as reliable and dependable. Further details of sample characteristics are available in Table 1 of Sundaram et al. (2013).

Identification and seriousness of illness described in cholera vignette

Approximately, three-quarters of respondents at both sites identified the illness as cholera (72.6% urban, 77.8% rural, $p = 0.28$), either by the English term *cholera* or the Kiswahili term *kipindupindu*. The remaining respondents identified the condition as either normal diarrhoea (12.6% urban, 7.9% rural, $p = 0.18$) or some other illness (13.2% urban, 11.6% rural, $p = 0.76$), or they were unable to identify the illness at all (1.1% urban, 2.1% rural, $p = 0.45$).

The vast majority of respondents regarded the condition as very serious (91.6% urban, 91.0% rural, $p = 0.86$) or moderately serious (7.9% at both sites). There was no urban–rural variation in the accounts of severity of the illness. The basis for perceived severity referred to weakness, need for treatment, contagiousness and likelihood of fatality. No one said it was not serious. More respondents at the urban

site, however, said the condition was likely to be fatal without treatment (60.0% urban, 39.7% rural, $p < 0.001$). No one at either site reported the expectation of full recovery from the illness without treatment.

Vulnerability to illness described in cholera vignette

Respondents were asked whom they considered more vulnerable to the illness: men or women; adults or children and rich or poor people. If both options were regarded as equally vulnerable, or if neither option was considered susceptible, 'neither' was coded (see Table 1). The majority discounted any gender-based vulnerability, but more so in the rural area ($p < 0.001$). A larger number of urban respondents identified women as more vulnerable ($p < 0.001$). The vulnerability of women was explained with reference to contamination due to housecleaning and childcare, caring for sick people, being exposed to contaminated water or other causes. Men were considered less vulnerable because they spend more time at workplaces where the environment is cleaner. A distinctive idea at the rural site was that by selling goods in open markets, which are dirty, women's vulnerability increased. Urban but not rural respondents referred to the poor personal hygiene of women.

A majority of the urban respondents (67.9%) considered children to be more susceptible than adults. Children's vulnerability was explained by the urban residents as a result of their not knowing how to take care of themselves. A 43-year-old man from the urban site stated, 'Children are more likely to get it, because they do not know a lot about cleanliness. They have no control. They may play with dirty water. While playing, they put anything they find in their mouth'. A majority of rural residents (39.2%) considered neither group particularly more vulnerable to the illness.

Economic differences were regarded as a more important perceived risk factor at the urban site than the rural site, where the poor were seen as being at greater risk than the rich. At both sites, the poor were thought to be more vulnerable than the rich, with a significantly higher proportion of urban respondents reporting this difference ($p < 0.001$). The vulnerability of the poor was explained by their being compelled to live in a dirty environment, their inability to exercise appropriate discretion about what they eat, their limited access to safe water and their lesser degree of awareness about how to avoid such illnesses. A few respondents at both sites said the rich were more vulnerable, explaining that poor people are more accustomed to harsh conditions, which make them stronger. The rich, on the other hand, are more likely to get sick if they are exposed to the same conditions, and they also tend to eat refrigerated foods that may be spoiled.

Patterns of distress

'Weakness' was most prominent among the physical symptoms, and it was reported spontaneously more frequently than any other category at both sites (42.3% rural and 41.1% urban). The symptom was also mentioned by more than 90% at both sites when probed responses were included, but without site-specific differences in prominence. Prominence takes into account the fraction spontaneously mentioned, the percentage reported as a result of probing for that category, and the percentage identifying the symptom as most troubling in the comparison. The most troubling symptoms of cholera at both sites included the frequent passing of stool (presented

Table 1. Community perceptions of vulnerability to the illness for a cholera vignette in urban and rural Western Kenya, 2010.

	Urban site, $n = 190$ %	Rural site, $n = 189$ %	p value[a]
Sex			
Men more vulnerable	10.5	13.2	0.432
Women more vulnerable	35.3	13.8	**<0.001**
Neither more vulnerable	54.2	73.0	**<0.001**
Age			
Adults more vulnerable	17.4	27.5	**0.020**
Children more vulnerable	67.9	33.3	**<0.001**
Neither more vulnerable	14.7	39.2	**<0.001**
Social class			
Rich more vulnerable	2.1	3.7	0.380
Poor more vulnerable	60.5	43.9	**0.001**
Neither more vulnerable	37.4	52.4	**0.004**

[a]Fisher's exact test used for comparison of responses between urban and rural sites. Bold represents $p \leq 0.05$.

