

Gendered digital divides: assessing eHealth literacy and health- information-seeking behaviors among young adults on Saint Martin Island, Bangladesh

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Research Article

Keywords: eHealth literacy, digital health, health-information-seeking behaviour, gender inequality, self-medication, young adults, Bangladesh, digital divide, Saint Martin Island

Posted Date: September 28th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10720451/v1>

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Additional Declarations: No competing interests reported.

Abstract

Digital technologies may improve access to health information in geographically underserved communities, but gendered differences in digital access, privacy, autonomy, and eHealth literacy may limit their benefits. This study examined gender differences in eHealth literacy and health-information-seeking behaviours among young adults on Saint Martin Island, a remote coral island in Bangladesh, and factors associated with digital-health engagement. This convergent mixed-methods, cross-sectional study included 433 young adults aged 18–35 years (239 males, 194 females). Perceived eHealth literacy was measured with the eight-item eHealth Literacy Scale (eHEALS; items scored 1–5). Gender differences in categorical barriers were assessed with chi-square or Fisher's exact tests; eHEALS score differences were assessed with independent-samples or rank-based tests, one-way ANOVA compared eHealth literacy scores across categories of self-reported health-misinformation belief frequency. Multivariable binary and ordinal logistic regression examined associations between eHealth literacy score and health outcomes. Two-sided tests used $p < 0.05$. Qualitative data from 25 field-profile records were analysed using structured thematic synthesis and integrated with quantitative findings. Mean eHEALS item score was higher among males than females (3.16 vs. 2.68; $p < 0.001$; Cohen's $d = 0.48$), with excellent internal consistency (Cronbach's $\alpha = 0.941$). Females reported more language difficulties (84% vs. 70%) and privacy concerns (59% vs. 29%) than Males; cost was a major barrier for both. Higher perceived eHealth literacy was associated with higher odds of reported health-related habit change (OR = 2.22, 95% CI 1.63–3.07), an online doctor visit (OR = 1.46, 95% CI 1.05–2.04), and self-medication (OR = 1.80, 95% CI 1.22–2.72). Qualitative findings showed continued reliance on doctors, pharmacists, family members, and other trusted sources, alongside concerns about privacy, misinformation, language, cost, and connectivity. eHealth literacy was associated with gender and with both potentially beneficial and risky health behaviours. Digital-health interventions in geographically isolated communities should extend beyond technological access to address gender-specific barriers, privacy, affordability, connectivity, information verification, medication safety, and access to professional care.

Background

Digital technologies can extend access to health information and services where distance, travel costs, and shortages of health professionals constrain conventional care. The World Health Organization positions digital health as a means of strengthening equitable and effective health systems, while emphasising that technological tools must be integrated with organisational, financial, and human resources [1]. Access to a device or network, however, does not by itself ensure meaningful use. Digital inequality also encompasses differences in skills, autonomy, socioeconomic resources, patterns of use, and the ability to translate connectivity into beneficial outcomes [2–4].

eHealth literacy is central to this distinction. Norman and Skinner conceptualised eHealth literacy as the ability to seek, find, understand, appraise, and apply health information from electronic sources [5], and subsequently developed the eight-item eHealth Literacy Scale (eHEALS) to assess perceived knowledge, comfort, and skills in using electronic health information [6]. Later work has emphasised that eHealth

literacy is context-dependent and multidimensional, involving interactions among users, information tasks, communication environments, and broader health-literacy resources [7–12]. The eHEALS therefore represents self-perceived capability rather than an objective test of digital or clinical competence.

Meaningful digital-health engagement also depends on whether people can evaluate what they find. Reviews have linked lower health literacy with greater difficulty judging online health information, while readability studies show that much web-based health information exceeds recommended reading levels [13, 14]. The quality and credibility of online health content are variable, and users often rely on imperfect heuristics when deciding which sources to trust [15, 16]. Systematic reviews further show that eHealth literacy is associated with education, socioeconomic position, language, digital experience, health behaviour, and health-service use, while important gaps remain even among highly connected populations [17–19].

The relationship between eHealth literacy and health behaviour is therefore not necessarily linear or uniformly beneficial. Higher eHealth literacy has been associated with selected positive health behaviours [20], but internet-based health information is commonly used alongside professional and interpersonal sources rather than as a complete substitute for them [21–28]. People may search online before deciding whether to consult a clinician, use social media or peer experiences to interpret symptoms, and then verify information through trusted offline contacts. In resource-constrained settings, this mixed information ecology may support informed action but can also facilitate self-diagnosis or unsupervised medicine use when qualified care is difficult to reach.

Gender is a particularly important axis of digital inequality. The GSMA's 2026 report documents a persistent mobile-internet gender gap across low- and middle-income countries and identifies affordability, skills, safety, device access, and social constraints as continuing barriers for Females [29]. In Bangladesh, national ICT statistics show unequal patterns of digital access and use [30]. Bangladesh has also been developing a national digital-health strategy [31], while empirical studies have highlighted both the potential of mobile health services and the importance of social and cultural factors in adoption [32, 33]. Evidence from rural Bangladesh further indicates that interpersonal communication can remain especially influential where literacy and access constraints limit the usability of conventional information channels [34].

Saint Martin's Island is a geographically isolated community in Teknaf Upazila, Cox's Bazar District, where referral travel depends substantially on sea transport. The Department of Environment's draft master plan documents the island's distinctive environmental and tourism-management context [35]. For permanent residents, digital health could provide an additional route to information when face-to-face care is difficult to access, but the value of that route may be constrained by connectivity, cost, language, privacy, and household autonomy. Evidence from such island settings in Bangladesh remains limited, particularly on how gendered digital conditions intersect with perceived eHealth literacy and health-related decision-making.

Self-medication is also a relevant outcome in this setting because digital information may be acted upon without professional consultation. Studies in Bangladesh have documented self-medication and medication-use problems among students and community residents [36–38], while a systematic review found self-medication to be common among university students internationally [39]. These findings do not establish that digital information causes self-medication, but they support examining whether perceived eHealth literacy can coexist with both beneficial and potentially risky forms of self-directed health behaviour.

This study provides evidence on digital health inequalities in an underserved and geographically isolated population that is underrepresented in existing research. By examining eHealth literacy alongside health-information-seeking behaviours and gender-specific barriers, it moves beyond simple measures of internet access to consider whether individuals have the skills and autonomy required to use digital health information effectively. The findings may inform gender-responsive and context-appropriate digital health interventions, including efforts to improve digital health literacy, access to reliable health information, and safer health-seeking practices among young adults in resource-constrained communities.

Methods

Study aim and design

This community-based study aimed to assess perceived eHealth literacy, health-information-seeking practices, perceived barriers to accessing health information, trusted information sources, and selected health-related behaviours among young adult residents of Saint Martin Island, Bangladesh. This community-based study used a convergent mixed-methods design, consistent with established mixed-methods approaches that combine quantitative and qualitative evidence to address a shared research problem [40, 41]. A cross-sectional household survey and a qualitative descriptive component addressed the same broad domains; each component was analysed separately and integrated during interpretation through a joint display to identify convergence, complementarity, and divergence [42].

Study setting and participants

The study was conducted among permanent residents of Saint Martin Island, Teknaf Upazila, Cox's Bazar District, Bangladesh. The island is geographically separated from mainland Bangladesh, and access and referral travel depend substantially on sea transportation. Data collection was conducted in December 2025, when access to the island was feasible during the permitted tourism season following seasonal restrictions on travel during the monsoon and summer months.

For the quantitative component, eligible participants were permanent residents aged 18–35 years, able to communicate in Bengali or the local Chittagonian dialect, willing to provide informed consent, and with previous experience using a digital device. Tourists, seasonal visitors, and individuals without

previous digital-device experience were excluded. One eligible participant was selected from each sampled household.

The required sample size was estimated using a 95% confidence level, 50% expected prevalence, and 5% margin of error, yielding an initial sample size of 384 participants. Allowing for a 10% non-response rate, the target sample was increased to 427 participants [$384/(1 - 0.10)$]. A total of 433 complete records were available for analysis, comprising 239 Males and 194 Females. The island comprises nine administrative wards, and data collection was initiated from the predetermined community location (central mosque) and proceeded systematically across residential areas. Households were approached at five-household intervals, and one eligible participant was recruited from each selected household. This systematic approach was used to obtain geographical coverage across the island. A complete household sampling frame and a formally random starting point were not available; therefore, the procedure was intended to provide systematic geographical coverage rather than constitute a fully probability-based household sampling design.

The qualitative component comprised 25 field-profile records from purposively selected community members and adult key informants. Selection sought variation in gender, education, occupation, household circumstances, digital access, and community role. The qualitative archive included individual-interview records and a multi-participant discussion. Key-informant accounts were used to provide contextual information and were not treated as prevalence data for young adults.

Measures and data collection

Quantitative data were collected through face-to-face household interviews using a structured questionnaire. The questionnaire combined a previously published instrument with study-specific items. Perceived eHealth literacy was assessed using the eight-item eHealth Literacy Scale (eHEALS), originally developed and validated by Norman and Skinner [6]. Each item was rated from 1 (strongly disagree) to 5 (strongly agree), producing a conventional mean score of 1 to 5, with higher scores indicating greater perceived eHealth literacy. Internal consistency was assessed using Cronbach's alpha. The remaining questionnaire items, covering health-information-seeking behaviour, preferred and trusted information sources, perceived barriers to digital-health use, health-related habit change, self-medication, online doctor consultation, and health-misinformation belief, were developed by the research team specifically for the present study. An English-language version of the study-specific quantitative questionnaire is provided as Supplementary File 1.

The questionnaire also assessed health-information-seeking behaviour, including first action when ill, internet use for health information, preferred sources for sensitive health concerns, and the most trusted source of health information. Participants reported perceived barriers, including cost, slow internet speed, language difficulties, and privacy concerns. Participants were also asked to identify their biggest barrier to digital health use, with 'no barrier' included as a response category. Three separate multivariable binary logistic regression models examined factors associated with reported health-related

habit change, self-medication, and online doctor consultation. An ordered misinformation-related outcome was analysed separately using ordinal regression.

Qualitative data were collected using study-specific semi-structured Key Informant Interview (KII), In-Depth Interview (IDI), and Focus Group Discussion (FGD) guides developed by the research team. The guides addressed digital access, health-information seeking, trust and verification, privacy, sensitive health concerns, health-related behavioural change, healthcare access, and recommendations for improving access to reliable health information. Interviews and discussions were conducted in Bengali or the local Chittagonian dialect, as appropriate. All qualitative interviews were audio-recorded, transcribed verbatim, and systematically organized for analysis. The transcripts were reviewed alongside the participant profiles and coding matrices to ensure consistency and completeness of the qualitative analysis. English translations of the qualitative data-collection guides are provided as Supplementary File 2.

Statistical analysis

Quantitative data were cleaned, coded, and analysed using R statistical software version 4.5.2 (rstudio). Categorical variables were summarized using frequencies and percentages, while continuous and scale variables were summarized using means and standard deviations or medians and interquartile ranges, as appropriate. Gender differences in categorical variables were assessed using Pearson's chi-square test or Fisher's exact test when expected cell counts were small. Differences in continuous or scale variables between two groups were assessed using the independent-samples *t*-test or Wilcoxon rank-sum test, as appropriate. One-way analysis of variance (ANOVA) was used to compare eHealth literacy scores across categories of misinformation-related belief frequency.

Three separate multivariable binary logistic regression models examined factors associated with reported health-habit change, self-medication, and online doctor consultation. Predictors included in the multivariable models were selected a priori based on the study objectives and available demographic and digital-health variables. Misinformation susceptibility was assessed by asking participants how frequently they believed health-related 'fake news' encountered online, with responses categorized as never, once, and frequently. The categories were treated as ordered levels for ordinal logistic regression. Adjusted odds ratios (ors), 95% confidence intervals (cis), and *P* values were reported. Multicollinearity was assessed before multivariable modelling, and the proportional-odds assumption was assessed for ordinal logistic regression. Statistical significance was assessed using two-sided tests with $P < 0.05$. Given the exploratory nature of the study, no adjustment for multiple comparisons was applied. ANOVA was used as an unadjusted comparison of eHEALS scores across misinformation-belief categories, whereas ordinal logistic regression was used to estimate adjusted associations with the ordered outcome.

