

Digital Literacy Levels and Communication Effectiveness During Cholera Outbreak Among Women of Reproductive Age in Embakasi Ward

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Abstract

Digital literacy is essential for women of reproductive age to access, interpret, evaluate, and apply cholera-related health information shared on Facebook. However, communication effectiveness during cholera outbreaks remains inconsistent in Embakasi Ward, Nairobi County, partly due to gaps in digital literacy. Despite investments in outbreak communication systems, there is limited empirical evidence on how digital literacy influences communication effectiveness among women of reproductive age in high-risk urban settings. A mixed-methods research design was employed. The target population comprised 28,900 women of reproductive age in Embakasi Ward. Using Yamane's (1967) formula, 395 respondents were sampled, alongside eight purposively selected key informants. Data were collected using structured questionnaires and semi-structured interview guides. Reliability was confirmed using Cronbach's Alpha ($\alpha = 0.881$). Quantitative data were analyzed using descriptive statistics, Pearson correlation, and regression analysis in SPSS version 30, while qualitative data were analyzed thematically. Digital literacy demonstrated a strong, positive, and statistically significant relationship with communication effectiveness during cholera outbreaks ($r = 0.768$, $p < 0.001$). The composite mean was 3.89 (SD = 0.540), indicating that respondents considered digital literacy important for effective engagement with Facebook-based health communication. Regression analysis showed that digital literacy significantly predicted communication effectiveness ($B = 0.652$, $\beta = 0.478$, $p < 0.001$). Navigation, interpretation, and information-filtering abilities were the most influential dimensions. Digital literacy was significantly associated with communication effectiveness during cholera outbreaks among women of reproductive age in Embakasi Ward. The null hypothesis was rejected at $p < 0.001$. Community-based digital health literacy programmes should strengthen Facebook navigation, health-message interpretation, and credibility evaluation. Digital literacy training should also be integrated into community health promotion policies to support informed health decision-making during cholera outbreaks.

Keywords: *Digital literacy level, Communication effectiveness, Cholera outbreak, Women of reproductive age, Embakasi Ward, Facebook health communication*

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1. Introduction

Digital literacy level, defined as the ability to access, evaluate, interpret, and apply digital health information effectively, including the skills required to navigate online environments and assess the credibility of sources, plays a fundamental role in determining communication effectiveness during cholera outbreaks among women of reproductive age (Van Deursen & Helsper, 2021). Individuals with higher digital literacy are better equipped to distinguish credible health messages from misinformation, critically assess source reliability, and apply accurate information to guide health behaviour during disease outbreaks. Conversely, limited digital literacy increases vulnerability to misinformation, reducing the likelihood of adopting recommended preventive practices during cholera outbreaks and weakening overall communication effectiveness (Van Deursen & Helsper, 2021).

Globally, digital literacy has consistently been identified as a critical determinant of communication effectiveness during infectious disease outbreaks. Individuals with stronger analytical thinking and digital literacy skills are more likely to correctly interpret health messages and adopt preventive behaviour such as hand hygiene, safe water use, and timely healthcare seeking during disease outbreaks (Vos, Sutton, Gibson, Lu & Limaye, 2020). In China, studies conducted during COVID-19 outbreaks revealed that individuals with higher digital health literacy were more likely to distinguish credible public health messages from false claims circulating on Facebook and Twitter, leading to higher adherence to recommended preventive behaviour. These findings confirm that communication effectiveness is shaped by cognitive capacity and digital interpretation ability rather than exposure alone, underscoring that digital literacy constitutes a foundational determinant of how health messages are processed and acted upon during public health emergencies (Pennycook et al., 2024).

In Africa, structural limitations in digital literacy significantly reduce individuals' ability to interpret and act on health messages effectively during cholera outbreaks, weakening communication outcomes across the continent (UNESCO, 2022). Women with stronger digital literacy skills are better positioned to navigate Facebook health content, verify its credibility, and act on it appropriately during disease outbreaks, confirming that the ability to locate, evaluate, and apply digital information is critical in disease prevention (Maddah, 2023). In Nigeria, disparities in digital literacy among women of reproductive age constrained the effectiveness of communication during cholera outbreaks, with women possessing limited digital skills demonstrating a reduced capacity to distinguish credible outbreak alerts from misinformation circulating on social media platforms (Ogunboye, 2023). These findings underscore that digital literacy gaps among women of reproductive age in African contexts constitute a persistent structural barrier to effective health communication during cholera outbreaks, particularly in communities characterized by inadequate sanitation and limited access to safe drinking water (Oluwole, Adeyemi, Balogun & Akinyemi, 2023).