in the vignette), physical weakness, vomiting (presented in the vignette), unconsciousness and abdominal cramps. There were no site-specific or gender-specific differences in the narratives that explained how the respondents in the urban and rural sites described the physical features of cholera. 'Loss of appetite' was reported more frequently and with higher prominence at the urban site (total reported 94.2% urban and 88.4% rural; prominence 1.14 urban and 1.06 rural, $p = 0.042$). 'Abdominal pain' was cited more frequently and more prominently at the rural site (total reported 79.9% rural and 61.1% urban; prominence 0.99 rural and 0.83 urban, $p = 0.004$). 'Stool frequency' was a feature of the vignette, and it was, therefore, a given, rather than a respondent-reported, symptom, but it was identified more frequently as the most important symptom at the urban site (47.4% urban and 15.3% rural, $p < 0.001$). A small number at both sites could not identify a single most important symptom, and their responses were coded 'cannot say' (13.2% urban and 20.6% rural, $p = 0.056$).

Financially, the illness appeared to be more distressing for urban residents; loss of family income (total reported 97.9% urban and 94.7% rural; prominence 2.94 urban and 2.31 rural, $p < 0.001$) and illness-related costs were reported by significantly more urban residents (total reported 97.9% urban and 87.3% rural; prominence 1.51 urban and 1.28 rural, $p < 0.001$).

Meanings and perceived causes

Perceived causes of cholera at both the sites were similar, including 'drinking contaminated water', 'dirty environment' and 'lack of latrines'. Environmental issues, particularly 'dirty environment' and 'flies', were more prominent among urban respondents, although the last was reported by about 96% at each site (see Table 2). The most prominent perceived cause at the urban site was 'dirty environment', and at the rural site, it was 'drinking contaminated water'. 'Flying toilets' were a distinctive

Table 2. Perceived causes for a cholera vignette in urban and rural Western Kenya, 2010.

	Urban site, $n=190$				Rural site, $n=189$				
	How reported?[b]				How reported?[b]				
Category[a]	Total reported%	Spontaneous%	Most important%	Mean prominence[c]	Total reported%	Spontaneous%	Most important%	Mean prominence[c]	p value[d]
Ingestion	**98.9**	**81.6**	**25.8**	**2.58**	**96.8**	**76.7**	**33.9**	**2.75**	0.434
Drinking contaminated water	97.4	62.6	19.5	2.18	93.7	57.7	23.8	2.23	0.778
Eating unprotected/ spoiled food	95.3	61.1	6.3	1.75	91.0	52.9	10.1	1.74	0.432
Eating forbidden food	11.6	0.5	0.0	0.12	14.8	0.0	0.0	0.15	0.365
Eating soil	60.0	0.0	0.0	0.60	52.4	0.0	0.0	0.52	0.136
Behaviour	**97.4**	**29.5**	**3.2**	**1.37**	**96.3**	**31.7**	**7.9**	**1.52**	0.245
Contact with contaminated water	55.8	4.7	1.1	0.64	63.0	6.9	1.6	0.75	0.115
Not washing hands	95.8	25.8	2.1	1.29	96.3	27.5	6.3	1.43	0.252
Environment	**98.9**	**68.4**	**55.3**	**3.33**	**98.9**	**45.0**	**35.4**	**2.50**	**<0.001**
Dirty environment	97.9	40.0	30.5	2.29	94.7	21.2	15.9	1.63	**<0.001**
Lack of latrines	96.3	24.2	23.7	1.92	95.2	23.3	15.9	1.66	0.125
Flies	96.3	35.8	1.1	1.35	95.8	18.5	3.7	1.25	**0.004**
Malaria	19.5	1.6	0.0	0.21	24.9	0.0	0.0	0.25	0.243
Worms	23.2	0.5	0.0	0.24	39.7	0.0	0.0	0.40	**0.001**

Table 2 (*Continued*)

Category[a]	Urban site, $n=190$				Rural site, $n=189$				
	How reported?[b]				How reported?[b]				
	Total reported%	Spontaneous%	Most important%	Mean prominence[c]	Total reported%	Spontaneous%	Most important%	Mean prominence[c]	p value[d]
Magico-religious causes	**22.6**	**0.5**	**0.5**	**0.25**	**25.4**	**0.0**	**2.1**	**0.32**	0.498
Witchcraft	9.5	0.0	0.0	0.09	11.6	0.0	0.0	0.12	0.494
God's will	8.9	0.0	0.0	0.09	7.4	0.0	0.0	0.07	0.586
Violation of taboo/tradition	10.0	0.5	0.5	0.12	15.3	0.0	2.1	0.22	0.116
Miscellaneous	**12.1**	**12.1**	**15.3**	**0.70**	**42.3**	**42.3**	**20.6**	**1.47**	**<0.001**
Other causes[e]	10.0	10.0	2.6	0.28	30.7	30.7	2.6	0.69	**<0.001**
Cannot say	2.1	2.1	12.6	0.42	11.6	11.6	18.0	0.77	**0.005**

