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Social Media Peer Communication and Cholera Risk Perception During the 2024 Outbreak in Lagos, Nigeria: A Health Belief Model Analysis

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Abstract

Background: Cholera remains a persistent and deadly global public health challenge. Recent resurgences have caused large-scale outbreaks. Due to gaps in public health risk awareness, effective risk communication using the HBM is now critical for cholera control and prevention. During the 2024 cholera outbreak, Lagos Island residents mainly relied on social media peers to exchange risk information. This study examined cholera risk perception among residents in the hotspot areas, established how the six HBM constructs were used in the cholera-related social media peer interactions, identified dominant cues to action in social media peer interactions, and established the association between exposure to peer-generated cholera messages and risk perception and the adoption of preventive behaviours. Methods: This is a cross-sectional study that combined a survey of social media users on Lagos Island and a quantitative content analysis of Facebook and X posts during the outbreak. A total of 350 Lagos Island residents were surveyed using a multi-stage cluster sampling strategy; 540 Facebook posts and 894 X tweets were content-analysed from a large corpus of data scraped from the platforms. Results: Findings showed high exposure to peer-generated cholera messages and cues to action on X and Facebook. HBM constructs appeared in varying proportions across platforms. ANOVA results and Games–Howell post-hoc comparisons showed a statistically significant difference in average engagement

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across the HBM constructs [$p < 0.05$]. Chi-square tests indicated a significant association between exposure to peer-generated cues to action and the adoption of cholera health behaviours [$p < 0.05$]. Conclusions: The study concluded that social media peer communication was significantly associated with residents' understanding and perception of cholera risk during the outbreak. Health agencies should identify influential local voices on X and Facebook and assimilate them into public health communication strategies to strengthen the relevance, resonance, and effectiveness of digital health messages in outbreak contexts.

Keywords: cholera risk awareness and prevention; digital health literacy; health belief model; cues to action; health information ecosystem; peer communication

1. Theoretical Framework and Epistemological Foundation

1.1. Introduction and State of the Art

Cholera remains a persistent and deadly global public health challenge, evidenced by the recent resurgence of large-scale outbreaks, especially in resource-limited and conflict-affected regions [1]. Despite ongoing efforts in prevention and treatment, recurrent global outbreaks in recent years have resulted in significant mortality and morbidity among vulnerable populations in more than one-third of the world's countries [2]. Reports estimate about 2.6 million cases per year, resulting in approximately 95,000 deaths in endemic 69 countries [2]. Between January and May 2026, 68,749 cholera cases, including 944 deaths, were reported worldwide [3]. These persistent outbreaks have been compounded by population displacement, poor sanitation, rapid urbanisation, climate-related disasters, especially in populations with limited access to clean water and medical treatment, and gaps in public health risk awareness [1,4–6].

Therefore, effective risk communication has become a critical element of cholera control and prevention efforts alongside biomedical interventions [7–9] as individuals' perceptions of their susceptibility to and the severity of the disease have been found to influence their adoption of preventive health behaviours [10]. Research has also shown that during outbreaks, information and cues to action shared through various communication channels are critical to shaping the public understanding of health risks and inspiring preventive actions [11–13]. At a time when digital technologies are increasingly mediating health information exchange, social media has become a primary information ecosystem where individuals obtain, discuss, and share outbreak-related information, making it relevant to examining risk communication and public responses to cholera outbreaks such as the 2024 outbreak in Nigeria.

Cholera has been endemic in Nigeria since it first appeared in 1972 [14,15], and it remains a significant public health concern, especially in communities with inadequate water treatment, poor sanitation, and poor hygiene practices [16]. The most recent cholera outbreak was in 2024, when Nigeria recorded 19,452 suspected cases and 711 deaths, with a case fatality rate of 3.7% [14,17]. During the outbreak, Lagos State recorded the highest number of suspected cases in Nigeria. With 4667 cases, the state accounted for 43 per cent of the 10,837 suspected cases recorded in 35 states and the Federal Capital Territory [FCT] as of 29 September. Lagos Island local government area (LGA) (596 cases) was a major epicentre for the 2024 cholera outbreak in Nigeria, contributing significantly to the high number of cases in Lagos and accounting for 5% of all suspected cases reported in the country [18]. These have led to urgent calls for cholera prevention by increasing risk awareness and facilitating better public health action against cholera in Nigeria [14,19].

The Nigerian government and key stakeholders in the healthcare sector have used various communication methods to convey cholera risks and prevention protocols [14,20,21]. During the 2024 cholera outbreak, the Federal Government of Nigeria, through the instrumentality of the Nigeria Centre for Disease Control (NCDC), used mainstream and social media to communicate to Nigerians about cholera risk and prevention strategies to help control the spread of cholera. However, residents largely turned to their social media networks for enlightenment, practical guidance, and assurances [22] for two vital reasons: official updates and response capacity from health authorities do not keep pace with the rapid spread of cholera and public anxiety around it [23], and Nigerian health journalists lack the knowledge necessary to accurately and effectively disseminate health information [24]. Moreover, the 2024 cholera outbreak in Lagos, Nigeria, happened within an increasingly digital communication environment where social media platforms have become primary channels for public discourse, information seeking, and peer health communication.

Peer health communication is the exchange of health-related information between individuals of similar age, status, community, or health concerns. Given their ability to enable users to connect and exchange information with peers [25], social media platforms allow users to access health-related content published by peers and interact with them for health information or support [26,27]. Recent studies have noted a rise in the peer-to-peer sharing of health information on social media and other online settings, largely attributable to increased media literacy [28] and the emergence and the widespread societal impacts of COVID-19 [16]. Members of online communities may now find it more acceptable to receive health information and advice from peers [29,30].

While there is abundant empirical evidence that social media has become a crucial tool for disseminating health information [31–33] and that social media are utilised for peer communication during a particular disaster [34], what remains unclear, however, is whether and how peer-generated cholera-related contents on social media functioned as a cue to action and social influence in shaping people's risk perception and preventive behaviours during the 2024 cholera outbreak, particularly in hotspot communities in Lagos, Nigeria. This was examined in this study using the Health Belief Model (HBM), which posits that individual's health behaviours are associated with their perceptions of susceptibility of a health threat, beliefs about the likelihood of getting a disease or condition; the severity of its consequences, beliefs about the seriousness of contracting a diseases or condition, including the consequences; the benefits of taking action, beliefs about the positive aspects of adopting a health behaviour (e.g., efficacy of the behaviour for reducing risk or serious consequences); the barriers to doing so, beliefs about the obstacles to performing a behaviour and the negative aspects (both tangible and psychological costs) of adopting a health behaviour; cues to action, internal and external stimuli that could trigger the health behaviour; and self-efficacy, beliefs that one can perform the recommended health behaviour [31,35,36]. This framework is significant in examining cholera risk perception and prevention in peer interactions because research has shown that people adopt and sustain health-related habits through social influence and peer modelling [37,38].