In Kenya, communication effectiveness during cholera outbreaks remains inconsistent among women of reproductive age due to differences in digital literacy levels that affect their capacity to interpret and apply health information shared on Facebook. While health institutions increasingly use Facebook to disseminate outbreak alerts and preventive messages, not all women can interpret or apply this information effectively due to limited digital literacy (Mbeeria, 2024). Women with limited digital literacy struggle to interpret or trust health content on Facebook because they have difficulty verifying source credibility, making them more susceptible to misinformation that delays appropriate health responses during outbreaks. In some cases, peer-generated content is perceived as more reliable than official health messages due to limited capacity to evaluate source credibility, leading to inconsistent

adherence to preventive guidelines during cholera surges (Ahmad, 2026). These findings highlight the urgent need to shift from message dissemination-focused approaches to user-centred communication models that emphasize digital interpretation ability as a key determinant of effective health communication during cholera outbreaks among women of reproductive age in Kenya.

1.1 Problem Statement

Effective communication during cholera outbreaks is a critical component of public health emergency response, ensuring that populations receive timely, accurate, and actionable information that supports preventive behaviour and reduced disease transmission. The Ministry of Health and health agencies have invested in strengthening outbreak communication systems through community health education and water, sanitation, and hygiene interventions (World Health Organization, 2023; Nasirumbi, 2025). Ideally, adequate digital literacy levels among women of reproductive age should enable effective interpretation and application of health information shared on Facebook during cholera outbreaks, resulting in improved risk awareness and stronger compliance with preventive measures.

Despite these investments, cholera outbreaks continue to be reported in Nairobi County, particularly in Embakasi Ward, implying persistent gaps in communication effectiveness. During the 2025 cholera outbreak in Kenya, Embakasi East and Embakasi Central were among the most affected sub-counties, recording confirmed cases and deaths that reflect sustained vulnerability in densely populated urban settlements (Nairobi County Health Department, 2025; Ministry of Health, 2025). While health institutions increasingly use Facebook to disseminate outbreak alerts and preventive messages, not all women of reproductive age can interpret or apply this information effectively due to limited digital literacy (Mbeeria, 2024). Women with limited digital literacy struggle to evaluate source credibility, making them susceptible to misinformation that delays appropriate health responses during outbreaks (Ahmad, 2026).

Despite the recognized importance of digital literacy in health communication, limited empirical evidence exists on how digital literacy levels specifically influence communication effectiveness during cholera outbreaks among women of reproductive age in high-risk urban settings such as Embakasi Ward. This study therefore sought to address this gap by examining the influence of digital literacy level on the effectiveness of communication during cholera outbreaks among women of reproductive age in Embakasi Ward, Nairobi County.

1.2 Objective of the Study

The study sought to examine the influence of digital literacy level on communication effectiveness during cholera outbreaks among women of reproductive age in Embakasi Ward.

1.3 Research hypothesis

H₀: Digital literacy level has no statistically significant influence on communication effectiveness during cholera outbreaks among women of reproductive age in Embakasi Ward, Nairobi County.

H_a: Digital literacy level has a statistically significant influence on the effectiveness of communication during cholera outbreaks among women of reproductive age in Embakasi Ward, Nairobi County.

2. Literature Review

2.1 Theoretical Review

The study was anchored on the Uses and Gratifications Theory, introduced by Katz, Blumler, and Gurevitch (1973), which explains how individuals actively select media platforms to satisfy specific needs and desires. Unlike traditional media theories that view audiences as passive recipients of information, Uses and Gratifications Theory considers media users as active participants who consciously choose communication channels that provide the benefits they seek (Whiting & Williams, 2020). The theory identifies information seeking, social interaction, entertainment, education, and personal identity as key motivations influencing media selection, making it particularly relevant to understanding how women of reproductive age engage with Facebook health content during cholera outbreaks.