[a]Symptoms analysed as groups (in bold) based on reported categories. Categories reported by less than 5% are not listed. Category order in the interview maintained.
[b]Columns indicate the frequency of reported categories, the percentage of responses that were reported spontaneously for each category and the percentage of responses that identified the category as most important.
[c]Mean prominence calculated from values assigned based on how the category was reported: where not reported = 0, reported on being probed = 1, reported spontaneously = 2, identified as most important = 3.
[d]Wilcoxon test used for comparison of mean prominence between sites. Bold represents $p \leq 0.05$.
[e]Includes contact with infected persons, unprotected sexual intercourse, cold weather, mosquitoes, breathing in contaminated air and eating cold food.

feature of the 'dirty environment' and life in the urban site. The term refers to the practice of passing stool in polythene bags, which are thrown into the open pathways of the informal settlements.

Environmental causes were frequent but less prominent for rural respondents, and they were explained differently. For rural respondents 'dirty environment' more likely referred to the open disposal of human stool in the bushes and on muddy and contaminated grounds, in addition to exposure in open-air markets with the high potential for spreading cholera. Rural residents explained how stool is passed in the open bush because pit latrines are unavailable in homes, and stool is washed into the river when it rains. Using such water from rivers and streams contaminated with human faeces was acknowledged as a cause of cholera. 'Eating unprotected/spoiled food' was the second most prominent perceived cause at the rural site. Narratives in the rural setting referred to poor food hygiene when food is served at funerals and other social gatherings.

'Eating soil' was more frequently identified as a perceived cause by men (67.6% of men and 45.4% of women, with a respective prominence of 0.68 men and 0.45 women, $p < 0.001$). Most men referred to the practice of eating soil as a possible cause for cholera mainly because they regard soil as dirty or filled with germs. A 30-year-old urban man explained, 'Eating soil can cause cholera because one may pick up soil where an infected person had deposited his stool'. It was clear in the accounts of some men that they associated the practice with women, as indicated in statements such as: 'The soil women eat, this is called *dodoa*, could be a cause, but it depends on whether the soil has been picked from the surface or dug from deeper in the ground (26-year-old urban man)'. Although 'dirty environment' was reported by more than 95% of both men and women, it was more likely to be reported spontaneously and/or as the most important perceived cause by men (prominence 2.10 for men and 1.84 for women, $p = 0.043$). Site-specific gender differences were also notable. 'Flies' was reported as a perceived cause in nearly equal numbers by men and women at the urban site but was more likely to be cited spontaneously and/or as the most important by women (prominence 1.28 for urban men and 1.42 for urban women, $p = 0.044$). A 24-year-old urban woman offered the following explanation for how flies could cause cholera: 'Flies carry dirt with them from the toilets and drop it on food'.

One-fifth of the respondents reported causes other than the ones listed in the interview, with significantly more 'other' responses from the rural site. Furthermore, significantly more respondents from the rural site were unable to identify any causes at all or single out one in particular as the most important cause. These responses were coded as 'cannot say'.

Help-seeking

Help-seeking accounts for the condition presented in the cholera vignette were classified into either home-based or outside treatment categories (see Table 3). Respondents' qualitative descriptions of patterns of help-seeking were similar at both sites. Provision of oral rehydration therapy (ORT) was most prominent among reported home-based treatments. Four urban respondents, however, explained that ORT should only be done for children and was not meant for adults. Ideas about the benefits of ORT were diverse, and although a majority emphasised its value in

Table 3. Self-treatment at home and help-seeking outside home for a cholera vignette in urban and rural Western Kenya, 2010.