The classical way to apply the HBM is through surveys, examining the relationship between people's beliefs and their health behaviours [39], but critics have stated that with social media becoming an extremely important space for health promotion, only using the survey method to study HBM would lose valuable and rich information on social media [40]. Moreover, surveys could be influenced by social desirability bias, and participants could answer questions in a socially desirable way [40]. As a result of these limitations, Mao et al. [40] situated their study on social media and content-analysed HBM constructs in COVID-19-related tweets on X, arguing that people's engagement on social media could more realistically reflect their true attitudes and interests due to

anonymity. However, the lack of integration of the two methods in a single study means that little is known about the association between self-reported individual cholera risk perceptions during an outbreak and the social contexts in which those perceptions emerge. Therefore, unlike previous studies that examined the audience and social media separately, this study collected concurrent data from the audience and social media. Data from a survey of residents in Lagos Island, a cholera hotspot during the outbreak, were used to examine how individuals' self-assessment of their susceptibility to cholera, the severity of cholera, benefits of a prevention protocol in preventing cholera, barriers related to the adoption of suggested prevention protocols, self-efficacy of successfully implementing the recommended health behaviour, and cues to action towards adopting prevention protocols is associated with their decision to adopt or disregard cholera prevention protocols. This was followed by scraping data from social media to help the researchers gain insights into how the six HBM constructs were used in the cholera-related posts and how peer interactions during the outbreak are linked to cholera-related health behaviour.

Of particular interest in this study are X (formerly Twitter) and Facebook, as research has identified them as two of the most popular and preferred social media platforms in Nigeria [41,42]. These platforms are a vibrant source of peer-to-peer communication that enables users to access health-related content, interact with others for information, and share experiences or seek social support [26]. Moreover, as platforms for macro-level storytelling that elicit immediate feedback and support [43], X and Facebook have proven to be major tools for communication during emergencies and disasters [44,45]. Understanding how peer-driven social media exchanges on X and Facebook served as cues to action is therefore crucial for explaining patterns of risk perception and social influences on the adoption of cholera prevention protocols during the outbreak and for strengthening the application of the Health Belief Model to contemporary public health crises in urban Nigerian settings.

Therefore, the objectives of this research include to assess patterns of peer communication on social media during the outbreak; examine cholera risk perception—including perceived susceptibility, severity, benefits, barriers, and self-efficacy—among residents in hotspot areas; establish how the six HBM constructs were used in the cholera-related social media peer interactions during the outbreak; identify dominant cues to action in social media peer interactions during the outbreak; and know if peer-generated cholera messages are associated with risk perception and preventive behaviours.

1.2. Theoretical Framework

This study is underpinned by the Health Belief Model (HBM), developed in the 1950s by Hochbaum, Rosenstock, and Kegeles to provide insights into why people make certain health-related decisions and how various factors influence their motivations. It is relevant in studying whether social media peer-generated cholera posts and interactions can become a cue to action and a social influence in shaping people's risk awareness and their perception of the urgency of adopting preventive behaviours in an acute pandemic context. The model has become a fundamental framework for health communication.

Research has demonstrated that health communication is central to disease prevention by enabling individuals and communities to obtain, understand, and use information about health risks [7,8]. This is particularly important during health emergencies because of the need for the timely exchange of information, advice, and opinions among key stakeholders and affected populations to enable informed decision-making and facilitate appropriate changes in behaviour [22]. The Crisis and Emergency Risk Communication (CREC) framework, developed by the US Center for Disease Control and Prevention in 2002, provides a foundation for understanding communication in emergency contexts

by emphasising the need for communication that responds to changing needs across all phases of a public health crisis [46], thereby complementing Quarantelli's sociological understanding of disasters, which illustrates that people do not respond to emergencies only as isolated individuals but also through social, community, and communication processes [47,48].

These emergency response processes have been expanded by the emergence of digital platforms, which allow individuals to search for, interpret, produce, and share real-time health information with their peers. In the digital environment, individuals can negotiate risks, interpret information, exchange experiences, and influence how their peers respond to health threats. This perspective aligns with Norman and Skinner's eHealth literacy framework, which highlights the skills to seek, find, understand, and evaluate health information from electronic sources and apply the knowledge gained to address or solve a health problem [49,50]. Thus, in an outbreak context, social media users may function concurrently as recipients, interpreters, and producers of health risk information.

However, the snag with the social media environment is that it presents a vital tension between trust and risk. While there is evidence that peer-generated information may be seen as more relatable, immediate, and trustworthy because they are produced by existing social networks [22,23,51], they are also known to facilitate the rapid spread of rumours, disinformation, and misinformation and to generate mistrust, confusion, and risk-taking behaviours during outbreaks [52]. Research in a Global South country has confirmed the risk of social media in propagating erroneous and imprecise information, anti-vaccine propaganda, and conspiracy theories [53]. Therefore, social media peer-generated interactions can either reinforce appropriate risk perceptions and preventive actions, or they can undermine them.

1.3. Hypotheses

H1. *The average user engagement on social media does not vary significantly based on the Health Belief Model (HBM) constructs featured in cholera posts.*

H2. *Exposure to peer-generated cues to action on social media is not significantly associated with the adoption of cholera health behaviour.*

2. Materials and Methods

2.1. Research Design

A cross-sectional research design that combined a questionnaire survey with a quantitative content analysis was adopted in this study. It is cross-sectional as it collected both datasets at a single specific point in time to demonstrate patterns of peer communication and risk perception during the outbreak. The survey investigated respondents' risk perception and health behaviour, while the content analysis examined cholera-related peer communications in the social media environment. X and Facebook were chosen for the social media phase because they are two of the most popular and preferred social media platforms in Nigeria [41,42] and are vibrant sources of peer-to-peer communication during health emergencies [26,44,45]. Moreover, both platforms are heavily adopted by millennial users, who make up over 70% of the study population.

2.2. Research Method

The two parallel methods used in this cross-sectional study included a quantitative content analysis of cholera-related posts on Facebook and X and a structured survey of residents of Lagos Island. The two datasets were gathered concurrently, and each was used independently to meet distinct research objectives. They helped the researchers to

understand the association between social media peer communication and cholera risk perception during the 2024 outbreak in Lagos, Nigeria, at both population and platform levels, and strengthen the rigour of the study.

Cholera-related posts and tweets were scraped from Facebook using the Meta Content Library and API and X using Octoparse Version 10.2.0, which enabled the researchers to easily collect data from various web sources without complex coding. On Octoparse, the data were collected in relation to the Twitter Advanced Search Scraper's applicable terms and data access policies: the researchers scraped only conversation-level public tweets and comments that are accessible. The Meta Content Library and API provided comprehensive access to only public content archives from Facebook pages, events, and profiles that meet specific follower or verification thresholds.

The search targeted posts/tweets, usernames and engagement metrics. The keywords used included "cholera," "outbreak," "Lagos Island cholera," "Eti-Osa cholera," "Ikoyi cholera," "Victoria Island cholera," "2024 cholera," "Lagos cholera response," "cholera epidemic," and "cholera outbreak". Boolean operators (AND, OR) were used to combine some keywords. The time frame scraped was between 9 June and 31 December 2024 (the period of the outbreak). After scraping the data from X and Facebook, they were cleaned to remove redundancies, personally identifiable information, and broken entries. The information was structured and stored in MongoDB and fed into SPSS Version 23, where they were analysed. The structure included grouping the coded data according to the following: platform (Facebook or X), user engagement (likes, retweets, quotes, replies, and bookmarks for X; reactions, shares, and comments for Facebook; volume and frequency for X and Facebook), cues to action (warnings, testimonials on family or personal experiences, advice, and community alerts/call to action), and other HBM constructs (susceptibility, severity, benefits, barriers, and self-efficacy).