The Uses and Gratifications Theory is especially relevant to this study because it provides a comprehensive explanation of how the digital literacy levels of women of reproductive age determine the extent to which they derive meaningful value from Facebook health communication during cholera outbreaks. Digital literacy strengthens users' ability to actively navigate Facebook content, critically evaluate the credibility of health information sources, and effectively apply accurate outbreak messages to guide preventive behavior (Islam, Laato, Talukder & Sutinen, 2021). Women with higher digital literacy are better positioned to maximize the informational benefits of Facebook by distinguishing credible health messages from misinformation, thereby enhancing communication effectiveness during cholera outbreaks. Conversely, women with limited digital literacy are less able to derive value from health information available on Facebook, reducing their capacity to interpret outbreak alerts and adopt recommended preventive practices. Health communication scholars have established that social media users often rely on Facebook to obtain health information because of its accessibility and interactivity, but the ability to benefit from such information is fundamentally conditioned by users' digital literacy capacities (Islam, Laato, Talukder & Sutinen, 2021). The theory therefore provides a strong conceptual foundation for understanding how digital literacy level shapes communication effectiveness during cholera outbreaks among women of reproductive age in Embakasi Ward, Nairobi County (Liu, Zhang & Wang, 2022).

2.2 Empirical Review

Digital literacy level influences the effectiveness of communication by determining how well women can navigate, interpret, and filter health information on Facebook during cholera outbreaks. Strong navigation skills enable users to access relevant health content efficiently, while interpretive skills help them understand the meaning and implications of shared messages (Becker, Wagner & Klein, 2022). Information filtering ability allows users to distinguish credible health information from misleading or irrelevant content. Higher digital literacy, therefore, improves comprehension, reduces the risk of misinformation, and enhances the effectiveness of health communication during outbreaks, making it a fundamental determinant of how women of reproductive age respond to cholera-related health messages.

Globally, the digital literacy dimensions of navigation, interpretation, and information filtering have consistently been identified as significant determinants of communication effectiveness during cholera outbreaks among women of reproductive age. In the United Kingdom, strong digital navigation skills enabled women to efficiently access verified outbreak updates and preventive guidelines, improving adherence to recommended hygiene practices during outbreaks (Jones, Smith & Brown, 2024). Similarly, in Germany, digital interpretation ability supported accurate understanding of risk communication messages, reducing misinformation

and confusion during cholera outbreaks (Müller, Schneider & Hoffmann, 2020). Furthermore, in France, information-filtering ability significantly enhanced communication effectiveness by enabling women to prioritize verified health sources and avoid misleading content circulating on social media platforms (Dubois, Martin & Lefèvre, 2020).

In Africa, digital literacy gaps among women of reproductive age continue to constrain communication effectiveness during cholera outbreaks. In Cameroon, strong interpretation skills supported accurate comprehension of outbreak alerts and preventive instructions, improving informed decision-making during cholera outbreaks (Asongu, Acha-Anyi & Tchamyau, 2021). Nevertheless, in Rwanda, effective information-filtering skills enabled women to prioritize verified health sources while minimizing exposure to false outbreak narratives (Habimana, Nkusi & Uwamahoro, 2026). Likewise, in Tanzania, improved digital navigation ability enhanced the speed of locating verified health information, reducing delays in responding to public health warnings during outbreaks (Mtega, Bernard & Msungu, 2022).

In Kenya, dimensions of digital literacy significantly influence the effectiveness of communication during cholera outbreaks among women of reproductive age across different county contexts. In Mombasa County, strong digital navigation skills enabled women to locate Ministry of Health advisories and county health alerts, improving adherence to cholera prevention measures in coastal informal settlements (Abdullahi, Salim & Hassan, 2020). Similarly, in Kisumu County, digital interpretation skills facilitated accurate understanding of outbreak alerts and sanitation instructions shared on social media platforms, reducing disease transmission in lakeside communities (Odhiambo, Ouma & Anyango, 2022). However, in Kilifi County, information filtering ability enabled women to distinguish credible health sources from misinformation, ensuring that only reliable health messages influenced their preventive behaviours during cholera outbreaks (Wanjala, Mutisya & Kamau, 2021).

3. Materials and Methods

The study employed a mixed-methods research design that enabled the concurrent collection of quantitative and qualitative data, with each dataset analyzed independently before integration in the interpretation (Amadi, 2023). The quantitative strand adopted a survey design while the qualitative strand employed an exploratory approach to obtain detailed perspectives from health communication officers and Nairobi City County health workers regarding Facebook-based health communication during cholera outbreaks. The integration of both approaches provided a more comprehensive understanding of how digital literacy level influences communication effectiveness during cholera outbreaks among women of reproductive age than a single methodological approach would have.

The study targeted 28,900 women of reproductive age residing in Embakasi Ward, Nairobi County, as well as 8 key informants, comprising two health communication officers and six Nairobi City County health workers directly involved in the cholera outbreak response. Using Yamane's (1967) formula at a precision level of 0.05, a sample of 395 women was derived for the quantitative strand. Simple random sampling was used to select quantitative respondents, ensuring equal probability of selection and minimizing bias, while purposive sampling was used to select the 8 key informants based on their specialized knowledge and direct involvement in outbreak communication.