	Urban site, $n = 190$				Rural site, $n = 189$				
	How reported?[b]				How reported?[b]				
Category[a]	Total reported%	Spontaneous%	Most helpful%	Mean prominence[c]	Total reported%	Spontaneous%	Most helpful%	Mean prominence[c]	p value[d]
Self-treatment at home									
Drinking more water/ liquids	87.9	46.3	19.5	1.93	91.0	42.9	24.3	2.07	0.493
Herbal treatment	30.0	13.2	5.8	0.61	36.5	12.7	4.8	0.63	0.292
Oral rehydration therapy[e]	84.2	31.6	36.8	2.26	89.9	30.2	31.2	2.14	0.759
Prayers	51.1	1.1	5.3	0.68	32.3	0.0	1.6	0.37	**<0.001**
Self-administered antibiotics/drugs	76.8	41.1	25.8	1.95	70.9	26.5	28.6	1.83	0.251
Help-seeking outside home									
Health facilities	100.0	100.0	95.8	4.87	100.0	99.5	88.4	4.65	**0.005**
Traditional healers	12.1	3.7	0.0	0.16	17.5	1.1	0.0	0.19	0.187
Pharmacy/over-the-counter drugs	55.3	4.2	0.5	0.61	63.0	6.9	3.2	0.79	0.072
Faith healers	15.8	2.1	0.5	0.19	21.2	1.6	1.6	0.28	0.183
Informal help from a health worker/friend	44.2	1.6	2.6	0.54	65.1	6.3	6.3	0.90	**<0.001**

[a]Categories reported by less than 15% in both sites are not listed. Category order in the interview maintained.
[b]Columns indicate the frequency of reported categories, the percentage of responses that were reported spontaneously for each category and the percentage of responses that identified the category as most helpful.
[c]Mean prominence calculated from values assigned based on how the category was reported: where not reported = 0, reported on being probed = 1, reported spontaneously = 2, identified as most helpful = 3.
[d]Wilcoxon test used for comparison of mean prominence between sites. Bold represents $p \leq 0.05$.
[e]Includes ready-made oral rehydration solution packets and home-made fluids.

providing rehydration, some other ideas suggested included the following: it provided energy, increased one's appetite, reduced germs in the stomach, stopped diarrhoea and vomiting and increased blood in the body. Drinking more water or liquids was recommended just as frequently, followed by the recommendation to use antibiotics or drugs. Tetracycline and flagyl were the most frequently mentioned antibiotics or drugs; they are available from pharmacies for self-treatment at home. These drugs were more frequently named in narratives at the urban site. Furthermore, spontaneously reported consumption of self-prescribed antibiotics or drugs for home treatment was mentioned significantly more at the urban site. Prayer was more prominent in urban accounts, reported by about half of urban respondents and about a third of rural responses.

In terms of gender differences for self-help, men were more likely to recommend herbal treatments (41.1% of men and 25.8% of women, with a respective prominence of 0.83 and 0.42, $p < 0.001$). Women were more likely to recommend using ORT (83.8% of men and 90.2% of women reporting, with a respective prominence of 2.01 and 2.38, $p = 0.017$).

A health facility was unanimously recommended at both sites for help outside the home (see Table 3). Use of informal help from a health worker or a friend was more prominent in the rural site.

Ways of prevention

Respondents' ideas for preventing the illness described in the cholera vignette included using safe water, health education and the safe disposal of stool as the three most prominent categories in decreasing order. Ensuring cleanliness and safety of food as a way to prevent cholera was significantly more prominent at the urban site ($p = 0.002$) (see Table 4). 'Safe disposal of stool', however, was more prominent at the rural site ($p = 0.026$). Preventive drugs (e.g., antibiotics, antiparasitic drugs or any others locally regarded as preventive drugs) were a higher priority in the rural site. Although health education was reported by 98.9% at both sites, it was more prominent in urban accounts, where more people regarded it as the most important means of prevention. A 53-year-old rural female farmer explained why health education was important for prevention:

> Health education should be brought even before drugs and vaccines so that people are educated at *barazas* (weekly public gatherings that are addressed by local government officers) and can change gradually. Some people are being forced to do things like building pit latrines, and they do it, but they do not use those pit latrines because they don't know why they are supposed to use them. But with health education, they will learn how and why to use them, and they will want to build more for themselves.

The prompt burial of people who die from cholera was mentioned in rural accounts, as was discouraging people from eating at funerals. Protection from magico-religious influences was acknowledged by a minority of respondents, more so in rural areas ($p < 0.001$), as a way of preventing illness depicted by the cholera vignette.

Table 4. Prevention methods for a cholera vignette in urban and rural Western Kenya, 2010.