Qualitative analysis and mixed-methods integration

A qualitative component was conducted to provide contextual explanations for the quantitative findings. The qualitative dataset comprised 25 purposively selected community members and key informants. A structured thematic synthesis was undertaken using the available participant profiles, coding matrices, field records, and preserved interview excerpts. The analysis focused on recurring patterns related to digital access, gender, health-information seeking, trust, misinformation, privacy, language, and structural barriers. Through iterative review and grouping of related patterns, the qualitative findings were organised into six interconnected themes: (1) digital integration and everyday use, (2) gendered digital access and autonomy, (3) health-information seeking and trust, (4) digital health literacy and verification, (5) structural barriers, and (6) the perceived role and potential of digital health. Quantitative and qualitative findings were subsequently integrated through a joint display to examine convergence, complementarity, and divergence [43, 44].

Ethical considerations

Ethical approval

was obtained from the Ethical Review Committee, Faculty of Biological Sciences, University of Dhaka, Bangladesh (Reference No. 373/Biol. Scs./2025–2026). Written informed consent was obtained from all quantitative and qualitative participants before data collection. Participation was voluntary, and participants were informed of their right to decline participation or withdraw without penalty.

AI Declaration

OpenAI was used solely for language editing, clarity improvement, and consistency checking during manuscript preparation. All scientific content, analyses, interpretations, and references were reviewed and verified by the authors, who take full responsibility for the final manuscript

Results

Quantitative Results

The eight-item eHealth Literacy Scale (eHEALS) demonstrated excellent internal consistency in the study population, with a Cronbach's α of 0.941. The final quantitative analysis included 433 participants, comprising 239 Males and 194 Females. Participant characteristics and eHealth literacy scores are presented by gender in Table 1, followed by analyses of gender differences, health-information-seeking behaviours, perceived barriers, and health-related outcomes.

Table 1
Participant characteristics and perceived eHealth literacy by gender

Characteristic	Male N = 239	Female N = 194	P-value ²
Age (years)	25.7 (5.4)	25.1 (5.7)	0.2
Marital Status			< 0.001
Unmarried	99 (41%)	33 (17%)	
Married	138 (58%)	161 (83%)	
Divorced/Widowed	2 (0.8%)	0 (0%)	
Education Level			0.002
No Education	41 (17%)	49 (25%)	
Primary	82 (34%)	83 (43%)	
Secondary	70 (29%)	44 (23%)	
HSC	27 (11%)	15 (7.7%)	
Degree/Honors	19 (7.9%)	3 (1.5%)	
Occupation			< 0.001
Business	131 (55%)	6 (3.1%)	
Fishing	71 (30%)	6 (3.1%)	
Housewife	1 (0.4%)	153 (79%)	
Student	23 (9.6%)	16 (8.2%)	
Unemployed	13 (5.4%)	13 (6.7%)	
Family Income			< 0.001
< 10k	93 (39%)	112 (58%)	
10k-20k	104 (44%)	69 (36%)	
20k-30k	26 (11%)	9 (4.6%)	
> 30k	16 (6.7%)	4 (2.1%)	
EHealth Literacy Score	3.16 (0.99)	2.68 (1.00)	< 0.001
¹ Mean (SD); n (%)			
² Wilcoxon rank sum test; Fisher's exact test; Pearson's Chi-squared test; Statistical tests were selected according to variable type and expected cell counts.			

Among the participants, 239 (55.2%) were male, and 194 (44.8%) were female. The mean age was similar between males and females (25.7 ± 5.4 vs. 25.1 ± 5.7 years; $p = 0.20$). However, significant gender differences were observed in marital status, education, occupation, and family income (all $p < 0.01$). Females were more likely to be married (83% vs. 58%), whereas males were more frequently engaged in business (55%) or fishing (30%). The proportion with no formal education was higher among females (25% vs. 17%).

Importantly, eHealth literacy scores differed significantly by gender, with males having a higher mean eHealth literacy score than females (3.16 ± 0.99 vs. 2.68 ± 1.00 ; $p < 0.001$), indicating a moderate gender difference in perceived eHealth literacy. First action when ill is shown in Fig. 1.

The analysis reveals a statistically significant relationship between gender and the first action taken when falling ill ($\chi^2 = 43.94$, $p < 0.001$), with a moderate effect size (Cramer's $V = 0.319$). The most striking divergence is found in self-reliance versus family support: males are substantially more likely to visit a pharmacy as their first resort, whereas females show a much stronger preference for consulting their parents.

While both genders show similar low frequencies for hospital visits and ignoring symptoms, males are slightly more inclined to use the internet for self-diagnosis. Overall, the data suggest that males were more likely to report visiting a pharmacy as their first action when ill, whereas females were more likely to consult their parents during the early stages of illness. Internet use for health information is shown in Fig. 2.

The analysis reveals a statistically significant difference between genders regarding the use of the internet for health purposes ($\chi^2 = 9.71$, $p = 0.0018$), although the strength of this association is relatively weak (Cramer's $V = 0.15$). While a high number of both males and females report not using the internet for health, a distinct gap emerges among those who do. Specifically, males are significantly more likely to utilize the internet for health-related outcomes compared to females, who show a much lower frequency in the "Yes" category. This suggests that while online health-seeking is not the primary behavior for most of this group, Males are more inclined to turn to digital resources than their female counterparts. Sensitive-health information sources are shown in Fig. 3.

Statistical analysis reveals a significant relationship between gender and the preferred source of information for sensitive health issues ($\chi^2 = 25.16$, $p < .001$), supported by a moderate effect size (Cramer's $V = 0.241$). While both genders frequently consult doctors and family, notable disparities emerge in other categories. Consistent with general internet use trends, males are substantially more likely to turn to the internet for sensitive topics compared to females.

Furthermore, males show a stronger preference for seeking advice from a pharmacy, whereas females rely more heavily on family members for support. Interestingly, females are also slightly more likely to report seeking help from "no one," suggesting a potentially higher level of privacy or isolation regarding sensitive concerns. Overall, the findings suggest that males lean toward more anonymous or

professional-transactional sources (internet, pharmacy), while females prioritize established interpersonal connections. Most trusted health-information sources are shown in Fig. 4.

The analysis indicates a significant association between gender and the health source individuals trust most ($\chi^2 = 23.64$, $p < .001$), with a moderate effect size (Cramer's $V = 0.234$). While doctors remain the most trusted source for both groups, males exhibit a much higher count of trust in medical professionals and pharmacies compared to their female counterparts.

In contrast, females demonstrate a higher level of trust in family as a primary health source, nearly doubling the count seen in males for this category. Furthermore, the internet is the least trusted source overall, though it maintains a notably higher trust level among males than females. These results suggest that while males prioritize professional and pharmaceutical expertise, Females place a higher premium on familial guidance when evaluating health information. eHealth literacy by gender is shown in Fig. 5.

The analysis demonstrates a statistically significant gender gap in eHealth Literacy scores, as evidenced by an independent samples t-test ($t = 4.97$, $p < .001$). On average, males exhibit a higher eHealth literacy score than females, with a mean difference of approximately 0.48 points. This finding is further corroborated by the Mann-Whitney U test ($p < .001$), confirming that the distribution of literacy scores differs significantly between the two groups.

The boxplot visualizes this disparity, showing that the mean eHealth literacy score was 3.16 ($SD = 0.99$) among Males and 2.68 ($SD = 1.00$) among Females ($p < 0.001$), indicating a moderate gender difference in perceived eHealth literacy. With a Cohen's d of 0.48, the effect size is considered moderate, suggesting a meaningful gender difference in perceived eHealth literacy. While both genders utilize the full spectrum of the scale from 1 to 5, the interquartile range for males is shifted toward the higher end of the scale, indicating a more consistent level of comfort with digital health resources compared to females. Digital-health barriers by gender are shown in Table 2.

Table 2
Reported barriers to digital health use by gender

Characteristic	Male N = 239	Female N = 194	P-value ²
Cost Barrier	180 (75%)	145 (75%)	0.9
Internet Speed Barrier	129 (54%)	117 (60%)	0.2
English Language Barrier	168 (70%)	163 (84%)	< 0.001
Privacy/Safety Barrier	69 (29%)	115 (59%)	< 0.001
¹ n (%)			
² Pearson's Chi-squared test			

Gender differences were observed in specific digital-health barriers. The prevalence of cost and internet-speed barriers was similar between males and females (75% vs. 75%, $p = 0.90$; and 54% vs. 60%, $p = 0.20$, respectively). However, females reported significantly higher barriers related to English language (84% vs. 70%, $p < 0.001$) and privacy/safety concerns (59% vs. 29%, $p < 0.001$) than males. These findings suggest that language and privacy concerns represent important gendered barriers to digital-health access and use. Primary digital-health barriers are shown in Fig. 6.

When participants were asked to identify their primary barrier to digital health use, the distribution of responses differed significantly by gender ($\text{Chi}^2 = 15.57$, $p = 0.0082$). While both groups identify skills as a major hurdle, females report this as their single largest barrier more frequently than males.

When asked to identify their primary barrier, males more frequently selected cost, English language, and slow network speed than females. Notably, a much higher proportion of males claim to face no barriers at all, doubling the count of females in that category. These findings suggest that while the distribution of primary barriers differed by gender, with females more frequently reporting skills-related barriers and Males more frequently reporting cost-, language-, and connectivity-related barriers, males also more frequently reported having no barrier. eHealth literacy by health-habit change is shown in Fig. 7.

The analysis reveals a highly significant relationship between an individual's eHealth literacy score and their likelihood of changing health habits ($t = -11.43$, $p < .001$). Participants who successfully changed a habit demonstrated substantially higher eHealth literacy scores compared to those who did not.

The boxplot visualizes a clear disparity in digital health proficiency: the median score for those who modified their habits is approximately 3.8, whereas the median for those who did not change remains significantly lower at approximately 2.4. Furthermore, the interquartile range for the "Yes" group is noticeably tighter and shifted toward the upper end of the 5-point scale, indicating that higher perceived eHealth literacy was associated with a greater prevalence of reported health-habit change. These

findings suggest that higher perceived eHealth literacy was associated with greater likelihood of reported health-habit change. eHealth literacy by self-medication is shown in Fig. 8.

The analysis demonstrates a highly significant relationship between an individual's eHealth literacy score and the tendency to engage in self-medication ($t = -7.72, p < .001$). Those who report practicing self-medication have significantly higher digital health literacy scores than those who do not.

The boxplot highlights this distinction clearly: the median eHealth literacy score for the self-medication group is approximately 3.8, while the median for the non-self-medicating group is much lower, at roughly 2.9. Furthermore, the interquartile range for the 'Yes' group was concentrated toward the higher end of the 5-point scale. These findings indicate an association between higher perceived eHealth literacy and self-medication; however, the cross-sectional design does not establish whether greater eHealth literacy contributes to self-medication or whether other factors explain the association. eHealth literacy by online doctor consultation is shown in Fig. 9.

Statistical analysis reveals a highly significant relationship between an individual's eHealth literacy score and their likelihood of online doctor consultation ($t = -6.4, p < .001$). Individuals who reported visiting a doctor exhibited significantly higher digital health literacy scores than those who did not.

The boxplot illustrates a clear difference in median proficiency levels: the median score for the doctor-visit group is approximately 3.6. In contrast, the median for the non-visiting group is lower at roughly 2.9. Notably, the "Yes" group displays a more concentrated interquartile range at the higher end of the scale. This finding suggests that higher perceived eHealth literacy may coexist with greater engagement with professional healthcare rather than replacing professional consultation. However, because the study was cross-sectional, the observed association should not be interpreted as evidence that higher eHealth literacy leads to greater healthcare-seeking. eHealth literacy by misinformation-belief frequency is shown in Fig. 10.

A one-way ANOVA reveals a statistically significant difference in eHealth literacy scores based on an individual's frequency of believing "fake news" ($F = 6.01, p = 0.0027$). The distribution of eHealth literacy scores differed across the three categories of self-reported misinformation belief frequency.