A post-scraping categorisation was done using Fabi.ai (Fabi 2.0 platform architecture), a web-based AI-powered data analysis platform. The CSV of all the data scraped from Facebook and X was uploaded into the AI tool and instructed to categorise them into the HBM constructs that they matched, such as susceptibility, severity, benefits, barriers, self-efficacy, and cues to action. To validate the automated classification, two independent coders, blinded to the AI results, randomly coded a subset (20%) of the classified data. A percentage assessment to compare the AI classification with their human coding yielded a 97% agreement, indicating a high level of agreement. The prompts used are contained in Table 1.

A structured questionnaire was administered by three co-authors of this article over eight days to eligible residents of Lagos Island who lived on the Island during the 2024 cholera outbreak and who have used X or Facebook for at least two years. The administration of the instrument started on 23 January 2025 and ended on 30 January 2025. This was at the turn of the new year to avoid any recall bias that might affect the collection of factual data from the respondents. The instrument assessed exposure levels; peer communication frequency; exposure to peer-generated cues; self-reports of HBM constructs, including perceived susceptibility, severity, benefits, barriers, and self-efficacy; the relationship between social media exposure and risk perception; the association between social media messages and peers on preventive behaviours; and demographic and contextual factors that shaped exposure to peer communication, message interpretation, and risk perception and behaviour.

2.3. Operationalisation of HBM Constructs

Table 1 shows how the HBM constructs were operationalised in this study. It also includes the prompts that were used to categorise the scraped data into the HBM constructs that they matched on Fabi.ai.

Table 1. Operationalisation and categorisation of the HBM constructs.

S/N	HBM Construct	Prompts Used in Categorisation of Posts/Tweets	Sub-Themes
1	Perceived susceptibility	Categorise as perceived susceptibility if post suggests that people may contract cholera; identifies people as being vulnerable; discusses who is more likely to contract cholera; links certain conditions to the likelihood; expresses concern over the likelihood; suggests that exposure to certain condition will increase likelihood.	Individual susceptibility to getting cholera; community susceptibility to getting cholera; family susceptibility to getting cholera; general susceptibility to getting cholera [anyone is susceptible]
2	Perceived severity	Categorise as perceived severity if post describes cholera as serious, severe, or life-threatening; mentions death, severe illness, or hospitalisation caused by cholera; describes the consequences of cholera; emphasises the seriousness or severity of cholera; expresses fear or concern about getting cholera.	Belief that cholera can cause severe illness; cholera leads to hospitalisation; cholera causes death; cholera has serious consequences for households
3	Perceived benefits	Categorise as perceived benefits if post describes the benefits of taking preventive action; explains how preventive measures reduces infection; talks about benefits of early treatment or care; compares benefits of preventive actions and risks of inaction.	Treating drinking water reduces risks; handwashing prevents infection; following health guidelines offer protection; social media health advice is beneficial
4	Perceived barriers	Categorise as perceived barriers if post identifies obstacles to treating/preventing cholera; mentions a lack of preventive resources/clean water/sanitation/healthcare; stresses any difficulty in adopting recommended behaviour; says they are unable to follow recommended behaviour.	Difficulty in getting clean water; hygiene supplies are not always available; preventive measures take too much time; some online pieces of advice are difficult to follow
5	Cues to action	Categorise as cues to action if post includes warning, advice, messages, announcements, alert, or reminder about cholera; encourages people to take preventive action; shares information that prods people to protect themselves; recommends specific actions; describes an event that prods people to action.	Warning posts/comments; information about symptoms; peer advice; testimonials encouraging action; peers urge preventive action using images/videos; influential friends urge care; community leaders/opinion leaders share alerts; peers urge treatment of drinking water
6	Self-efficacy	Categorise as self-efficacy if post expresses confidence in the ability to avoid or prevent cholera; says that a person can successfully perform recommended preventive action; describes individual's ability to access preventive resources, clean water, sanitation, and hygiene; describes success in adopting preventative measures or willingness to do so.	Confidence about protecting self from cholera; ease of following preventive measures even when inconvenient; knowledge of what to do if someone shows symptoms; ability to take immediate action if cholera risks increase

2.4. Population

The survey population included adult users of *X* and Facebook residing in Lagos Island. In the absence of official statistics on platform-specific users at the local level, the 2022 Lagos Island population estimate of 314,900 [54] was used as the accessible population frame.

The population for the content analysis included all cholera-related tweets and posts generated within the study period (9 June–31 December 2024). The scraping yielded a corpus of 1911 tweets from *X* and 1172 from Facebook. These formed the sampling frame for content analysis.

2.5. Sample Size

For the survey, using the Krejcie and Morgan [55] table for sample size determination for a known population, a sample of 384 respondents was deemed appropriate for a population of 314,900.

For the content analysis, a 50% systematic sample of posts and tweets was selected from each platform as follows: 956 tweets (50% of 1911) and 586 Facebook posts (50% of 1172). This proportion exceeds the suggested sample size in quantitative content analysis for large datasets [56,57] because of the need to include more posts and tweets that will facilitate a robust analysis and to increase the rigour of this study.

2.6. Sampling Technique

For the survey, a multi-stage cluster sampling strategy was combined with purposive selection to ensure representative and targeted coverage: firstly, 19 streets [10%] were randomly selected from the 185 streets identified in Lagos Island; secondly, houses on each selected street were sampled systematically using a skip interval of 5; and lastly, one eligible respondent per household was selected, but where multiple households existed, one was chosen at random. The inclusion criteria were that only active users of X or Facebook for a minimum of 2 years were purposively included to ensure platform familiarity, and only those who lived on Lagos Island during the 2024 cholera outbreak in Nigeria were included to ensure that informed insights were obtained.

For the content analysis, systematic sampling with a skip interval of 2 was used to select tweets and Facebook posts sequentially from the scraped dataset.

2.7. Research Instruments and Reliability

A structured questionnaire made up of closed-ended questions was developed for the survey, while the code sheet was used to record data from the content analysis. For the questionnaire, a pilot test was conducted using repeated administration of the questionnaire to the same group of respondents (in Landmark University, Nigeria) within a one-week interval. Reliability tests for the six HBM subscales using SPSS demonstrated acceptable internal consistency, with Cronbach's Alpha coefficient ranging from 0.76 to 0.82 (perceived susceptibility, $\alpha = 0.78$; perceived severity, $\alpha = 0.81$; perceived benefits, $\alpha = 0.80$; perceived barriers, $\alpha = 0.76$; cues to action, $\alpha = 0.82$; and perceived self-efficacy, $\alpha = 0.77$).

For the content analysis, two graduate students of Political Science and Mass Communication, both fluent in pidgin and standard English, coded all the scraped files. The inter-coder reliability of the two coders was calculated by double-coding a random subsample of 59 (5%) Facebook posts. Krippendorff's alpha was used to assess inter-coder reliability of the six HBM variables (susceptibility, severity, benefits, barriers, cues to action, and self-efficacy), and the coefficient ranged from 0.80 to 1.0, indicating moderate to perfect agreement [58], confirming the reliability of the coding protocol.

2.8. Data Collection and Analysis

Out of the 384 copies of the survey questionnaire that were administered and retrieved, 34 (8.9%) were not usable because 18 respondents selected multiple answers for single-choice questions, 16 handed back their copies without answering most of the critical questions, and 350 (91.1%) copies were usable. For the content analysis, a total of 586 (50%) Facebook posts and 956 (50%) tweets from X were systematically selected (using a skip interval of 2) from the large corpus of scraped data and analysed for various content patterns. However, 46 Facebook posts and 62 X tweets were removed because they contained more than one HBM construct. The researchers needed to ensure that each post belonged exclusively to one construct in order to maintain the independence assumption of the one-way ANOVA. Therefore, 540 Facebook posts and 894 tweets from X were analysed.