	Urban site, $n = 190$				Rural site, $n = 189$				
	How reported?[b]				How reported?[b]				
Category[a]	Total reported%	Spontaneous%	Most useful%	Mean prominence[c]	Total reported%	Spontaneous%	Most useful%	Mean prominence[c]	p value[d]
Wash hands	96.8	31.1	2.6	1.36	96.8	31.2	5.8	1.46	0.653
Safe water	98.4	70.5	5.8	1.86	97.9	65.1	12.2	1.99	0.627
Clean/safe food	98.9	64.2	4.2	1.76	97.9	46.0	4.8	1.58	**0.002**
Safe disposal of garbage	98.4	41.6	4.2	1.53	97.4	46.0	8.5	1.69	0.257
Safe disposal of stool	97.4	51.1	5.8	1.66	98.4	56.1	13.8	1.96	**0.026**
Preventive drugs	86.3	4.7	4.7	1.05	91.5	5.8	7.4	1.20	**0.049**
Vaccines	86.8	1.6	10.0	1.18	88.9	1.1	6.9	1.11	0.695
Health education	98.9	2.1	42.1	2.27	98.9	4.8	15.9	1.51	**<0.001**
Protection from supernatural influence	7.4	0.0	0.5	0.09	21.7	0.5	0.0	0.22	**<0.001**
Other methods[e]	21.1	21.1	4.7	0.56	20.1	20.1	6.3	0.59	0.898

[a]Categories reported by less than 5% are not listed. Category order in the interview maintained.
[b]Columns indicate the frequency of reported categories, the percentage of responses that were reported spontaneously for each category and the percentage of responses that identified the category as most useful.
[c]Mean prominence calculated from values assigned based on how the category was reported: where not reported = 0, reported on being probed = 1, reported spontaneously = 2, identified as most useful = 3.
[d]Wilcoxon test used for comparison of mean prominence between sites. Bold represents $p \leq 0.05$.
[e]Includes maintaining personal hygiene, maintaining environmental cleanliness, usage of clean utensils and clothes, not eating at funerals, avoiding infected persons, protected sexual intercourse/abstinence, avoiding alcohol and avoiding geophagy.

Discussion

Our study highlights social and cultural features of cholera in an urban community and a rural community in Western Kenya, following the large nationwide cholera outbreak of 2009. Despite public health interventions in both communities, which entailed health talks intended to create awareness about various aspects of cholera (i.e., transmission, prevention and clinical presentations), features of the condition were understood differently at each site. This study considered illness-related aspects of cholera, with reference to community-identified patterns of distress, perceived causes and help-seeking. It focused on the respondents' accounts of illness rather than the priority symptoms of the disease (Eisenberg, 1977). Local features may reflect environmental, social and cultural settings; the quality of infrastructure as well as access to health services and information in urban and rural settings. Our study shows how urban and rural settings influence the perceived role of physical symptoms and the financial impact of the illness, perceived causes, preferred help-seeking and prevention strategies.

Although economically better off than their rural counterparts, urban residents were more troubled by loss of income due to illness and the cost of treatment. Better economic opportunities and reliance on monetised transactions may explain why urban residents are more sensitive to income loss and the effects of cholera on the ability to work and earn. Fewer livelihood opportunities without money are a feature of the more monetised society of urban residents in informal settlements. A possible reason for the younger age profile among urban respondents in comparison to rural respondents, as observed in our data, is that young people are more likely to migrate from rural to urban areas for livelihood opportunities, while older people may return to rural homesteads for retirement.

The condition described in the cholera vignette was identified and named as cholera by a majority of respondents at both sites. The perceived severity and fatality associated with the illness was also considerable. Although cholera was regarded as a serious illness by most respondents, the higher perceived fatality by urban residents suggests greater perceived vulnerability. Urban residents also appeared more sensitive to the vulnerability of children and of women. Definite ideas acknowledging vulnerable segments of the population at the urban site were not supported at the rural site. This finding suggests that highlighting the benefits for women and children of interventions for cholera control at the urban site may demonstrate responsiveness to perceived needs and thereby promote community participation. That approach, however, may be less relevant at the rural site, where the community is more likely to regard everyone as equally vulnerable.

The finding that a 'dirty environment' was the most prominent perceived cause at the urban site and 'drinking contaminated water' at the rural site suggest priorities arising from different local conditions. Urban residents must contend with filthy conditions, and 'flying toilets' are a common urban phenomenon. They represent an effort to adjust to the dilapidation and non-functional state of urban sewage systems. In contrast, rural residents in areas that are relatively clean and green do not have to worry as much about the cleanliness of their surroundings. Absence of piped drinking water at the rural site, however, increases reliance on surface water sources such as rivers, streams and lakes that may be contaminated.