The boxplot shows that those who report believing fake news "once" actually maintain a slightly higher median eHealth literacy score compared to those who "never" believe it. However, those who believe fake news "frequently" show the widest variance in literacy and a median score that drops back down to approximately 2.7. The observed pattern suggests that the relationship between eHEALS score and self-reported misinformation belief may not be linear; however, the cross-sectional design and self-reported outcome do not allow conclusions about the mechanisms underlying this pattern. Habit-change regression results are shown in Table 3.

Table 3
Multivariable logistic regression of reported health-related habit change

Characteristic	OR	95% CI	P-value
EHealth Literacy Score	2.22	1.63, 3.07	< 0.001
Gender			
Male	—	—	
Female	0.91	0.56, 1.48	0.7
Education Level			
No Education	—	—	
Primary	2.22	1.11, 4.64	0.028
Secondary	3.40	1.56, 7.70	0.003
HSC	3.77	1.27, 11.8	0.019
Degree/Honors	4.36	1.14, 19.6	0.039
Family Income			
< 10k	—	—	
10k-20k	1.14	0.69, 1.87	0.6
20k-30k	0.86	0.36, 2.08	0.7
> 30k	0.88	0.29, 2.82	0.8
Cost Barrier			
No	—	—	
Yes	0.70	0.41, 1.19	0.2
Internet Speed Barrier			
No	—	—	
Yes	0.79	0.49, 1.26	0.3
English Language Barrier			
No	—	—	
Yes	0.58	0.30, 1.11	0.10
Privacy/Safety Barrier			
Abbreviations: CI = Confidence Interval, OR = Odds Ratio			

Characteristic	OR	95% CI	P-value
No	—	—	
Yes	1.39	0.85, 2.30	0.2
Abbreviations: CI = Confidence Interval, OR = Odds Ratio			

In the multivariable logistic regression model, eHealth literacy was strongly associated with health-habit change following online health information. Each one-unit increase in eHealth literacy score was associated with more than twice the odds of reporting a health-habit change (OR = 2.22, 95% CI: 1.63–3.07, $p < 0.001$). Gender was not significantly associated with health-habit change after adjustment (female vs. Male: OR = 0.91, 95% CI: 0.56–1.48, $p = 0.70$).

Education showed a positive gradient: compared with participants with no education, those with primary (OR = 2.22, 95% CI: 1.11–4.64), secondary (OR = 3.40, 95% CI: 1.56–7.70), HSC (OR = 3.77, 95% CI: 1.27–11.8), and degree/honors education (OR = 4.36, 95% CI: 1.14–19.6) had significantly higher odds of health-habit change. None of the income or digital-health barrier variables showed statistically significant associations with the outcome ($p > 0.05$). The model had an AIC of 491.04. Self-medication regression results are shown in Table 4.

Table 4
Multivariable logistic regression of self-medication

Characteristic	OR	95% CI	P-value
EHealth Literacy Score	1.80	1.22, 2.72	0.004
Gender			
Male	—	—	
Female	0.95	0.54, 1.68	0.9
Education Level			
No Education	—	—	
Primary	1.53	0.60, 4.41	0.4
Secondary	1.71	0.62, 5.27	0.3
HSC	1.53	0.44, 5.73	0.5
Degree/Honors	1.10	0.25, 4.89	> 0.9
Family Income			
< 10k	—	—	
10k-20k	0.84	0.46, 1.52	0.6
20k-30k	0.66	0.23, 1.74	0.4
> 30k	1.29	0.41, 3.96	0.7
Cost Barrier			
No	—	—	
Yes	0.85	0.48, 1.54	0.6
Internet Speed Barrier			
No	—	—	
Yes	1.43	0.82, 2.52	0.2
English Language Barrier			
No	—	—	
Yes	0.34	0.17, 0.67	0.002
Privacy/Safety Barrier			
No	—	—	
Abbreviations: CI = Confidence Interval, OR = Odds Ratio			

Characteristic	OR	95% CI	P-value
Yes	0.75	0.41, 1.35	0.3
Abbreviations: CI = Confidence Interval, OR = Odds Ratio			

In the multivariable logistic regression model, higher eHealth literacy was significantly associated with self-medication. Each one-unit increase in eHealth literacy score was associated with higher odds of self-medication (OR = 1.80, 95% CI: 1.22–2.72, $p = 0.004$). Gender, education level, family income, cost barriers, internet-speed barriers, and privacy/safety barriers were not significantly associated with self-medication ($p > 0.05$).

In contrast, participants reporting an English-language barrier had substantially lower odds of self-medication than those without this barrier (OR = 0.34, 95% CI: 0.17–0.67, $p = 0.002$). The model had an AIC of 389.03. Online-doctor-consultation regression results are shown in Table 5.

Table 5
Multivariable logistic regression of Online doctor consultation

Characteristic	OR	95% CI	P-value
EHealth Literacy Score	1.46	1.05, 2.04	0.027
Gender			
Male	—	—	
Female	1.42	0.86, 2.36	0.2
Education Level			
No Education	—	—	
Primary	1.20	0.58, 2.62	0.6
Secondary	1.62	0.70, 3.86	0.3
HSC	3.37	1.16, 10.2	0.028
Degree/Honors	4.45	1.26, 16.4	0.022
Family Income			
< 10k	—	—	
10k-20k	1.27	0.76, 2.14	0.4
20k-30k	0.76	0.29, 1.86	0.6
> 30k	2.05	0.69, 5.98	0.2
Cost Barrier			
No	—	—	
Yes	0.76	0.45, 1.30	0.3
Internet Speed Barrier			
No	—	—	
Yes	1.44	0.89, 2.37	0.14
English Language Barrier			
No	—	—	
Yes	0.81	0.43, 1.54	0.5
Privacy/Safety Barrier			
Abbreviations: CI = Confidence Interval, OR = Odds Ratio			

Characteristic	OR	95% CI	P-value
No	—	—	
Yes	1.31	0.78, 2.21	0.3
Abbreviations: CI = Confidence Interval, OR = Odds Ratio			

In the multivariable logistic regression model, eHealth literacy was significantly associated with online doctor visits. Each one-unit increase in eHealth literacy score was associated with higher odds of visiting a doctor online (OR = 1.46, 95% CI: 1.05–2.04, $p = 0.027$). Participants with HSC education (OR = 3.37, 95% CI: 1.16–10.2, $p = 0.028$) and degree/honors education (OR = 4.45, 95% CI: 1.26–16.4, $p = 0.022$) also had significantly higher odds of online doctor visits compared with those with no education.

Gender, family income, and all four digital-health barriers were not significantly associated with online doctor visits ($p > 0.05$). The model had an AIC of 471.52. Misinformation-belief regression results are shown in Table 6.

Table 6
Ordinal logistic regression of frequency of believing online health misinformation

Predictor	Estimate	SE	P-value	OR	CI
EHealth literacy score	0.295	0.136	0.031	1.343	1.029–1.759
Female (vs. Male)	0.249	0.214	0.245	1.283	0.843–1.953
Primary education (vs. No formal education)	-0.001	0.286	0.996	0.999	0.570–1.754
Secondary education (vs. No formal education)	0.525	0.338	0.121	1.69	0.872–3.293
HSC education (vs. No formal education)	0.424	0.467	0.364	1.527	0.611–3.822
Degree/Honors education (vs. No formal education)	-0.713	0.626	0.255	0.49	0.136–1.621
Family income 10,000–20,000 BDT (vs. <10,000 BDT)	0.105	0.221	0.634	1.111	0.720–1.715
Family income 20,000–30,000 BDT (vs. <10,000 BDT)	1.014	0.379	0.008	2.756	1.312–5.826
Family income > 30,000 BDT (vs. <10,000 BDT)	0.76	0.504	0.131	2.139	0.791–5.774
Cost barrier: Yes (vs. No)	-0.069	0.237	0.769	0.933	0.587–1.486
Internet-speed barrier: Yes (vs. No)	0.595	0.209	0.004	1.814	1.206–2.743
English-language barrier: Yes (vs. No)	0.099	0.293	0.736	1.104	0.622–1.967
Privacy/safety barrier: Yes (vs. No)	1.253	0.223	< 0.001	3.502	2.272–5.452

In the ordinal logistic regression model, higher eHealth literacy was significantly associated with greater odds of reporting higher levels of fake-news belief (OR = 1.34, 95% CI 1.03–1.75, $p = 0.031$). Among socioeconomic factors, participants with a family income of 20k–30k had higher odds of being in a higher fake-news belief category compared with those earning < 10k (OR = 2.76, $p = 0.008$).

Several digital-health barriers were also significantly associated with fake-news belief. Participants reporting an internet-speed barrier had higher odds of being in a higher fake-news belief category (OR = 1.81, $p = 0.004$), while those reporting privacy/safety barriers had substantially higher odds (OR = 3.50, p

< 0.001). Gender, education level, cost barriers, and English-language barriers were not significantly associated with fake-news belief.

The proportional-odds assumption was not violated ($P = 0.350$). The ordinal regression model had an AIC of 756.22. Overall, the findings suggest that greater eHealth literacy does not necessarily protect against believing online health misinformation and may coexist with greater exposure or engagement with potentially unreliable online health information.

No evidence of problematic multicollinearity was observed among the predictors. VIF values ranged from 1.05 to 1.84, well below the commonly used threshold of 5. The highest VIF was observed for education level (VIF = 1.84), followed by English-language barriers (VIF = 1.66). These results indicate that multicollinearity was unlikely to substantially affect the estimates of the multivariable models.

Qualitative findings

The qualitative analysis identified six interconnected themes related to digital engagement, gendered access, health-information seeking, evaluation of online information, structural barriers, and the perceived role of digital health. Together, these themes provided contextual explanations for the quantitative findings, particularly the observed gender differences in eHealth literacy, online health-information use, privacy concerns, and perceived barriers.

Digital integration and everyday use

Participants described regular use of mobile phones and internet-based platforms for communication, education, social interaction, and livelihood-related activities. However, routine digital engagement did not necessarily translate into frequent use of digital resources for health purposes. Health-related internet use was generally described as occasional or supplementary, particularly when participants wanted to obtain preliminary information before consulting a trusted person or health professional.

“I use my phone every day for communication and other activities, but I do not usually use it for health information.” (Participant interview)

This distinction suggests that access to digital technology alone may not ensure meaningful engagement with digital health information.

Gendered digital access and autonomy

Gender differences in access to and control over digital devices emerged as an important theme. Some female participants described shared-device use, dependence on husbands or other family members, and limited privacy when accessing the internet. In contrast, participants with personal devices generally reported greater freedom to search for information independently. These differences were particularly relevant for sensitive health concerns, for which privacy and autonomy were important considerations.

“Sometimes I have to use a family member’s phone, so I cannot always search for something privately.” (Participant interview)

Participants also described changing patterns among younger females, suggesting that personal smartphone ownership and independent internet use may be increasing. Nevertheless, household decision-making, financial constraints, and social expectations continued to shape females digital autonomy.

Health-information seeking and trust

Participants generally regarded doctors, health professionals, family members, and other trusted individuals as more reliable sources of health information than social media or unspecified online sources. The internet was nevertheless used as a supplementary source, particularly for obtaining preliminary information, understanding symptoms, or exploring sensitive topics. Several participants described cross-checking information found online with a doctor, pharmacist, family member, or another trusted person.

I may search online first, but I prefer to ask someone I trust before deciding what to do.

This pattern complements the quantitative findings showing gender differences in preferred and trusted health-information sources. It also indicates that digital health information is often incorporated into existing interpersonal and professional health-seeking networks rather than replacing them.

Digital health literacy and verification

Participants demonstrated varying levels of confidence in finding and evaluating online health information. Some reported checking the source of information, comparing information across websites, or consulting health professionals. Others relied on general impressions or familiar sources and expressed uncertainty about how to determine whether a website or social-media post was credible.

There are many health posts online, but it is difficult to know which information is actually reliable.

Participants' accounts indicated that awareness of misinformation did not always translate into systematic verification. Limited knowledge of credible sources and difficulty distinguishing reliable from unreliable information could therefore increase vulnerability to misleading health content. These findings provide qualitative context for the quantitative association between eHealth literacy and misinformation-related outcomes.