Data were collected using structured questionnaires administered to women of reproductive age and semi-structured interview guides administered to key informants. A pilot study was conducted in Mugumu-ini Ward, involving 40 respondents and 1 key informant, to refine instruments and identify potential challenges (Creswell & Creswell, 2018). Content validity

was established using the Content Validity Index with a minimum threshold of 0.70, while reliability was assessed using Cronbach's Alpha coefficient with an acceptable threshold of 0.70.

Quantitative data were analyzed using SPSS version 30 through descriptive statistics, Pearson correlation analysis, and multiple linear regression analysis to determine the influence of digital literacy level on communication effectiveness. Qualitative interview data were subjected to thematic analysis, with findings triangulated with quantitative results during interpretation to enhance the credibility, depth, and comprehensiveness of the study's conclusions.

4. Results and Discussion

4.1 Response Rate

Response rate analysis was conducted to determine the proportion of questionnaires successfully completed and the participation rate in key informant interviews.

Table 1: Response Rate

Category	Administered	Completed	Response Rate (%)	Non-Response (%)
Questionnaires	395	318	80.5	77
Key Informant Interviews	8	6	-	2

The study administered 395 questionnaires; 318 were successfully completed and returned, yielding a response rate of 80.5%, while 77 (19.9%) were either not returned or incomplete. This response rate was considered high and acceptable for statistical data analysis, as response rates above 70% are generally regarded as adequate for ensuring reliable statistical analysis and minimizing non-response bias (Lund et al., 2023). The high response rate was attributed to the relevance of the study topic to respondents, effective administration of research instruments, and assurance of confidentiality and anonymity. Additionally, six out of eight targeted key informants participated in the interviews, with two unavailable due to competing professional commitments.

4.2 Reliability Tests Results

The study examined the internal consistency reliability of the constructs, and the results are presented in Table 2.

Table 2: Reliability Test Results

Variable	Number of Items	Cronbach's Alpha (α)	Interpretation
Digital Literacy Level	9	0.881	Excellent Reliability

Digital literacy level showed a Cronbach's alpha of 0.881, indicating excellent internal consistency among the items measuring the construct and exceeding the minimum acceptable threshold of 0.70. This confirmed that the questionnaire items consistently and reliably measured the digital literacy level construct and were suitable for subsequent statistical analysis (Forero, 2024).

4.3 Descriptive Statistics: Digital Literacy Level

The study objective was to examine the influence of digital literacy level on communication effectiveness during cholera outbreaks among women of reproductive age in Embakasi Ward, assessing three dimensions: navigation ability, interpretation ability, and information filtering.

Table 3: Respondents' Perception of Digital Literacy Level

Statement	SD	D	M	A	SA	Mean	SD
I can easily locate cholera-related health information on Facebook.	4 (1.3%)	4 (1.3%)	87 (27.4%)	138 (43.4%)	85 (26.7%)	3.93	.838
I can often navigate Facebook pages and groups to find health information.	4 (1.3%)	2 (0.6%)	66 (20.8%)	198 (62.3%)	48 (15.1%)	3.89	.698
I can frequently search for cholera-related messages on Facebook without difficulty.	0 (0.0%)	4 (1.3%)	55 (17.3%)	208 (65.4%)	51 (16.0%)	3.96	.619
I can clearly understand health messages about cholera shared on Facebook.	0 (0.0%)	2 (0.6%)	25 (7.9%)	184 (57.9%)	107 (33.6%)	4.25	.617
I can accurately interpret information about cholera prevention on Facebook.	0 (0.0%)	33 (10.4%)	55 (17.3%)	171 (53.8%)	59 (18.6%)	3.81	.859
I can easily make sense of instructions given in Facebook health posts about cholera.	4 (1.3%)	2 (0.6%)	99 (31.1%)	163 (51.3%)	50 (15.7%)	3.80	.753
I can often identify relevant cholera-related information on Facebook.	2 (0.6%)	4 (1.3%)	76 (23.9%)	185 (58.2%)	51 (16.0%)	3.88	.702
I can frequently distinguish useful health information from irrelevant content on Facebook.	2 (0.6%)	2 (0.6%)	88 (27.7%)	176 (55.3%)	50 (15.7%)	3.85	.703
I can consistently tell whether cholera-related information on Facebook is appropriate for guiding decisions.	2 (0.6%)	36 (11.3%)	87 (27.4%)	129 (40.6%)	64 (20.1%)	3.68	.941
Composite Aggregate Score						3.89	.540

The findings established that respondents generally perceived digital literacy as a key enabling factor in accessing and engaging with cholera-related health information on Facebook during outbreaks (composite mean = 3.89, SD = 0.540). The relatively low standard deviation suggests strong agreement among respondents, implying that digital literacy competencies were widely regarded as necessary for effective engagement with Facebook-based health communication during cholera outbreaks.