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise survey responses and digital content data. Post-level mean engagement and standard deviations were calculated separately for Facebook and X due to the differences in the engagement structures and metrics of the two platforms. Similarly, one-way ANOVA was used separately for Facebook and X to examine the differences in post-level user engagement across the Health Belief Model (HBM) constructs. Games–Howell post-hoc comparisons were subsequently conducted to identify the specific HBM constructs that differed significantly in mean engagement. Eta squared (η^2) was used to estimate the effect size of the ANOVA.

In the one-way ANOVA, a case was defined as an individual cholera-related post on Facebook and X during the study period. Each post represented a unit of analysis and was assigned an HBM construct based on its coded content; its corresponding user engagement score was recorded as the dependent variable.

Chi-square tests of independence were conducted to examine associations between exposure to peer-generated cues to action and participants' reported change in cholera health behaviour. Cramer's V was used to test the strength of the association.

All statistical tests were evaluated at the 0.05 level of significance.

2.9. Ethical Considerations

Informed consent was obtained from respondents by administering a signed consent form attached to the questionnaire that explained the study's purpose and contained ethical principles, a consent statement, and a signature/date. For the content analysis, consent was not required because only publicly accessible social-media information was scraped and did not involve interaction with users or access to restricted content [59]. The researchers acknowledged that information provided on social media that is intentionally public is considered in the public domain and usable, but the identity of the users should be protected [59]. Therefore, public accessibility was not considered automatic consent; the researchers also considered the intended public nature of the posts/tweets, potential identifiability and sensitivity, and potential risks to users. Also, the data collected were limited to information necessary for the content analysis. All direct identifiers were expunged from the datasets before analysis.

3. Results

3.1. Quantitative Survey Results

3.1.1. Respondents' Demographic Characteristics

The distribution of the respondents' demographic characteristics in Table 2 shows that most of the respondents for this study were male, married, millennials, and civil/public servants and had a tertiary education. The majority have lived in the study area for between 5 and 7 years and considered themselves highly competent in the use of social media. This

confirms that Lagos is an increasingly digital communication environment and that the respondents were educated enough to understand the dynamics of peer communication, message interpretation, and risk perception and behaviour.

Table 2. Distribution of respondents' demographic data.

Items	Responses	Frequency	Percent
Gender	Female	145	41.4
	Male	205	58.6
	Total	350	100
Age group	18–20 years	9	2.6
	20–25 years	40	11.4
	26–35 years	146	41.7
	36–45 years	105	30.0
	46 and above	50	14.3
	Total	350	100
Marital status	Single	136	38.9
	Married	214	61.1
	Total	350	100
Highest Educational Qualification	Primary/Basic Education	71	20.3
	Secondary Education	77	22.0
	Tertiary Education	202	57.7
	Total	350	100
Occupation	Public/Civil Servant	157	44.9
	Business Person	81	23.1
	Student	76	21.7
	Artisans	20	5.7
	Other	16	4.6
	Total	350	100.0
How long have you lived in Lagos Island	2–4 years	47	13.4
	5–7 years	144	41.1
	8–10 years	41	11.7
	Above 10 years	118	33.7
	Total	350	100.0
Digital media literacy	Very poor	13	3.7
	Poor	27	7.7
	Average	69	19.7
	Good	133	38.0
	Excellent	108	30.9
	Total	350	100.0

3.1.2. Social Media Peer Communication During the Outbreak

Table 3 shows a high level of exposure to cholera-related messages shared by peers on *X* and Facebook. A majority of respondents (60%) reported exposure to a large extent, while 24% experienced exposure to an average extent. The findings suggest that the cholera outbreak generated an intensely active and highly penetrative peer communication environment, providing participants with abundant informational context for understanding risk and responding appropriately.

Figure 1 indicates that cholera risk communication during the outbreak on Lagos Island was multisourced, meaning that no single actor dominated the information landscape. Although the data show that institutional actors such as health agencies and healthcare professionals remained highly influential, peer communication appeared as a major conduit for health information.

Table 3. Extent of exposure to cholera messages by peers on X/Facebook.

	Frequency	Percent
To a large extent	210	60.0
To an average extent	84	24.0
To a little extent	56	16.0
Not at all	0	0
Total	350	100.0

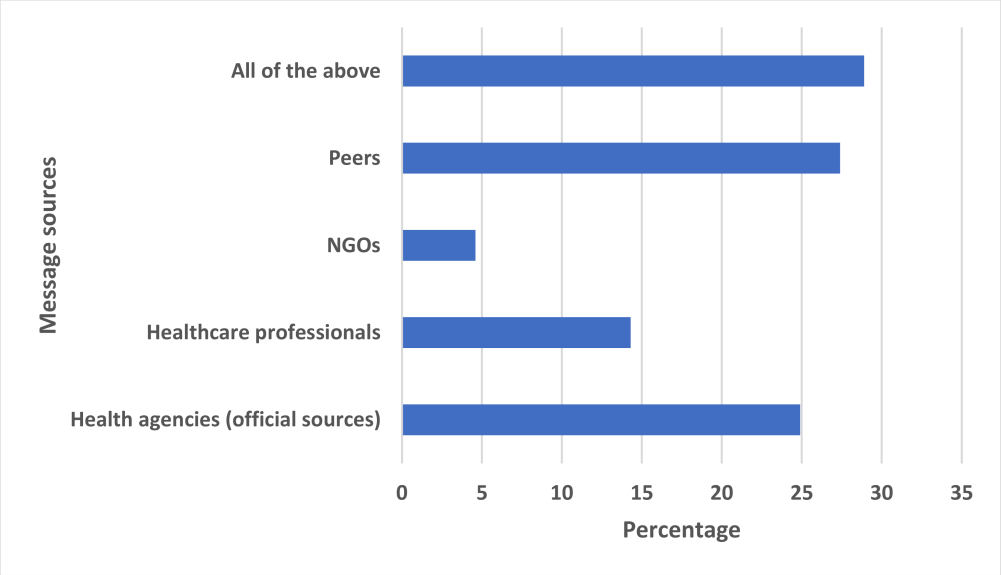


Figure 1. Leading sources of messages about cholera risk and prevention strategies.

Figure 2 shows that several factors potentially shape participants' perception of the credibility of cholera-related messages shared by peers on social media, but individual health literacy emerged as the most dominant factor. This was followed by exposure to alternative sources, including official health agencies, expert posts, or news outlets. The implication is that the majority of the participants depended on internal cognitive capacities (internal literacy) and external points of comparison (alternative sources) instead of contextual or demographic factors to assess peer-generated cholera information.