Structural barriers to digital health use

Participants identified several structural and socioeconomic barriers that constrained their ability to obtain and use online health information. These included the cost of internet access, slow or unreliable connectivity, language difficulties, limited privacy, and difficulties accessing professional healthcare services locally. For some participants, limited availability of healthcare services increased the perceived value of online health information; however, poor connectivity and other resource constraints could simultaneously restrict its usefulness.

The internet can help when it is difficult to reach a doctor, but the connection and cost can make it difficult to use.

These accounts reinforce the quantitative findings that cost, language, and privacy were important barriers and that some barriers were experienced differently by male and female. The qualitative findings further suggest that digital health engagement is shaped by the interaction between individual skills and the broader social and infrastructural environment.

Perceived role and potential of digital health

Participants generally viewed digital health as having potential to improve access to health information, particularly where geographical or service-related barriers made face-to-face consultation difficult. Privacy was considered an important potential advantage for sensitive health concerns, while online resources were also perceived as useful for health education and obtaining preliminary information.

At the same time, participants emphasized that digital health should complement rather than replace professional healthcare. They identified the need for reliable internet access, trustworthy health information, greater digital-health literacy, and opportunities to verify online information with qualified health professionals.

Online information can be useful, especially when getting to a doctor is difficult, but people also need to know which information they can trust.

Integration of qualitative findings

Overall, the qualitative findings complemented the quantitative results by showing that gender differences in eHealth engagement were not attributable to digital skills alone. Access to personal devices, household autonomy, privacy, language, connectivity, financial constraints, and trust in information sources all influenced how participants used digital health resources. The findings also suggest that greater eHealth literacy may facilitate both productive health-information seeking and independent health-related decision-making, while contextual barriers can limit the extent to which these skills translate into safe and effective health practices. Digital health was therefore viewed primarily as a complement to existing healthcare and social support systems, rather than as a substitute for professional care. The mixed-methods joint display is shown in Table 07.

Table 07
Mixed-methods joint display

Quantitative finding	Qualitative finding	Integration
Females reported greater privacy barriers	Females described shared-device use and limited privacy	Convergence
Males had higher eHealth Literacy Score	Males described greater independent device use	Complementarity
Internet use differed by gender	Females described household restrictions	Complementarity
Higher eHealth Literacy Score associated with self-medication	Participants described using online information for self-treatment	Complementarity

Discussion

This mixed-methods study examined gender differences in perceived eHealth literacy, digital-health barriers, and selected health-seeking and health-related behaviours among young adults living on Saint Martin Island, Bangladesh. The findings show that digital-health engagement in this geographically isolated population is shaped not only by perceived digital-health skills but also by gender, education, language, privacy, connectivity, and access to trusted sources of care. Males reported higher eHealth literacy than Females, whereas Females experienced substantially greater English-language and privacy/safety barriers. Higher eHealth literacy was associated with greater odds of health-habit change, self-medication, and online doctor visits, but also with self-reported frequency of believing health-related misinformation encountered online. Together, these findings extend the existing literature by showing that perceived eHealth literacy was associated with greater engagement with digital health without necessarily ensuring safer or more reliable health-related decision-making.

A central finding was the gender difference in perceived eHealth literacy. Male participants had a significantly higher mean eHealth literacy score than female participants (3.16 ± 0.99 vs. 2.68 ± 1.00 ; $p < 0.001$). This pattern is consistent with broader evidence that gender remains an important dimension of the digital divide. The GSMA has identified affordability, digital skills, safety, device access, and social constraints as continuing barriers to Females' mobile-internet use in low- and middle-income countries [29], while national ICT data indicate unequal patterns of digital access and use in Bangladesh [30]. Studies of eHealth adoption in Bangladesh have also shown that social and cultural conditions influence the use of digital-health technologies [32, 33]. The qualitative findings in the present study provide an important contextual explanation for this disparity: participants described shared-device use, limited privacy, dependence on family members, and differences in autonomy over digital access. The observed gender gap should therefore not be understood simply as a difference in individual ability. Rather, it may partly reflect unequal opportunities to develop and exercise digital-health skills. While previous evidence has largely documented broader gender inequalities in digital access, this study contributes evidence from a geographically isolated Bangladeshi community showing how digital skills, household autonomy,

privacy, and social conditions intersect in everyday health-information seeking. This addresses an important evidence gap identified in the Introduction concerning how gendered digital conditions operate in an underserved island setting.

Gender differences were also evident in specific barriers to digital-health engagement. Cost was reported by 75% of both Males and Females, indicating that affordability is a substantial population-wide constraint rather than a predominantly gender-specific barrier. In contrast, Females were significantly more likely to report English-language barriers (84% vs. 70%; $p < 0.001$) and privacy/safety barriers (59% vs. 29%; $p < 0.001$). These findings are consistent with the broader digital-divide literature, which conceptualises meaningful digital inclusion as dependent on skills, resources, autonomy, and conditions of use rather than connectivity alone [2–4]. They also add context to national and international evidence on gendered digital inequality [29, 30] by showing that access to a device or network does not necessarily translate into an equal ability to use digital resources for health purposes. For health-information seeking, this distinction is particularly relevant because limited privacy may constrain searches about sensitive health concerns, while language difficulties may restrict access to understandable information. The findings therefore extend previous evidence by demonstrating that gender inequalities in digital health on Saint Martin Island involve the circumstances under which technology can be used privately, independently, and meaningfully, rather than access alone.

Higher eHealth literacy was strongly associated with health-habit change following the use of online health information. Each one-unit increase in eHealth literacy was associated with more than twice the odds of reporting a health-habit change (OR = 2.22, 95% CI: 1.63–3.07; $p < 0.001$). This is consistent with systematic and empirical evidence linking eHealth literacy with health-related behaviours [17, 20]. Education was also independently associated with this outcome, with progressively higher odds of reported habit change across the primary, secondary, Higher Secondary Certificate (HSC), and degree/honors categories compared with no formal education. This pattern suggests that perceived ability to locate and use electronic health information and broader educational resources may operate together in supporting the interpretation and application of online information. However, because the study was cross-sectional and the outcome was self-reported, the association should not be interpreted as evidence that eHealth literacy directly caused behavioural change. The present study nevertheless extends existing evidence by demonstrating this association in a geographically isolated population where formal healthcare and information resources may be more difficult to access. This contributes to the literature by moving beyond measures of digital access and examining whether perceived digital-health capability is associated with how individuals report acting on health information.

The relationship between eHealth literacy and self-medication illustrates why greater digital-health engagement should not automatically be interpreted as beneficial. Higher eHealth literacy was associated with greater odds of self-medication (OR = 1.80, 95% CI: 1.22–2.72; $p = 0.004$). Self-medication has previously been documented among students and community populations in Bangladesh [36–38] and among university students internationally [39]. Those studies establish the broader public-health relevance of self-medication but do not demonstrate that digital information is

responsible for the behaviour. The present findings add a different dimension by showing that, within this study population, greater perceived competence in accessing electronic health information coexisted with a greater likelihood of self-medication. In the context of geographic isolation and difficulties accessing formal healthcare, individuals who feel more confident obtaining health information online may also feel more able to make treatment decisions independently. The qualitative accounts support a cautious interpretation: participants commonly used online information for preliminary guidance but continued to consult doctors, pharmacists, family members, or other trusted individuals. Thus, the study contributes evidence that the relationship between eHealth literacy and health behaviour is not uniformly protective and that digital-health capability may support both constructive information seeking and potentially risky forms of self-directed care.

An additional finding was the substantially lower odds of self-medication among participants reporting an English-language barrier (OR = 0.34, 95% CI: 0.17–0.67; $p = 0.002$). One plausible interpretation is that difficulty understanding English-language online material may reduce exposure to medication-related digital information and therefore limit opportunities for acting independently on such information. This explanation remains tentative because the study did not directly measure the pathway between language difficulty, exposure to medication information, and treatment decisions. The finding should therefore not be interpreted as suggesting that language barriers are protective. Instead, it illustrates the complex ways in which unequal access to understandable information may shape digital-health behaviour. It also reinforces the need for health information that is understandable in the languages routinely used by the population.

Higher eHealth literacy was also associated with greater odds of an online doctor visit (OR = 1.46, 95% CI: 1.05–2.04; $p = 0.027$). Participants with HSC and degree/honors education also had significantly higher odds of online doctor visits than participants with no formal education. This finding is consistent with previous literature showing that online health information is often used alongside professional and interpersonal sources rather than replacing them [21–28]. The qualitative findings showed the same pattern: participants frequently described searching online for preliminary information while continuing to value doctors, pharmacists, family members, and other trusted sources. The present study therefore adds context-specific evidence that greater digital-health capability can coexist with, and potentially facilitate, engagement with professional care through digital channels. This is particularly relevant in Saint Martin Island, where geographical separation and dependence on sea transport may complicate access to mainland services [35]. Rather than positioning digital health as an alternative healthcare system, the findings support its potential role as a complementary pathway through which geographically isolated residents can obtain information and access professional advice.

The findings concerning misinformation were more complex and differed from a simple expectation that greater perceived eHealth literacy would necessarily protect users from unreliable information. Higher eHealth literacy was associated with self-reported frequency of believing health-related misinformation encountered online (OR = 1.34; $p = 0.031$). Participants with a family income of 20k–30k also had higher odds of higher fake-news belief than those with an income below 10k (OR = 2.76; $p = 0.008$), while

internet-speed barriers ($OR = 1.81$; $p = 0.004$) and privacy/safety barriers ($OR = 3.50$; $p < 0.001$) were independently associated with higher fake-news belief. Previous research has documented substantial variability in the quality and credibility of online health information and the difficulty users face when evaluating its trustworthiness [13, 15, 16]. The current finding extends this literature by showing that self-perceived eHealth literacy, as measured by eHEALS, does not necessarily correspond to successful identification of misinformation.

This apparently counterintuitive association requires cautious interpretation. EHEALS measures perceived knowledge and confidence in finding and using electronic health information rather than objective performance in distinguishing accurate from inaccurate content [5–7]. Individuals who perceive themselves as more capable digital-health users may engage more extensively with online information and may therefore encounter a greater volume and variety of content, including misinformation. Alternatively, confidence in evaluating online information may not always correspond to accurate appraisal. The qualitative findings support this interpretation: participants were aware that online health information could be misleading, yet many described uncertainty about identifying authoritative sources and relied on informal methods of verification. Accordingly, the finding should not be interpreted as evidence that greater eHealth literacy causes misinformation belief. Instead, it identifies an important gap between perceived digital-health competence and the ability to assess credibility, suggesting that eHealth literacy programmes may need to place greater emphasis on source evaluation and misinformation verification rather than information-search skills alone.

The associations between internet-speed and privacy/safety barriers and higher fake-news belief further demonstrate the importance of the wider digital environment. Digital inequality theory emphasises that meaningful use depends on resources, skills, autonomy, and the ability to convert access into beneficial outcomes [2–4]. The present results provide empirical support for this perspective in a health context. Even participants who feel confident using digital resources may struggle to obtain or verify reliable information when connectivity is poor, privacy is constrained, or credible sources are difficult to identify. This helps address the research gap concerning the interaction between individual eHealth literacy and structural conditions in geographically isolated communities. It also illustrates why interventions focused solely on improving individual skills may be insufficient if the surrounding information and infrastructure environment remains difficult to navigate.

The mixed-methods findings are particularly important in the context of Saint Martin Island. Existing research and policy discussions have described the potential of digital and mobile health in Bangladesh [31–33], but evidence from geographically isolated island populations remains limited. Referral travel from Saint Martin Island depends substantially on sea transportation [35], while participants in this study described problems related to cost, connectivity, language, privacy, and access to trusted professional advice. The qualitative evidence therefore helps explain why digital health may be especially valuable in this setting and, at the same time, especially difficult to use effectively. This combination represents a central contribution of the study: populations with substantial potential need for remote health information and services may also experience structural conditions that prevent them from realising

those benefits. In this respect, the study partly addresses the gap identified in the Introduction by connecting gendered digital inequality, perceived eHealth literacy, health behaviours, misinformation, and lived access constraints within the same geographically isolated population.