Eating soil, *geophagy,* was more frequently reported by men than women as a cause of the illness. Geophagy is a common practice in Western Kenya. Soil is eaten from the ground, termite mounds or walls of mud huts, and it is also sold on the street. People explain the practice in various ways (e.g., it tastes nice, it is believed to alleviate nausea and it may provide essential minerals) (Prince, Luoba, Adhiambo, Ng'uono, & Geissler, 1999). Although the practice is usually associated with the behaviour of women and children, it may have been noted by male respondents because it is more shameful for men. Some men, however, explicitly associated this practice of *dodoa* (geophagy) with women, for whom, it is relatively more acceptable. Other gender differences were notable for reported home-treatment priorities; men indicated less regard for ORT and more regard for herbal treatment than women.

The relevance of perceived vulnerability differentials in the urban area and possible implications for focusing interventions on groups perceived as vulnerable have been noted previously. Our findings suggest additional practical implications from distinguishing social and cultural features of cholera in urban and rural areas. More attention to food hygiene at funerals in rural areas is needed. Providing sanitary facilities and discouraging open defecation would help to prevent contamination of communal water supplies that often rely on surface water sources in rural areas, and this should be a priority for cholera control and prevention. Open defecation is also a problem in urban areas, where both health education and improved sanitary infrastructure are required. Several villages in the rural areas have been declared Open Defecation Free, which is a diarrhoeal disease-control measure to avoid contamination of water with human faeces (Institute of Development Studies, 2012). Such initiatives are lacking in urban areas, especially in informal settlements.

Unanimous preference for health facilities at both sites demonstrates trust in the health system and good prospects for effective public health action if there are resources and political will to support it. The credibility of health policy in the community suggests opportunities for the positive impact resulting from the strengthening of the health system. Better access and the enhanced capacity of health facilities should be a goal for preventing mortality generally and to reduce the case-fatality ratio for cholera. Community health workers, who are the preferred source of rural help-seeking, and other informal sources of help will benefit from training that increases timely access to care and facilitates health education, which is valued in the community, especially the urban community.

Easier access to medicine shops and pharmacies explains more frequent spontaneous urban references to self-prescribed antibiotics. Efforts are needed to reduce urban reliance on these drugs and to regulate their sale. Explaining other ways to prevent cholera should reduce the misuse of antibiotics and should emphasise the value of rehydration through ORT for lifesaving treatment. ORT for home management of cholera appears to be more highly valued as an intervention for children, and better awareness of its value for adults should be an aim of information, education and communication.

Supernatural perceived causes were reported by a relatively small segment of the population. Although no differences distinguished rural and urban areas in the prominence of supernatural perceived causes of cholera, the nature of religious and spiritual priorities had some distinctive features. In rural areas, protection from the influence of supernatural forces was noted more frequently and more prominently

for preventing cholera. Urban respondents were more likely to emphasise the value of prayer as a feature of self-treatment at home.

Other research in Nyanza province has also shown that high rates of rural cholera have been attributed to using contaminated water from rivers, eating contaminated food and sharing meals at funerals and communal parties (Shapiro et al., 1999; Shikanga et al., 2009). While these findings and ours indicate the need for better infrastructure and general development, specific interventions are also relevant for use in endemic areas, such as vaccines as an interim measure while development proceeds. The WHO (2010a) recommends oral cholera vaccines in endemic areas to complement classical prevention strategies (Mahamud et al., 2012). An effective vaccine strategy requires health-system capacity for delivering a vaccine and community regard for both the health system and the vaccine to motivate acceptance. Even though a cholera vaccine has not been available in the study communities, regard for vaccines was substantial, mentioned by 87.9% of all respondents. Although findings in this report focus on classical measures for cholera control, other findings from this study reported elsewhere have also identified cultural features of local cholera explanatory models that are likely to influence community vaccine acceptance in Kenya if it were to become available (Sundaram et al., 2013).

In summary, cultural concepts, perceived causes and preferred ways of treating and preventing cholera reflect the influence of urban and rural settings, as well as gender. Cholera is a well-known problem in both endemic study communities, identified by more than 75% of respondents. It is considered a serious illness with potentially fatal consequences, for which health education is desired and valued. Medical interventions are widely accepted and also valued. Findings indicate community priority, demand for and potential effectiveness of enhanced efforts to control cholera in Western Kenya, and they suggest strategies that are particularly well suited for control of urban and rural cholera.

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