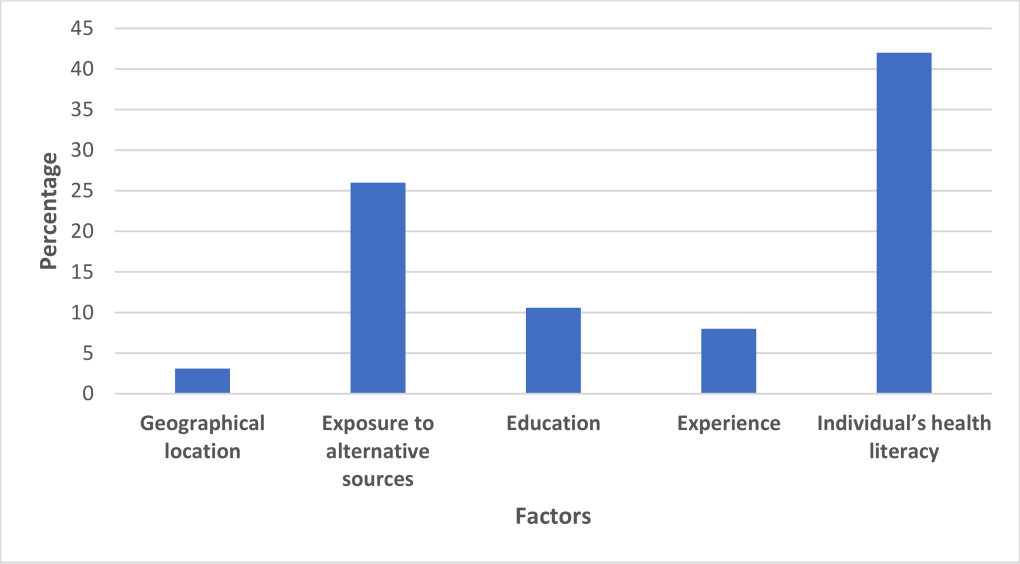


Figure 2. Factors that influenced the credibility of social media peer messages.

3.1.3. Self-Reported HBM Constructs Reflected in the Social Media Posts

Table 4 shows that the majority (84.6%) of the respondents were exposed to peer-generated cues to action on *X*/Facebook, indicating the prevalence of stimuli that initiated the decision-making process to embrace cholera health behaviour.

Table 4. Exposure to peer-generated cues to action.

	Frequency	Percent
Yes	296	84.6
No	21	6.0
Can't say	33	9.4
Total	350	100.0

The mean scores in Table 5 were above 3.51, showing that peer-generated cues to action were reasonably frequently seen by the participants. However, peer warnings, peer alerts about symptoms, peer calls for preventive actions, and peer appeals for adherence to prevention protocols (all > 3.51, the mean of means) were the most frequently seen peer-driven cues to action. Low standard deviations (between 1.12 and 1.20) show there was a moderate spread of responses, which reveals that the participants' experiences varied but trended upward towards frequent exposure.

Table 5. Level of exposure to various peer-generated cues to action.

	Mean [$\bar{x}$]	Standard Deviation [SD]
I saw peers/friends warn others to take precautions	3.70	1.12
I saw peers/friends share information about symptoms	3.56	1.16
I saw peers/friends advise to take treatment	3.48	1.15
I saw personal testimonials/stories encouraging caution	3.38	1.17
I saw peers/friends posting and commenting with images/videos urging preventive action	3.63	1.14
I saw influential friends urging other to be careful	3.40	1.17
I saw community leaders or respected individuals sharing alerts	3.34	1.20
I saw peers urging people to treat drinking water	3.58	1.16

Table 6 shows that the respondents reported moderate to high levels of cholera risk perception across the HBM constructs due to their exposure to social media peer interactions, with perceived benefits (m = 4.07, SD = 0.94) being the strongest and perceived barriers (m = 3.39, SD = 1.19) the weakest. This suggests that the respondents generally agreed that the cholera prevention measures mentioned in the peer interactions were perceived as beneficial. This is especially significant with three benefit items: "I believed that handwashing helped me prevent infection," "I believed that treating drinking water reduced my cholera risk," and "I believed that following cholera guidelines protected me". Meanwhile, the low mean for perceived barriers (m = 3.39, SD = 1.19) suggests that the respondents perceived some obstacles to adopting recommended preventive behaviours.

Table 6. Descriptive analysis of cholera risk perception using the HBM constructs.

Items	$\bar{x}$	*SD*
Perceived susceptibility	3.58	1.15
I believed I was at risk of getting cholera	3.42	1.24
I believed people in my community were likely to get cholera	3.68	1.12
I believed my family was vulnerable to cholera	3.48	1.21
I believed that anyone can get infected during an outbreak	3.77	1.13
Perceived severity	3.97	1.01
I believed cholera can cause illness	3.95	0.99
I believed that cholera can lead to hospitalisation	3.93	1.10
I believed that cholera can cause death	4.10	0.966
I believed that cholera has severe consequences for households	3.90	1.07
Perceived benefits	4.07	0.935
I believed that treating drinking water reduced my cholera risk	4.21	0.921
I believed that handwashing helped me prevent infection	4.24	0.908
I believed that following cholera guidelines protected me	4.08	0.958
I believed that social media health advice was beneficial	3.74	1.07
Perceived barriers	3.39	1.19
Clean water was expensive to get	3.64	1.164
Hygiene supplies were not always available	3.47	1.193
Preventive measures took too much time	3.10	1.286
Some advice online were hard to follow	3.36	1.247
Perceived self-efficacy	3.57	1.13
I was confident of protecting self from cholera	3.64	1.111
I was sure to follow preventive measures even when inconvenient	3.52	1.155
I knew what to do if someone showed symptoms	3.62	1.113
I could take action immediately if cholera risk increased	3.51	1.215

Perceived severity (m = 3.97, SD = 1.01) was also high, showing that the respondents generally perceived cholera as a serious threat, especially with one severity item: "I believed that cholera can cause death". Perceived susceptibility (m = 3.58, SD = 1.15) and perceived self-efficacy (m = 3.57, SD = 1.13) were moderately high, suggesting that the respondents moderately perceived themselves, their families, and their communities as being at risk of contracting cholera, and there was a moderately high level of confidence in the respondents' ability to perform the recommended health behaviour.

3.1.4. Adoption of Cholera Health Behaviour

Table 7 shows that the majority (86%) of the respondents changed their cholera health behaviour and adhered to the prevention protocols during the outbreak, suggesting that there were sufficient stimuli in the online environment that are connected with their adoption of recommended cholera-health behaviour.

Table 7. Participants' change of cholera health behaviour during the outbreak.

	Frequency	**Percent**
Yes	301	86.0
No	35	10.0
Can't say	14	4.0
Total	350	100.0

Table 8 shows that the respondents demonstrated a generally high level of engagement in preventive behaviours. However, the intensity of the engagement varied according to the preventive behaviour. Washing hands frequently with soap ($\bar{x}$ = 4.42) recorded the highest mean score, suggesting that it was the most widely practised preventive behaviour among the respondents. This was followed by the treatment of drinking water ($\bar{x}$ = 4.18) and avoidance of unsafe food/water sources ($\bar{x}$ = 4.05), indicating a wide understanding that cholera is water-borne. However, there was moderate-to-high engagement in thorough preparation of food ($\bar{x}$ = 3.62), signifying that the respondents were willing to cook or have their food cooked thoroughly. The safe disposal of all human wastes recorded the lowest mean score ($\bar{x}$ = 3.21), suggesting that while the respondents were generally actively engaged in other preventive behaviours, fewer actively engaged in safe disposal of human waste, suggesting the existence of a possible barrier to engagement.

Table 8. Preventive health behaviours adopted during the outbreak.