The overall pattern of findings has several implications for public health and development planning. For policymakers and public health authorities, the findings suggest that expanding connectivity or device access alone is unlikely to address the observed inequalities. Digital-health policy may need to consider meaningful access, including privacy, language accessibility, credibility of information, medication safety, and links to qualified healthcare. The association between perceived eHealth literacy and both beneficial and potentially risky behaviours further suggests that digital-health literacy initiatives should combine information-search skills with critical appraisal, misinformation recognition, and guidance on when professional medical advice is required. Such an approach would be consistent with the broader principle that digital-health technologies need to operate alongside organisational, financial, and human health-system resources [1].

At the local level, the findings may help guide community-based planning in geographically isolated settings. Local authorities and health-service providers could use evidence on language, privacy, connectivity, and trusted information sources when designing awareness activities or digital-health support. Locally understandable health information may be particularly important for users who experience English-language barriers, while privacy-sensitive approaches may be necessary where household or shared-device conditions restrict independent information seeking. Because participants continued to place substantial trust in doctors, pharmacists, family members, and other interpersonal sources, digital initiatives may be more acceptable and useful when they complement existing local health and social networks rather than attempt to replace them. Coordination between community-level actors and professional health services could therefore help create clearer pathways from online information seeking to appropriate care.

The findings may also inform donor agencies and development partners considering digital-health programmes in underserved communities. Resource allocation could support not only connectivity but also locally appropriate information, digital-health literacy, medication-safety education, verification skills, and links to professional advice. Programmes targeting Females may require particular attention to privacy, autonomous use of digital resources, and language accessibility. Monitoring and evaluation should also distinguish between greater digital engagement and safer health outcomes, because the present findings show that higher perceived eHealth literacy can coexist with self-medication and greater fake-news belief. This distinction is important for programme design: increased use of digital health should not itself be treated as evidence of improved health-information quality or safer decision-making.

More broadly, the study has relevance for global health and development efforts concerned with health equity and digitally underserved populations. The findings illustrate that digital-health expansion can reproduce existing inequalities when differences in skills, language, privacy, autonomy, infrastructure, and healthcare access are not addressed simultaneously. International and development actors

supporting digital transformation in health may therefore need to consider both individual capability and the structural environment in which technology is used. Evidence from Saint Martin Island adds a geographically distinctive perspective to this wider debate by showing how gender inequality and geographic isolation can intersect with digital-health opportunities and risks. Digital health in such settings may be most useful when positioned as a complement to accessible professional healthcare rather than as a substitute for it.

Strengths and Limitations

This study has several strengths. First, it focuses on a geographically isolated population that is underrepresented in the digital-health literature, providing evidence from a context in which digital health may have particular relevance. Second, the quantitative sample of 433 young adults enabled gender-specific comparisons and multivariable analyses. Third, eHEALS demonstrated high internal consistency in the study population (Cronbach's $\alpha = 0.941$). Fourth, the mixed-methods design allowed qualitative evidence to contextualise quantitative associations, particularly those concerning gendered access, privacy, language, trust, verification, and healthcare-seeking practices. This integration enabled the study to examine not only whether differences existed but also how participants experienced some of the social and infrastructural conditions surrounding digital-health use.

Several limitations should be considered when interpreting the findings. The household selection procedure did not use a complete household sampling frame or a formally random starting point, which may limit the representativeness and generalisability of the quantitative sample. The cross-sectional design prevents causal inference; associations between eHealth literacy and health-habit change, self-medication, online doctor visits, or fake-news belief should therefore not be interpreted as causal relationships. EHEALS measures perceived rather than objectively assessed eHealth literacy, meaning that reported confidence may not correspond directly to performance in locating, interpreting, or evaluating health information. This limitation is particularly relevant to the observed association between higher eHealth literacy and higher fake-news belief. Health behaviours, information-seeking practices, and barriers were self-reported and may be affected by recall or reporting bias. The quantitative sample was restricted to permanent residents aged 18–35 years with previous digital-device experience, limiting generalisability to older adults, people without digital-device experience, tourists, and populations in mainland or other geographic settings. The qualitative findings should therefore be interpreted primarily as contextual evidence rather than as estimates of population prevalence.

Future research could examine these relationships longitudinally and incorporate objective measures of digital-health information appraisal alongside perceived eHealth literacy. Further work could also assess how language-accessible information, privacy-sensitive approaches, misinformation-verification training, and links to professional healthcare operate in geographically isolated populations. Such research would help determine whether the associations identified here persist across other underserved settings and which forms of digital-health support are most appropriate.

Conclusion

This study identifies important gender inequalities in perceived eHealth literacy and digital-health conditions among young adults on Saint Martin Island, Bangladesh. Males reported significantly higher eHealth literacy, while Females experienced substantially greater English-language and privacy/safety barriers. Higher eHealth literacy was associated with greater odds of health-habit change and online doctor visits, but also with self-medication and higher fake-news belief. These findings indicate that greater perceived digital-health capability was associated with greater engagement with electronic health information without necessarily ensuring safe or reliable decision-making.

The study contributes evidence from a geographically isolated and underrepresented Bangladeshi population by showing that digital-health inequality extends beyond access to devices or internet connectivity. Individual skills interact with gender, language, privacy, infrastructure, education, trust, and access to professional healthcare. Digital-health strategies for such communities should therefore combine gender-responsive and language-accessible eHealth literacy support with critical appraisal and misinformation-verification skills, medication-safety guidance, privacy-sensitive access, reliable connectivity, trustworthy health information, and clear pathways to professional care. For policymakers, local authorities, service providers, and development partners, the findings suggest that digital health is most appropriately developed as an equitable and safe complement to professional healthcare rather than as a replacement for it.

Abbreviations

Abbreviation	Full term
eHealths	eHealth Literacy Scale
OR	Odds Ratio
CI	Confidence Interval
SD	Standard Deviation

Declarations

Ethics approval and consent to participate

The study was approved by the Ethical Review Committee, Faculty of Biological Sciences, University of Dhaka, Bangladesh (Reference No. 373/Biol. Scs./2025-2026). Written informed consent was obtained from participants, and confidentiality was maintained throughout data management and reporting. Qualitative quotations were reported using de-identified source identifiers. The study was conducted in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable.

Availability of data and materials

The data and related study materials are not publicly available at present due to confidentiality considerations. They may be available from the Corresponding Author upon reasonable request, subject to applicable confidentiality requirements.

Competing interests

The authors declare that they have no competing interests.

Funding

This study was self-funded and received no external funding or financial support.

Authors' contributions

MTTM (Most Tabassum Tamanna Mim): Conceptualization and initiation of the study; development of the initial research idea and working title; research planning and study design; coordination with academic advisors and supervisor; development and refinement of research questions and study instruments; ethical approval and IRB coordination; fieldwork planning; qualitative and quantitative data collection; coordination and supervision of the 12-member field team; training of data collectors; coordination and participation in multiple meetings related to data collection, transcription, and manuscript preparation; preparation of the initial manuscript draft; substantial revision and restructuring of the manuscript; integration and merging of the two previous manuscripts; critical review and editing; coordination of co-authors; incorporation of supervisor and reviewer feedback; and final proofreading and preparation of the manuscript for submission.

AU (Ahsan Ullah): Contribution to study planning and methodological discussions; involvement in fieldwork planning from the preparatory stage through data collection; consultation regarding sampling and data collection procedures; participation in qualitative and quantitative data collection; contribution to field-level research coordination, including coordination related to local-language data collection; contribution to writing the Introduction; critical review and revision of the manuscript; substantial effort in reviewing the final version of the manuscript; detailed checking and correction of the manuscript during the final three days of preparation; incorporation of necessary revisions and corrections; and contribution to the finalization of the manuscript for submission.

HA (Humayra Anjir): The author contributed to the development and refinement of the research questions, supported the data collection process, facilitated communication and coordination with

relevant teachers, and contributed to the draft writing of the Introduction, particularly the background of the study.

MNC (Md Nayeem Chowdhury): Contributed to methodology development, discussion and conclusion write-up; performed quantitative data analysis with data cleaning and visualization of the data; contributed to manuscript development and revision; suggested how to write up the introduction and literature review, including the significance of the study; reviewed and edited the manuscript; and incorporated suggested changes during manuscript finalization.

ST (Shamima Tahera): Revised the working title and research topic in response to the supervisor's recommendations; developed and refined the research questions; developed the quantitative questionnaire and qualitative topic guide; prepared the kobocollect/Excel data-collection form; conducted qualitative transcription and qualitative data analysis and write-up; contributed to the basic Discussion write-up; participated in data-collector training, transcription-related meetings, and manuscript-development meetings; edited the manuscript; and contributed substantially to manuscript revision. Support in IRB permission and method section.

All authors reviewed and approved the final manuscript and agreed to be accountable for all aspects of the work.

Acknowledgements

The authors would like to express their sincere gratitude to Rowshon Akhter, Associate Professor, Department of Information Science and Library Management, University of Dhaka, for her continuous guidance, constructive feedback, academic support, and careful review throughout the development of this research. Her insightful comments and ongoing support were instrumental in strengthening the quality of the manuscript.

We are also grateful to Dr. Md. Anwarul Islam, Professor, Department of Information Science and Library Management, University of Dhaka, for his valuable guidance, encouragement, and time during the initial stages of the research. His advice on the research direction and methodological development provided an important foundation for this work.

The authors sincerely acknowledge Kazi Sameeo Sheesh, Senior Research Fellow, Centre for Advanced Research in Arts and Social Science (CARASS), for providing valuable initial guidance and suggestions that contributed to the development of the study.

We are grateful to S M Sadeq, Director, Bangladesh Research Society, for his continued support, guidance, encouragement, and motivation throughout the research process.

Finally, the authors would like to express their deepest appreciation to the Dhaka University Research Society (DURS) for its continuous institutional support and assistance from the initiation of the research

through the completion and preparation of the manuscript for submission.

The authors gratefully acknowledge the contributions of all the individuals and the institution mentioned above, whose guidance, support, and encouragement significantly facilitated the completion of this research.