Furthermore, the majority of the respondents, 81.4%, reported that digital literacy helps women search for cholera-related messages on Facebook without difficulty (Mean = 3.96, SD = 0.619), while 77.4% indicated they can navigate Facebook pages and groups to find health information (Mean = 3.89, SD = 0.698). Key informants corroborated these findings, noting that women

Regarding information filtering, 74.2% indicated they can distinguish useful health information from irrelevant content on Facebook (Mean = 3.85, SD = 0.703), while 60.7% reported they can consistently tell whether cholera-related information is appropriate for guiding health decisions (Mean = 3.68, SD = 0.941). Key informants observed that women tend to rely on trusted pages and known health institutions to reduce exposure to misinformation during outbreaks. However, some key informants noted that certain women still struggle to differentiate between correct and misleading information, particularly when posts appear convincing, but sources are unverifiable. These findings are consistent with Fridman et al. (2023), who found that user evaluation skills are critical in distinguishing accurate from misleading online health information.

The study conducted a bivariate Pearson product-moment correlation analysis to assess the magnitude, direction, and significance of the association between digital literacy level and communication effectiveness.

Variable		Communication Effectiveness	Digital Level	Literacy
Communication Effectiveness Pearson Correlation		1		
	Sig. (2-tailed)			
	N			
Digital Literacy Level	Pearson Correlation	.768**	1	
	Sig. (2-tailed)	.000		
	N	318	318	

The results showed a strong positive and statistically significant relationship between digital literacy level and communication effectiveness ($r = 0.768$, $p < 0.001$). This indicates that respondents with higher levels of digital literacy were more likely to experience effective communication during cholera outbreaks. Individuals are more likely to adopt and utilize information when they possess the skills necessary to evaluate and process it, consistent with Uses and Gratifications Theory, which views media users as active participants who purposefully seek and process information that satisfies their needs. The findings concurred

with Abdoh (2022), who established that digital literacy significantly improves individuals' ability to access, understand, and use online health information effectively.

4.5 Regression Analysis

The study conducted simple regression analysis to determine the specific influence of digital literacy level on communication effectiveness during a cholera outbreak among women of reproductive age in Embakasi Ward.

Table 5: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
1 (Constant)	10.329	2.846		3.629	.000
Digital Literacy Level	.652	.067	.478		.000

a. Dependent Variable: Communication Effectiveness

The unstandardized B coefficient for digital literacy level ($B = 0.652$, $p < 0.001$) indicates that a one-unit increase in digital literacy level leads to a 0.652 increase in communication effectiveness, holding other factors constant, the highest unstandardized coefficient among all predictors. The standardized beta coefficient ($\beta = 0.478$, $p < 0.001$) further confirms that digital literacy level had the strongest positive influence on communication effectiveness, making it the most significant predictor in the model. This suggests that women who are more capable of navigating, interpreting, and filtering Facebook health content are better able to satisfy their informational needs and achieve effective communication outcomes during cholera outbreaks.

5. Conclusion

The study concluded that digital literacy level has a strong and statistically significant positive influence on communication effectiveness during cholera outbreaks among women of reproductive age in Embakasi Ward, Nairobi County. Women who possess navigation, interpretation, and information-filtering skills are better positioned to access, comprehend, and apply cholera-related health information shared on Facebook, thereby enhancing the effectiveness of communication during outbreaks. The null hypothesis was rejected at $p < 0.001$, confirming digital literacy level as the strongest predictor of communication effectiveness in the study.

6. Recommendations

Practical Implications: Community-based digital health literacy programmes targeting women of reproductive age should be implemented, focusing on improving Facebook navigation, health message interpretation, and evaluation of online information credibility to enhance effective use of digital health resources during cholera outbreaks.

Policy Implications: Digital literacy training should be integrated into community health promotion policies in urban informal settlements, with health policy frameworks prioritizing capacity-building initiatives to enhance women's ability to use digital platforms effectively for health decision-making during disease outbreaks.

Theoretical Implications: The findings support extending Media System Dependency Theory by emphasizing user digital capability as a key condition influencing the strength and effectiveness of media dependency relationships in digital health communication environments.

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