	Mean	SD
I began to treat my drinking water	4.18	0.94
I started regularly washing my hands with soap	4.42	0.82
I avoided unsafe food/water sources	4.05	0.98
I cooked food/had my food cooked thoroughly	3.62	1.10
I ensured all human wastes are safely disposed	3.21	1.18

3.2. Content Analysis of Social Media Posts

3.2.1. Posts and Engagement Metrics

Using a quartile-based grouping, data in Table 9 show that perceived severity (32%) dominated engagement on Facebook during the outbreak, followed by perceived benefits (27%), perceived susceptibility (19.6%), perceived barriers (18%), and self-efficacy (2.1%), and cues to action (1.8%) received the least engagement, suggesting minimal user interaction with peer-driven calls to action, warnings, alerts, and prompts. The overall implication is that the Facebook users had higher engagement with posts about risks and solutions but less with posts about behavioural reinforcement (cues to action and self-efficacy).

Table 9. Distribution of Facebook posts and engagement metrics across the HBM constructs.

HBM Constructs	Case	Total Engagement	Percent	Interpretations (Level of Engagement)
Perceived susceptibility	103	2836	19.6	Moderate
Perceived severity	100	4632	32	Highest
Perceived benefits	93	3907	27	Strong
Perceived barriers	98	2611	18	Moderate-low
Self-efficacy	59	298	2	Very low
Cues to action	87	201	1.4	Lowest
Total	540	14,485	100	

Using a quartile-based grouping, data in Table 10 show that perceived severity (30%) dominated engagement on X during the outbreak, followed by perceived benefits (25.2%), perceived susceptibility (21%), perceived barriers (12%), self-efficacy (7%), and cues to action (4.8%). Similar to engagement with HBM constructs on Facebook, X users had higher engagement with posts about risks and solutions but less with posts about behavioural reinforcement (cues to action and self-efficacy).

Table 10. Distribution of X posts and engagement metrics across the HBM constructs.

HBM Constructs	Case	Total Engagement	Percent	Interpretations (Level of Engagement)
Perceived susceptibility	228	24,958	21	Moderate
Perceived severity	157	35,654	30	Highest
Perceived benefits	163	29,962	25.2	Strong
Perceived barriers	139	14,262	12	Low
Self-efficacy	97	8319	7	Moderate-low
Cues to action	110	5693	4.8	Lowest
Total	894	118,848	100	

3.2.2. Peer-Generated Cues to Action

At the post-level engagements, 87 (16.1%) Facebook posts and 110 (12.3%) X tweets featured cues to action. However, some of those individual posts contained multiple cue types, accounting for a total frequency higher than the post-level engagements.

Table 11 showed that preventive-action advice/reminders were the dominant peer-generated cues to action on both platforms, followed by education on the transmission mode, symptom information, and treatment advice/early care-seeking, although their relative prominence differed between Facebook and X. This suggests that the cues in peer communication relied heavily on practical prevention and disease awareness, with relatively little reliance on personal testimonials, official alerts, and general education on cholera, during the 2024 cholera outbreak.

Table 11. Dominant peer-generated cues to action in the Facebook posts and X tweets.

Cue Types	Facebook n (%)	Rank	X n (%)	Rank
Symptom information	28 (22.4)	3	39 (18.9)	3
Treatment advice/early care-seeking	16 (12.8)	4	31 (15)	4
Personal testimonials/experiences	2 (1.6)	7	4 (1.9)	7
Preventive-action advice/reminders	37 (29.6)	1	60 (29.1)	1
Shared official alerts and announcements	5 (4)	6	15 (7.3)	5
Education on transmission mode	29 (23.2)	2	46 (22.3)	2
General education/information on cholera	8 (6.4)	5	11 (5.3)	6
Total	125 (100)		206 (100)	

3.3. Hypotheses Testing

Decision Rule: $p < 0.05$

H1. *The average user engagement on social media does not vary significantly based on the Health Belief Model (HBM) constructs featured in cholera posts.*

To test this hypothesis, one-way ANOVA was used separately for Facebook and X to examine the differences in post-level user engagement across the Health Belief Model (HBM) constructs.

Data in Table 12 show considerable variation in Facebook post engagement across the HBM constructs. Perceived severity generated the highest mean engagement (M = 46.32, SD = 50.14), followed by perceived benefits (M = 42.01, SD = 24.86). The Table also shows that perceived susceptibility (M = 27.53, SD = 18.123) and perceived barriers (M = 26.64, SD = 21.857) recorded comparable levels of post engagement, while self-efficacy (M = 5.05, SD = 2.88) and cues to action (M = 2.31, SD = 1.12) generated substantially lower engagement.

Table 12. Descriptive statistics of Facebook post engagement by HBM constructs.

HBM Constructs	*N*	Mean	Std. Deviation	Std. Error
Perceived susceptibility	103	27.53	18.123	1.786
Perceived severity	100	46.32	50.143	5.014
Perceived benefits	93	42.01	24.856	2.577
Perceived barriers	98	26.64	21.857	2.208
Self-efficacy	59	5.05	2.879	0.375
Cues to action	87	2.31	1.124	0.120
Total	540	26.82	31.238	1.344

A one-way ANOVA result in Table 13 shows a statistically significant difference in mean Facebook post engagement across HBM constructs, F (5, 534) = 38.652, $p < 0.001$, $\eta^2 = 0.265$. This indicates that engagement on Facebook varies depending on the type of HBM construct in cholera posts. The effect size ($\eta^2 = 0.265$) indicates that the HBM construct accounted for approximately 26.5% of the variance in post engagement, representing a relatively large effect.

Table 13. One-way ANOVA of differences in mean Facebook post engagement across HBM constructs.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	139,763.939	5	27,952.788	38.652	0.000
Within Groups	386,188.348	534	723.199		
Total	525,952.287	539			

Games–Howell post hoc comparisons in Table 14 showed that Facebook post engagement differed significantly between most HBM constructs. There was no statistically significant difference between perceived susceptibility and perceived barriers (MD = 0.891, $p = 1.000$) and between perceived severity and perceived benefits (MD = 4.309, $p = 0.973$). All other pairwise comparisons were statistically significant at $p < 0.05$.

Table 14. Games–Howell post-hoc comparison of post engagement on Facebook by HBM constructs.

(I) HBM	(J) HBM	Mean Difference (I–J)	Sig.
Perceived susceptibility	Perceived barriers	0.891	1.000
	Self-efficacy	22.483 *	0.000
	Cues to action	25.224 *	0.000
Perceived severity	Perceived benefits	4.309	0.973
	Perceived barriers	19.677 *	0.006
	Perceived susceptibility	18.786 *	0.008
	Self-efficacy	41.269 *	0.000
	Cues to action	44.010 *	0.000
Perceived benefits	Perceived barriers	15.368 *	0.000
	Self-efficacy	36.960 *	0.000
	Perceived susceptibility	14.477 *	0.000
	Cues to action	39.700 *	0.000
Perceived barriers	Self-efficacy	21.592 *	0.000
	Cues to action	24.333 *	0.000
Self-efficacy	Cues to action	2.741 *	0.000

* The mean difference is significant at the 0.05 level.

Data in Table 15 show substantial variation in X post engagement across the HBM constructs. Perceived severity generated the highest mean engagement (M = 227.10, SD = 85.996), followed by perceived benefits (M = 183.82, SD = 62.0). The Table also shows that perceived susceptibility (M = 109.46, SD = 34.944), perceived barriers (M = 102.60,

SD = 34.498), self-efficacy (M = 85.76, SD = 25.583), and cues to action (M = 51.75, SD = 18.684) recorded comparable levels of post-engagement.