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Figures

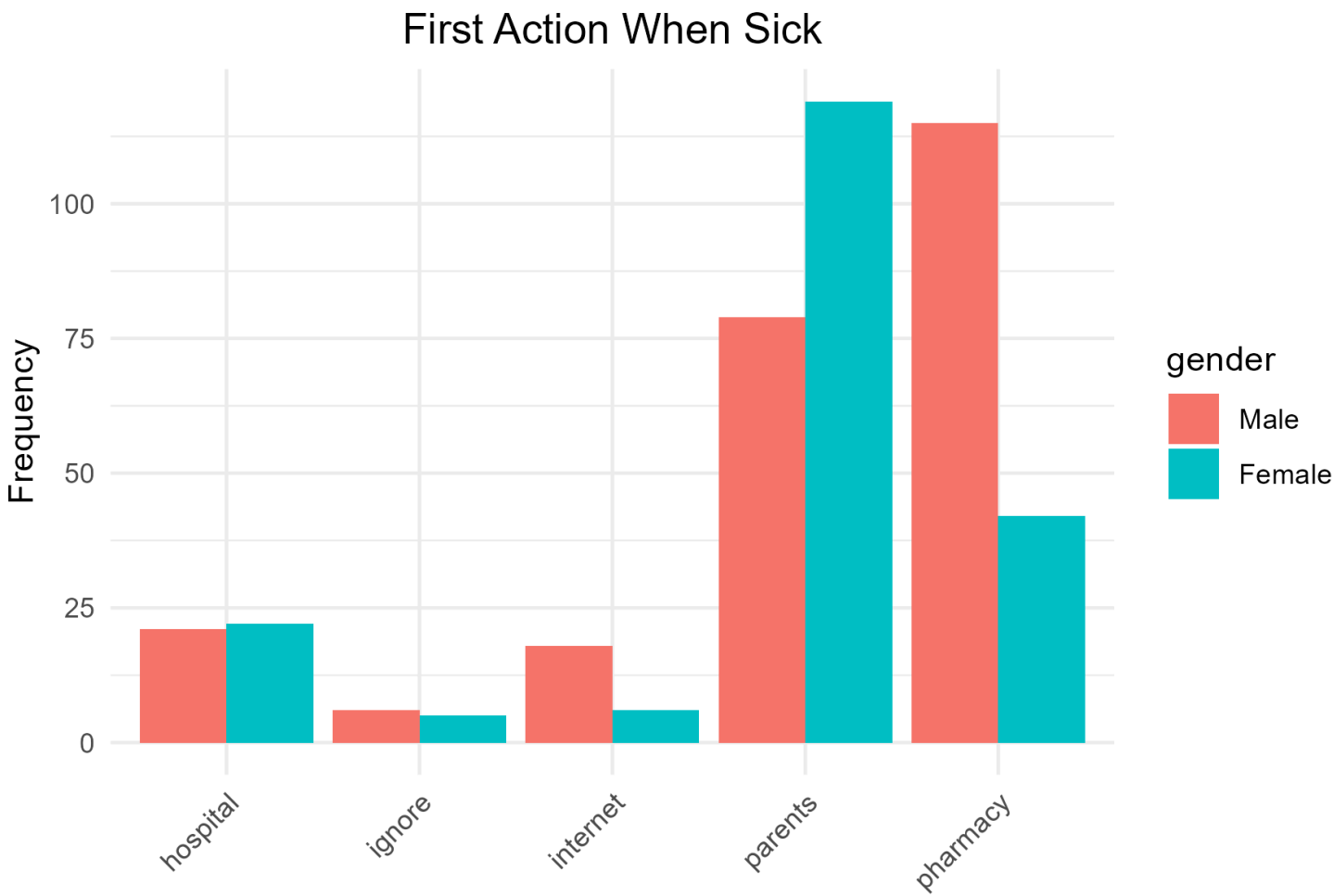


Figure 1

First action when ill by gender

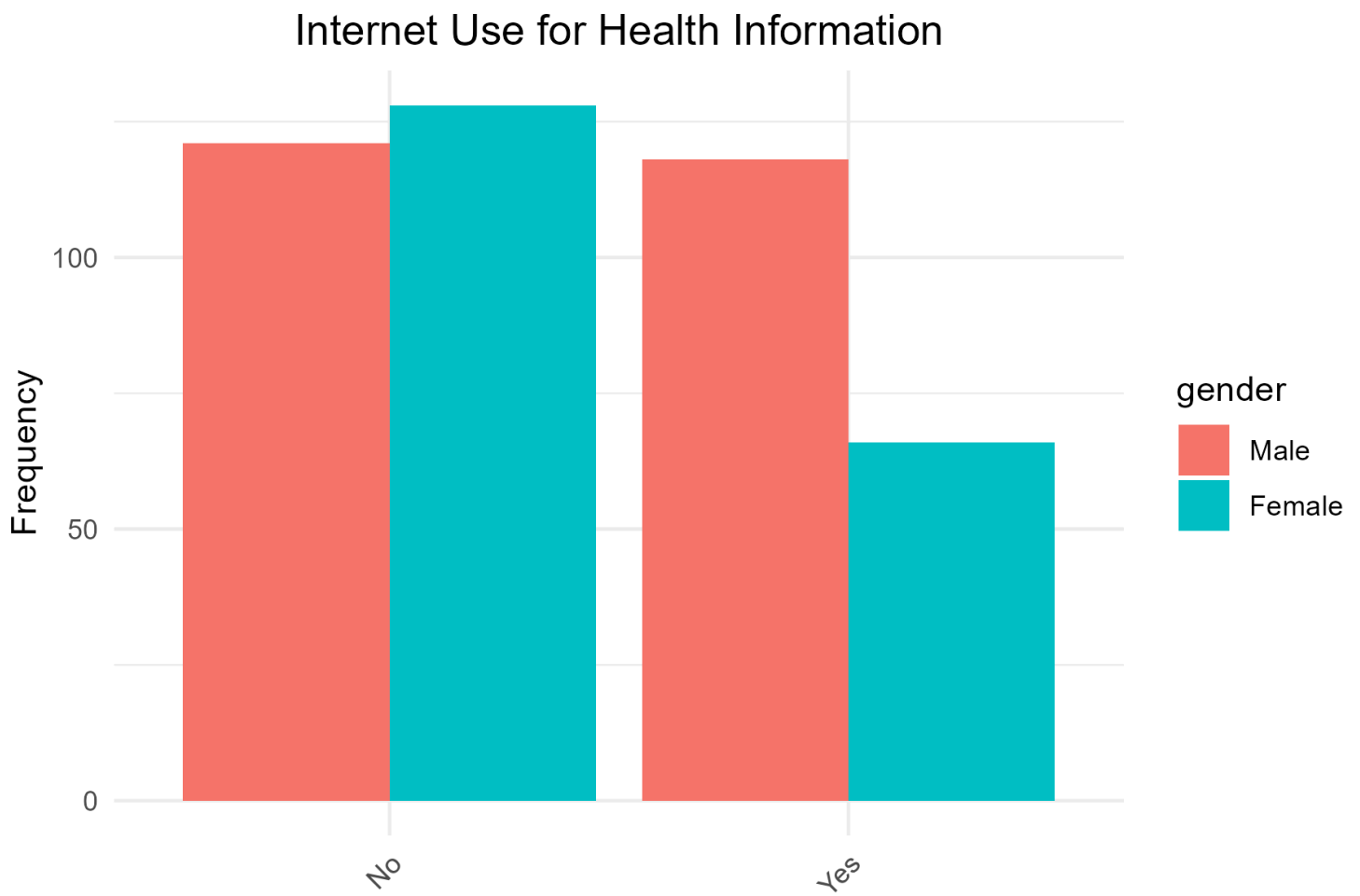


Figure 2

Internet use for health information by gender

Source for Sensitive Health Issues

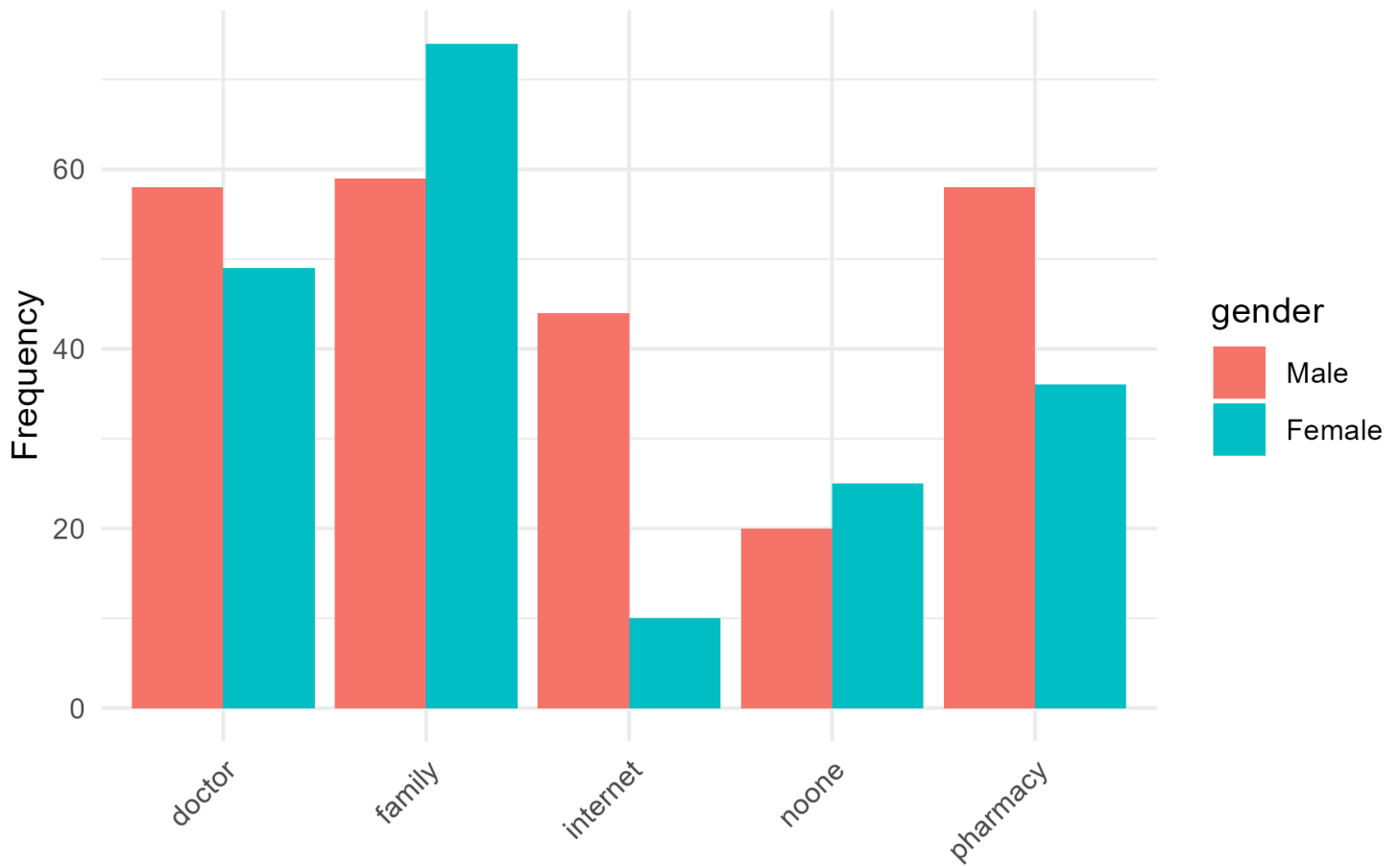


Figure 3

Preferred information source for sensitive health issues by gender

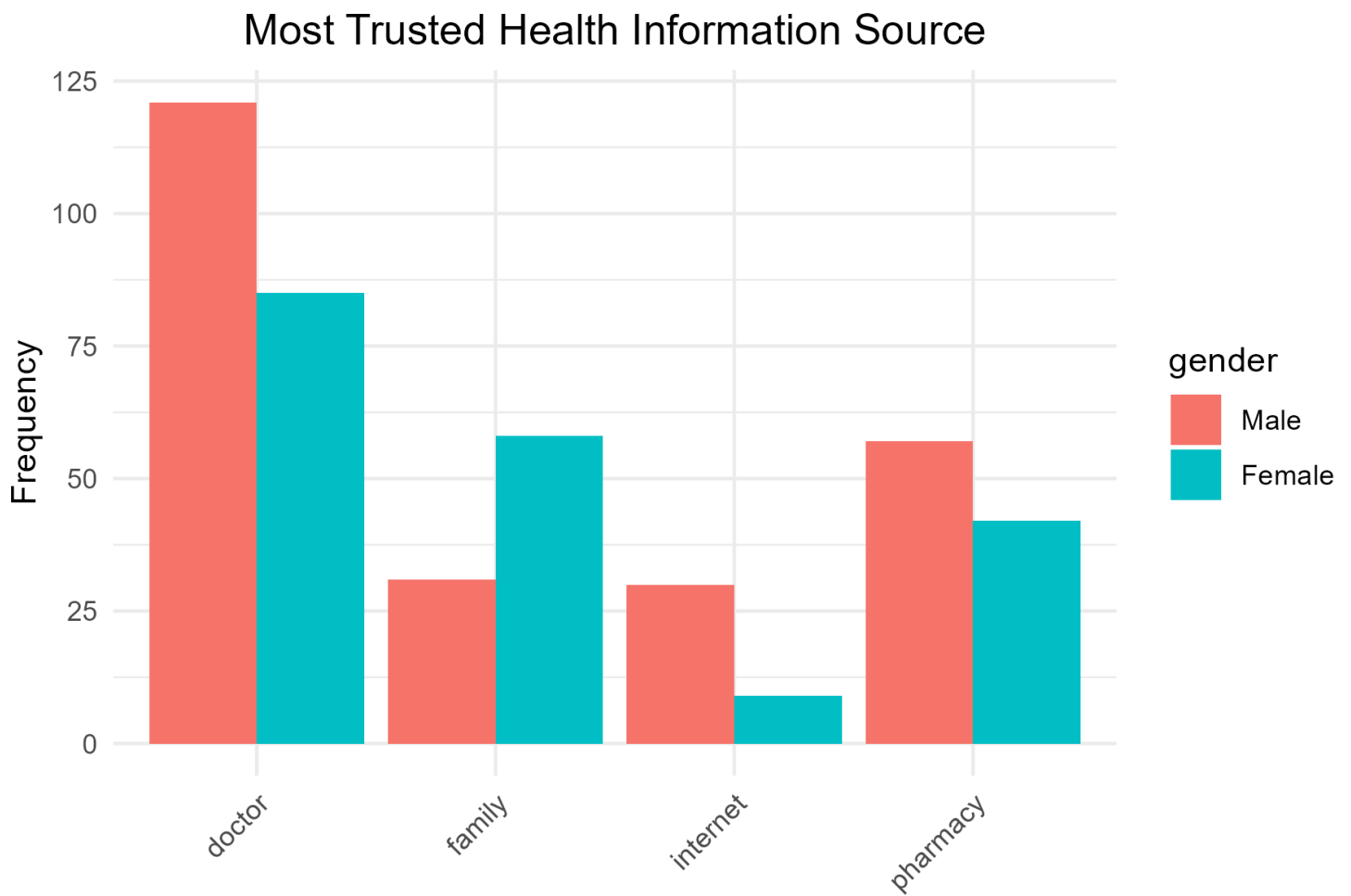


Figure 4

Most trusted health-information source by gender

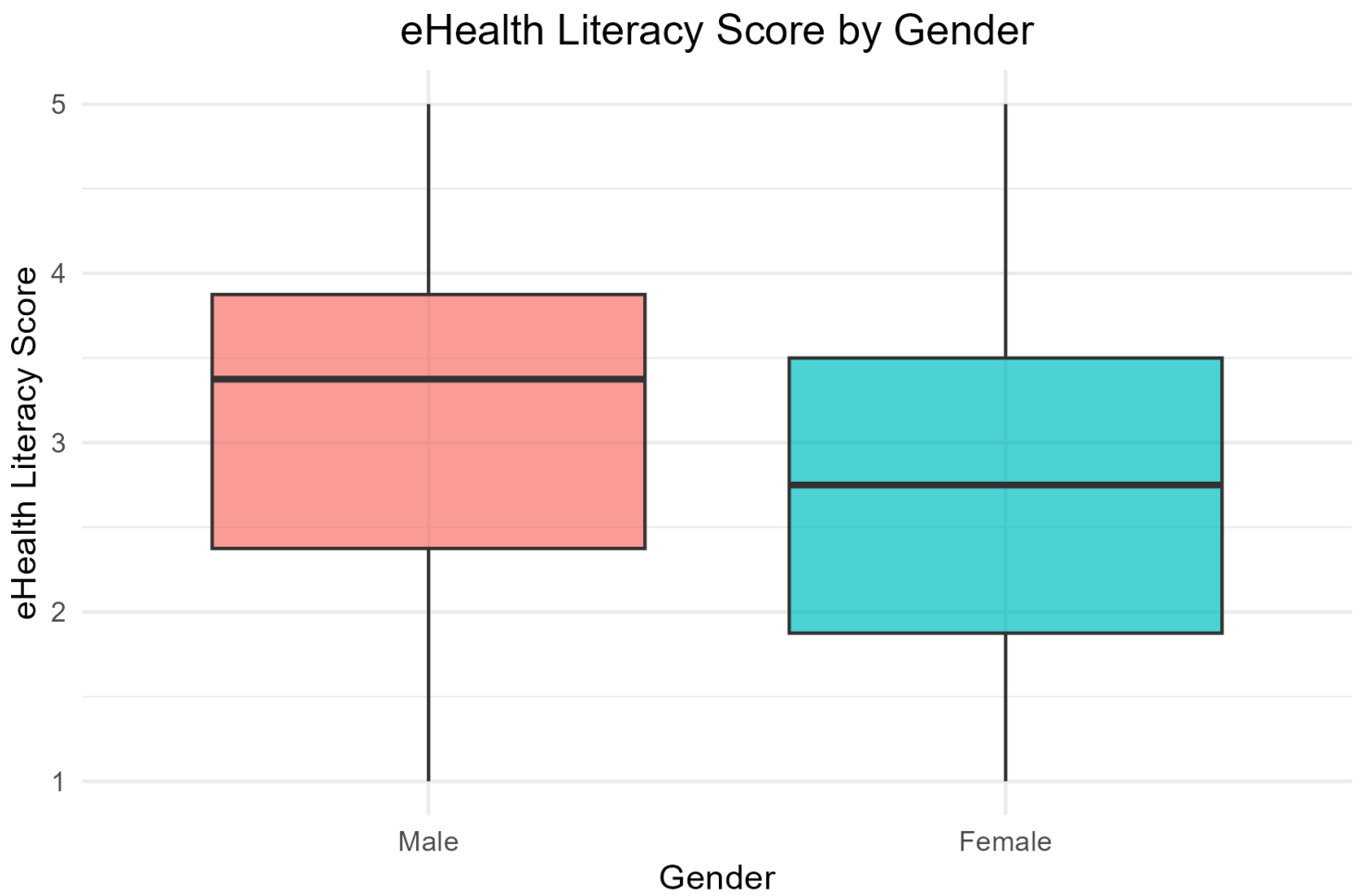


Figure 5

Perceived eHealth literacy score by gender

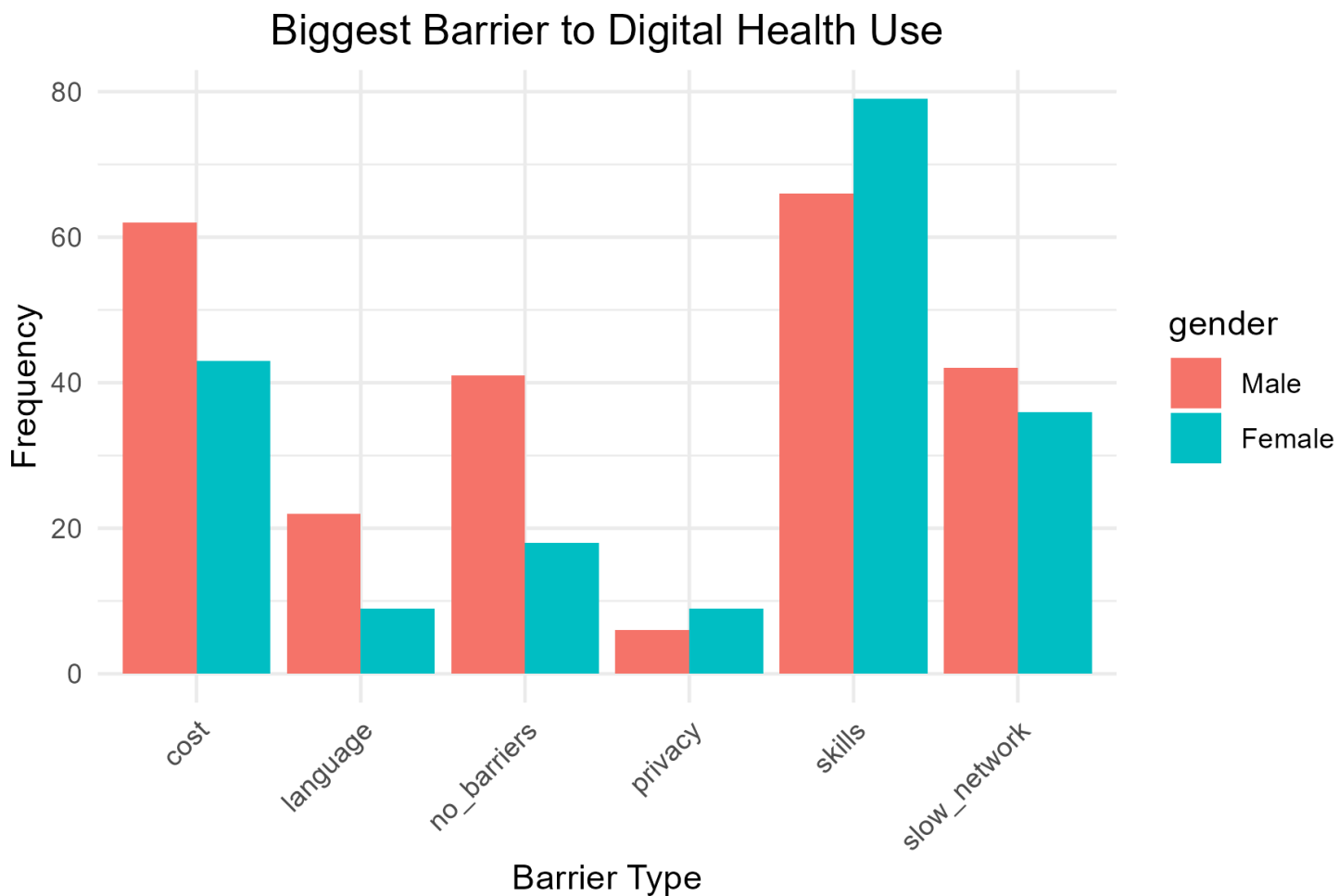


Figure 6

Primary barrier to digital health use by gender, including no barrier

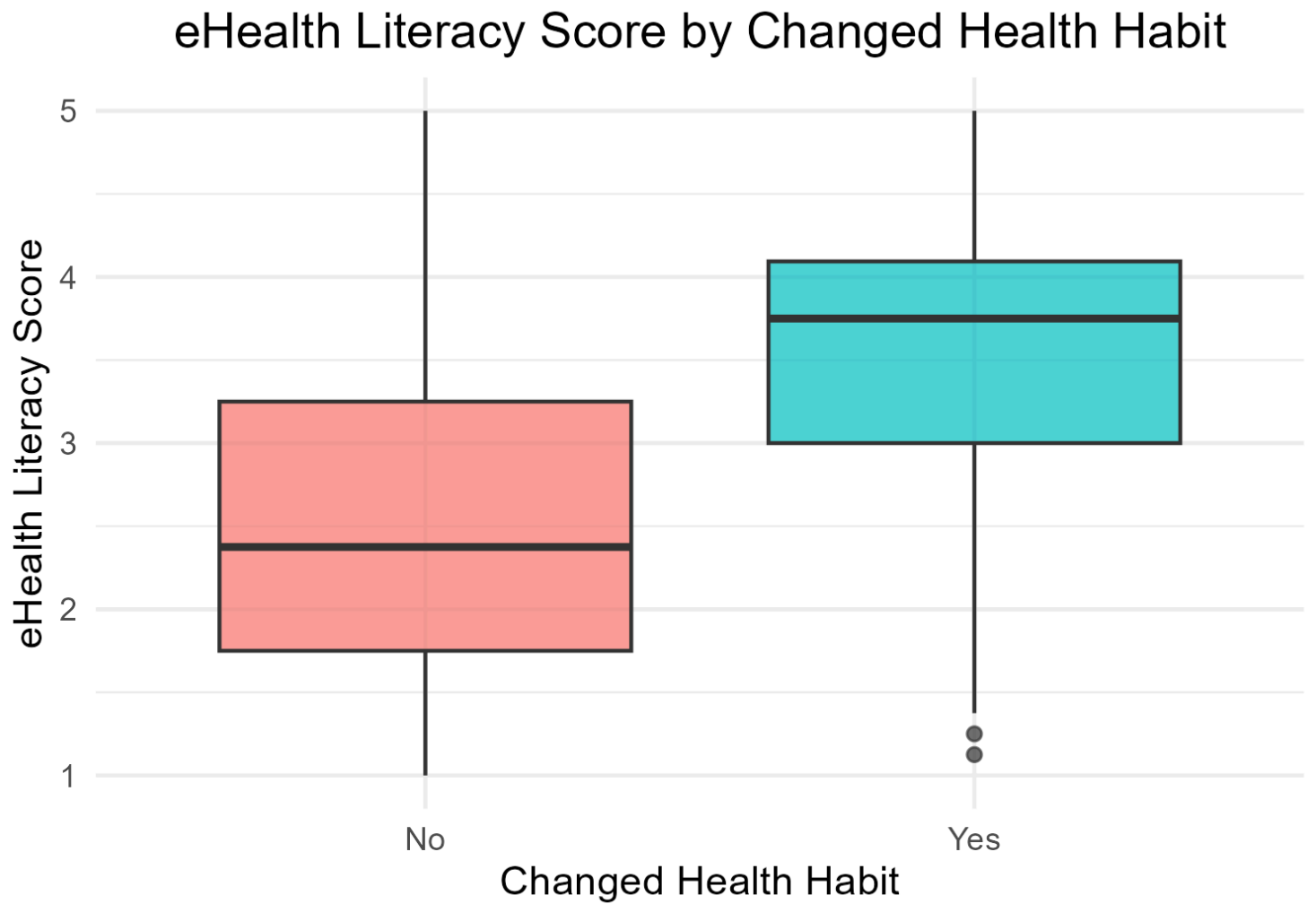


Figure 7