Table 15. Descriptive statistics of *X* post engagement by HBM constructs.

HBM Constructs	N	Mean	Std. Deviation	Std. Error
Perceived susceptibility	228	109.46	34.944	2.314
Perceived severity	157	227.10	85.996	6.863
Perceived benefits	163	183.82	62.000	4.856
Perceived barriers	139	102.60	34.498	2.926
Self-efficacy	97	85.76	25.583	2.598
Cues to action	110	51.75	18.684	1.781
Total	894	132.94	77.235	2.583

A one-way ANOVA result in Table 16 shows a statistically significant difference in mean X post engagement across HBM constructs, F (5, 888) = 230.414, $p < 0.001$, $\eta^2 = 0.564$. This indicates that engagement in X varies depending on the type of HBM construct in cholera posts. The effect size ($\eta^2 = 0.564$) indicates that the HBM construct accounted for approximately 56.4% of the variance in post engagement, representing a relatively large effect.

Table 16. One-way ANOVA of differences in mean *X* post engagement across HBM constructs.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3,008,220.817	5	601,644.163	230.414	0.000
Within Groups	2,318,693.921	888	2611.142		
Total	5,326,914.738	893			

Games–Howell post hoc comparisons in Table 17 showed that X post engagement differed significantly between most HBM constructs. There was no statistically significant difference between perceived susceptibility and perceived barriers (MD = 6.861, $p = 0.442$). All other pairwise comparisons were statistically significant at $p < 0.05$.

Table 17. Games–Howell post-hoc comparison of post engagement on *X* by HBM constructs.

(I) HBM	(J) HBM	Mean Difference (I–J)	Sig.
Perceived susceptibility	Perceived barriers	6.861	0.442
	Self-efficacy	23.702 *	0.000
	Cues to action	57.710 *	0.000
Perceived severity	Perceived benefits	43.280 *	0.000
	Perceived susceptibility	117.631 *	0.000
	Perceived barriers	124.491 *	0.000
	Self-efficacy	141.333 *	0.000
	Cues to action	175.341 *	0.000
Perceived benefits	Perceived barriers	81.212 *	0.000
	Self-efficacy	98.053 *	0.000
	Perceived susceptibility	74.351 *	0.000
	Cues to action	132.061 *	0.000
Perceived barriers	Self-efficacy	16.841 *	0.000
	Cues to action	50.850 *	0.000
Self-efficacy	Cues to action	34.008 *	0.000

* The mean difference is significant at the 0.05 level.

H2. *Exposure to peer-generated cues to action on social media is not significantly associated with the adoption of cholera health behaviour.*

A chi-square test of independence in Tables 18 and 19 showed a statistically significant association between exposure to peer-generated cues to action on social media and the adoption of cholera health behaviour, $\chi^2(4, N = 350) = 375.354$, $p = 0.00$, with a strong association (Cramer's V = 0.732). Therefore, the null hypothesis is rejected. Thus, respondents' exposure to peer-generated cues to action on social media is significantly associated with the adoption of cholera health behaviour.

Table 18. Chi-square tests showing association between exposure to peer-generated cues to action on social media and adoption of cholera health behaviour.

	Value	df	Asymptotic Significance [2-Sided]
Pearson Chi-Square	375.354 [a]	4	0.000
Likelihood Ratio	274.065	4	0.000
Linear-by-Linear Association	296.802	1	0.000
N of Valid Cases	350		

[a] 4 cells (44.4%) have an expected count less than 5. The minimum expected count is 0.84.

Table 19. Effect size of the association between exposure to peer-generated cues to action on social media and adoption of cholera health behaviour.

		Value	Approximate Significance
Nominal by Nominal	Phi	1.036	0.000
	Cramer's V	0.732	0.000
N of Valid Cases		350	

4. Discussion

This study conducted a Health Belief Model analysis of cholera risk perception during Nigeria's 2024 outbreak, examining peer-driven social media exchanges on X and Facebook in Lagos, Nigeria and their association with people's risk behaviour and perception of the disease. Findings from the survey demonstrated a high level of exposure to cholera messages on X and Facebook, indicating that digital platforms served as rapid-response communication channels response during the health emergency. This mirrors global evidence that social media has been widely used in health contexts by various users as a primary source of information, allowing the rapid dissemination of situational reports, risk updates, and preventive guidelines and ultimately impacting and reflecting the course of the outbreak [60–62]. This was also accentuated by the high digital media literacy in Lagos. This supports Aleshinloye and Mogbogu's [63] findings about the rapid diffusion of new media platforms that are instrumental to how young people access and circulate health information in Lagos State. As a result, the state has become a progressively digital communication environment where social media platforms are channels for public discourse, information seeking, and peer health communication.

The research showed a high level of peer communication about cholera on social media during the outbreak, with respondents reporting widespread exposure to cholera-related messages shared by their peers on X and Facebook. This widespread exposure supports the World Health Organisation's [64] position that social media has significant potential to facilitate peer-to-peer communication and strengthen the local-level response during public health emergencies. This finding provides a new perspective on health risk communication. While previous studies have explored the role of peer communication in

disaster communication and the crisis response [65,66], there has been limited scholarly attention to its role in health risk communication during outbreaks. Existing research, such as Ade-Johnson's [22], has examined social media's role in health risk emergencies from a top-down perspective, focusing on how local and international health organisations and professionals use platforms to communicate cholera risks. In contrast, the present research found that peer groups were major conduits for cholera risk information, complementing the efforts of institutional actors such as health agencies and healthcare professionals.

A key finding of this study is that participants were regularly exposed to peer-generated cues to action, suggesting that social media peer networks are associated with the level of awareness and response to cholera risks. The most prevalent self-reported cues included peer warnings, peer alerts about symptoms, peer calls for preventive actions, and peer appeals for adherence to prevention protocols. The findings of this study partly corroborate Vincenzo et al.'s [67] study about the abundance of peer- (and family-) generated cues to action in health emergencies. However, their study found that cues to action can also be delivered by physicians, pharmacists, and insurance companies using various modes, including print, audiovisual, online, and reminder formats. Meanwhile, there is evidence that cues to action are less explored in research than other HBM constructs [68].

For other HBM constructs, the survey results demonstrated a relatively high level of perceived susceptibility to cholera risk at personal, family, community, and wider societal levels; a generally high perception of cholera as a severe health threat during the outbreak; a high recognition of the benefits of adopting recommended cholera health behaviour; a reasonable perception of several obstacles to performing recommended cholera preventive behaviours—notably, there was an indication that the complexity of the cholera health messages and other practical challenges such as cost and availability of enabling resources may have hindered compliance; and a moderate-to-high perception of self-efficacy, indicating that while the majority of the respondents demonstrated a high sense of self-efficacy to perform cholera prevention behaviours during the outbreak, a reasonable proportion showed a lack of commitment and consistency in doing so. This finding differs from Tweneboah-Koduah et al.'s [69] report, which shows that the most significant constructs in cholera risk communication are perceived susceptibility, perceived barriers, cues to action, and self-efficacy. On the other hand, Gondwe [70] found that the dominant constructs are perceived severity of cholera, perceived threats, perceived barriers, and perceived benefits. Overall, these differences corroborate Williams et al.'s [71] finding that risk perceptions vary over time, across cognition and context, among other factors.