Perceived eHealth literacy score by reported health-habit change

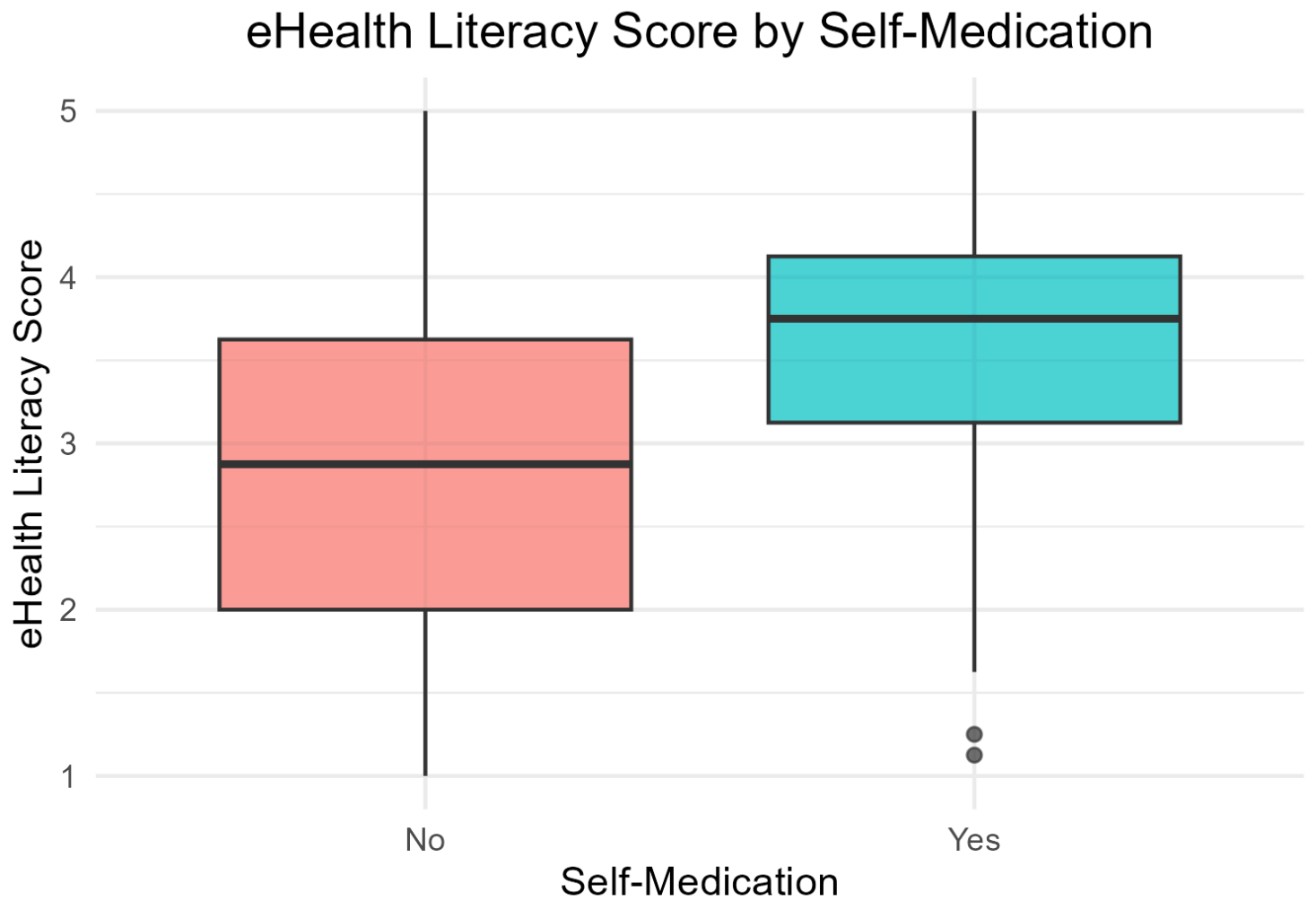


Figure 8

Perceived eHealth literacy score by self-medication status

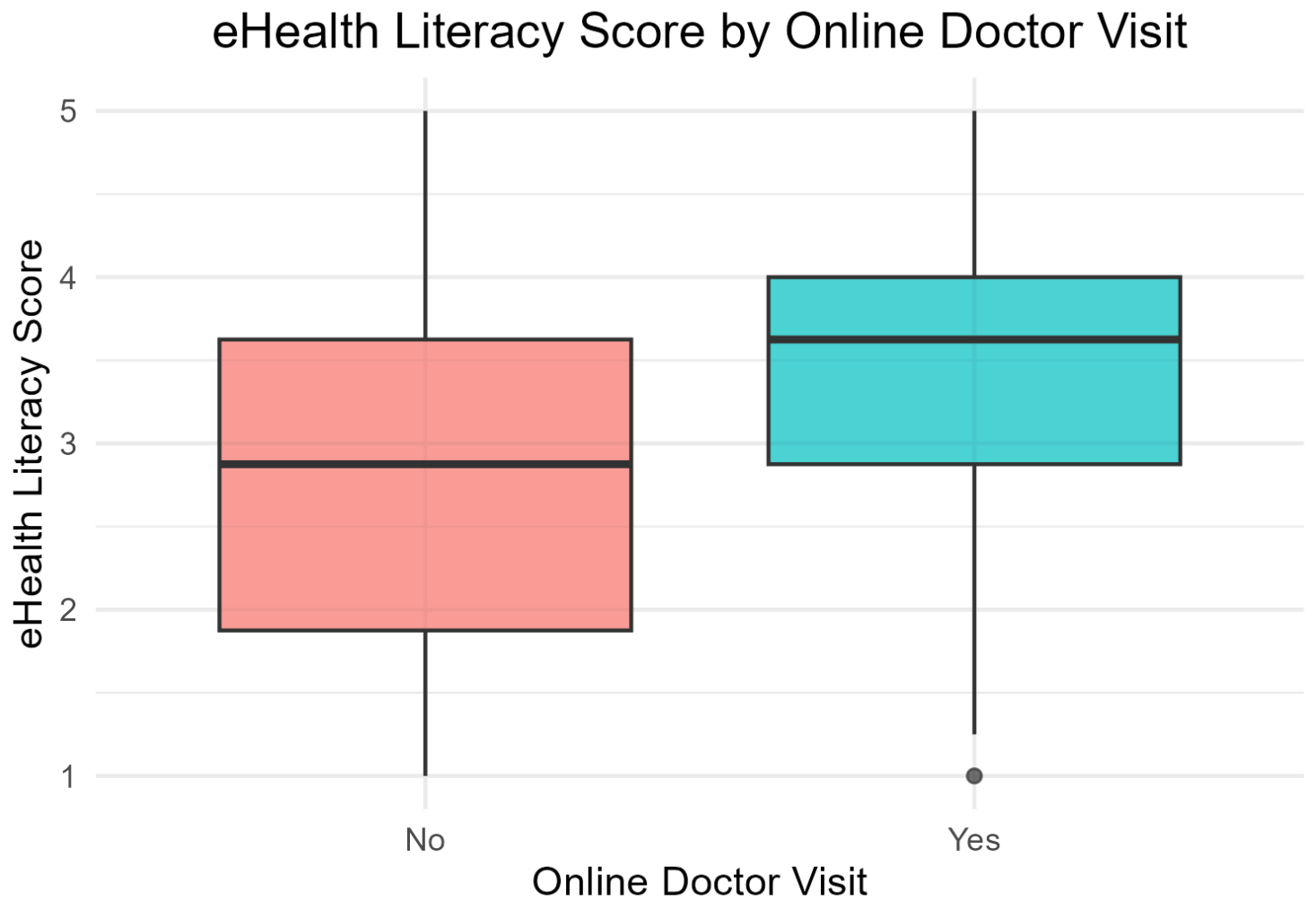


Figure 9

Perceived eHealth literacy score by online doctor consultation

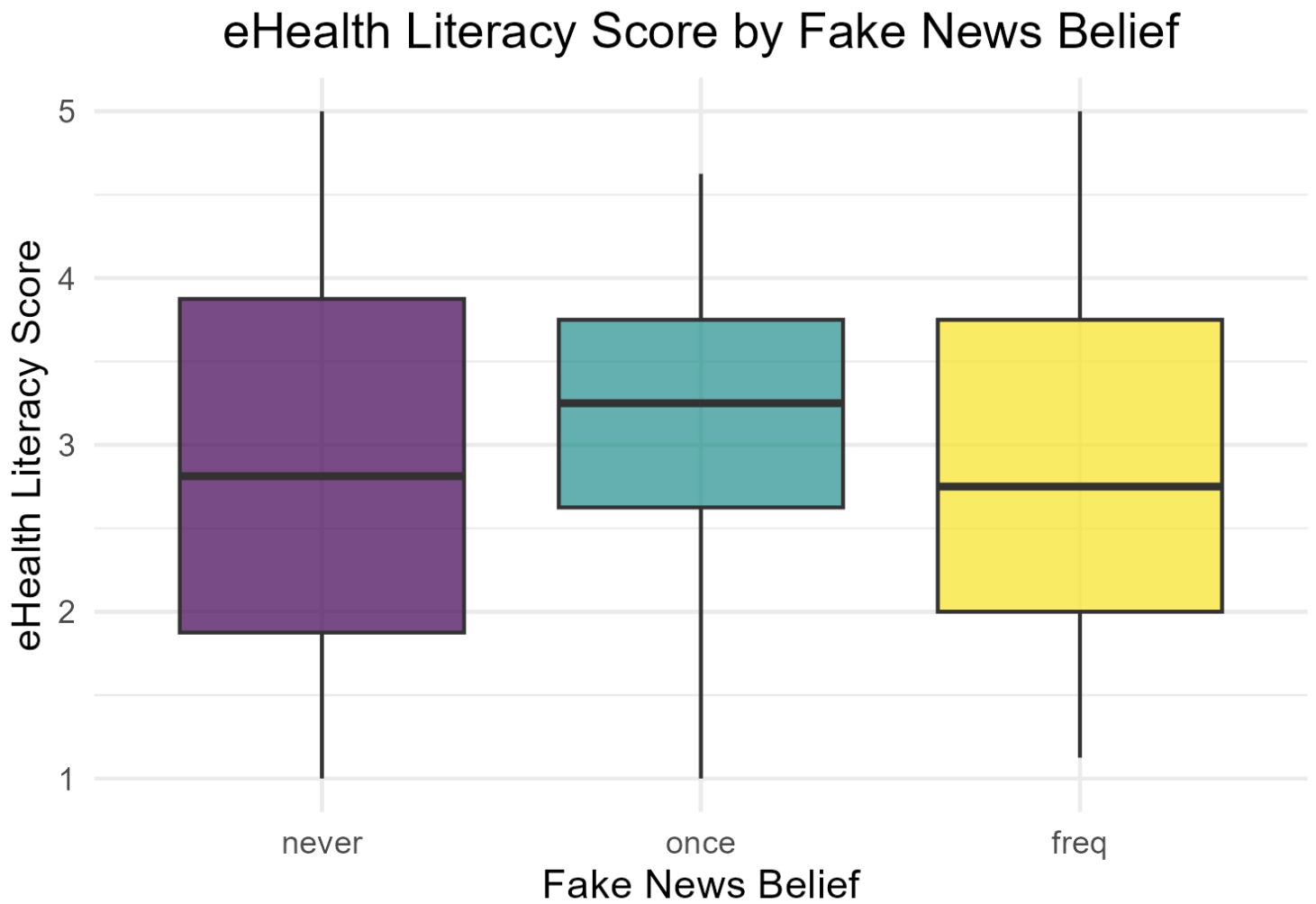


Figure 10

Perceived eHealth literacy score by health-misinformation belief frequency