The platform-specific analyses showed similar engagement patterns on both X and Facebook. Both platforms showed higher engagement with posts addressing risks and solution-oriented HBM constructs (perceived severity, perceived benefits, perceived susceptibility, and perceived barriers) than posts on behavioural reinforcement (cues to action and self-efficacy). This demonstrates the users' responsiveness to messages that highlighted the dangers of cholera and the perceived benefits of preventive behaviour, rather than to messages that emphasised sustained behavioural change. However, a notable difference between the platforms is that Facebook recorded slightly higher engagement with a perceived severity message (32%) than X (30%), which could be attributed to Facebook's UI architecture, which encourages longer posts and closed-loop personal networks. This supports the assertions of Dupuis et al. [72], who found that, unlike X, Facebook seems to cater to a more agreeable and temperate environment.

Relatedly, the content analyses of cues to action showed that preventive-action advice/reminders were the dominant peer-generated cues to action on both platforms, followed by education on the transmission mode, symptom information, and treatment advice/early care-seeking, although their relative prominence differed between Facebook

and X. This demonstrates that the cues to action in the peer-generated messages were largely action-oriented, with users on both platforms focusing on practical measures for the prevention of cholera, reinforced by information about cholera transmission and symptoms. It also supports the findings of Mao [40] that the most promoted health measures in Twitter HBM engagement are cues to action that emphasise practical measures such as cues on personal measures and on physical and social distancing measures.

The engagement scores across the six HBM constructs were compared, and the findings revealed that engagement varies by the type of HBM messages in cholera posts. Due to the differences in the engagement structures and metrics of Facebook and *X*, a separate one-way ANOVA found that engagement in Facebook varies depending on the type of HBM constructs in cholera posts [$F(5, 534) = 38.652$, $p < 0.001$, $\eta^2 = 0.265$], and a statistically significant difference in the mean was also found with *X* post engagement across HBM constructs [$F(5, 888) = 230.414$, $p < 0.001$, $\eta^2 = 0.564$]. More so, Games–Howell post-hoc comparisons showed that Facebook and *X* post engagements differed significantly between most HBM constructs, except between perceived susceptibility and perceived barriers (MD = 0.891, $p = 1.000$), and between perceived severity and perceived benefits (MD = 4.309, $p = 0.973$) on Facebook and between perceived susceptibility and perceived barriers (MD = 6.861, $p = 0.442$) on *X*. All of these differences suggest that users do not respond equally to all types of health messages. This differential user responsiveness to the six HBM constructs supports Jia et al.'s [31] assertions that the level of engagement depends on the topics, salience to the audience, and the persons who posted them. The significance of this finding is that some message types are more effective than others at capturing public attention during public health emergencies.

Another critical insight gained from this study is that the majority of the respondents who were exposed to cholera-related peer communication on social media adopted preventive health behaviours during the outbreak, suggesting that there were sufficient cues to action in the online environment that are linked to a behavioural change. This was highlighted by a chi-square test of independence that showed a statistically significant association between exposure to peer-generated cues to action on social media and the adoption of cholera health behaviour, $\chi^2(4, N = 350) = 375.354$, $p = 0.00$, with a strong association (Cramer's V = 0.732). This corroborates the findings of Tweneboah-Koduah et al. [69], who concluded that cues to action are a significant factor that could influence behaviour changes towards cholera prevention and the greater the cues to action, the greater the likelihood of indulging in cholera preventive behaviour. This study suggests that media literacy (42%) largely moderates the association between exposure to peer-generated cues to action on social media and the adoption of cholera health behaviour, as more health-conscious residents find social media peer messages credible and are more likely to seek peer content and adopt preventive measures.

However, while there was a reasonable level of adoption of preventive behaviours, the intensity of adoption varied according to particular preventive behaviours. For instance, preventive health behaviour was strongly adopted at most personal hygiene levels, including washing hands frequently with soap, the treatment of drinking water, and the avoidance of unsafe food/water sources, but it was moderate for thorough preparation of food and poor for safe disposal of waste. Poor adoption of some preventive behaviours could be a result of perceived barriers. For example, the poor adoption of the safe disposal of waste could have been impeded by external barriers to sustainable household waste management in Lagos [73].

5. Conclusions

This study established that social media peer communication was significantly associated with residents' understanding and perception of cholera risk during the 2024 outbreak on Lagos Island, Nigeria. Those peer-generated interactions provided adequate cues to action that are closely connected with the adoption of recommended preventive health behaviour. Moreover, engagement on social media peer interactions varied significantly by the HBM constructs in those cholera posts, demonstrating that some message types were more compelling than others at capturing public attention during the public health emergency.

The study concludes that peer communication is a critical component of the contemporary health risk communication landscape. These peer networks determine risk perception, interpretation, and behavioural decision-making and fill critical communication gaps in environments where formal communication channels are slow or constrained by providing accessible, relatable, and socially validated cues to action.

Therefore, public health agencies should identify influential local voices on X and Facebook and collaborate with them to disseminate verified information on cholera risk and prevention strategies. Assimilating the peer networks into coordinated public health communication strategies can strengthen the relevance, resonance, and effectiveness of digital health messages in outbreak contexts. Moreover, health agencies should also guard against misinformation and disinformation by implementing regular sponsored social media messages that combine disease prevention information with basic media-literacy guidance during early-warning periods and during outbreaks. Those targeted messages should teach the public how to verify sources, double-check health information, recognise misleading health claims, and avoid distributing unsubstantiated content.

6. Limitations

The use of digitally scraped data presents ethical and methodological limitations. Automated data collection through Octoparse and Meta tools was affected by platform restrictions, access limitations, changes in platform interfaces, and other technical factors, meaning that retrieved posts may not completely represent all publicly accessible content.

Also, the engagement figures reported in this study represent a snapshot of engagement at the time of data collection and not the present values. Given that the data were collected shortly after the outbreak, it could have impacted the engagement scores.

Moreover, research has demonstrated that even when programmatically collected, social media engagement can have reliability problems due to the difficulties in mapping post/URLs to objects on the platform and retrieving the correct engagement counts. Therefore, if particular posts or engagement fields are not completely captured, it could underestimate engagement.

Furthermore, the survey was based on self-reports, which may have influenced respondents to provide answers that they considered socially desirable. Similarly, given that the data were collected three weeks after the outbreak, there may have been a recall bias, as some of the respondents may not have remembered everything they believed and saw on social media during the outbreak.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/soc16090287/s1, Table S1: Exposure to perceived susceptibility to cholera risk; Table S2: Exposure to perceived severity of cholera risk; Table S3: Exposure to perceived benefits of adhering to cholera prevention protocol; Table S4: Exposure to perceived barriers to adopting cholera health behaviour; Table S5: Exposure to self-belief (self-efficacy) of performing the recommended health behaviour; Table S6: Posthoc comparisons; Table S7: Chi-square tests.

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Institutional Review Board Statement: The survey was conducted in accordance with the Helsinki Declaration and was approved by the Ethical and Legal Committee (ELRC) of Federal University, Oye-Ekiti, (ELRC/MC/2025/011) on 8 December 2025. For the content analysis, the study adhered to established principles for internet-mediated research: only publicly accessible social media posts available in the public domain were scraped; no personally identifiable information was disclosed in the report; and data were stored securely during the research process.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the survey before administration of the instrument.

Data Availability Statement: The data are contained within the Supplementary Material.

Conflicts of Interest: The authors declare no conflicts of interest.

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