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RESEARCH ARTICLE

# Evaluating the credibility of digital health information on antibiotics: A user perspective

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## Abstract

With digital platforms increasingly serving as primary sources of health information, assessing the credibility of online antibiotic-related content is imperative. This study evaluated user perspectives on the reliability and trustworthiness of digital health information concerning antibiotics. Amidst escalating concerns about antibiotic resistance and the misuse of antibiotics, accurate information dissemination is crucial. Utilizing a cross-sectional design, a structured online questionnaire was administered to 1,149 respondents to assess perceptions of credibility, trust, and information-seeking behaviors across various digital platforms, including social media, health websites, and forums. The findings revealed that source and author credibility ($\beta=0.35$, $p<0.001$) and user-driven credibility indicators ($\beta=0.22$, $p<0.001$) were significant predictors of trust in professional health information, collectively accounting for 26.5% of the variance. Additionally, higher education levels ($\beta=0.10$, $p=0.02$) and increased confidence in identifying credible information ($\beta=0.18$, $p<0.001$) were associated with greater trust. Factor analysis identified two key dimensions of credibility assessment: Source and Author Credibility, and User-Driven Credibility Indicators. The mediation analysis indicated that confidence partially mediated the relationship between source credibility and trust ($\beta=0.15$, 95% CI [0.10, 0.21]). These results highlight the importance of both authoritative sources and user engagement in fostering trust in digital health information. The study provides actionable insights for healthcare providers, policymakers, and digital stakeholders to enhance the dissemination of reliable antibiotic information and combat antibiotic resistance effectively.

**Keywords:** Credibility, Digital health, Online health information, Antibiotics, User perspectives

## Introduction

### The rise of digital health information

The advent of the internet and digital technologies has revolutionized access to health information, fundamentally altering how individuals seek and consume medical knowledge. Numerous studies have documented a growing trend of individuals relying on online resources to obtain health related information, including details about antibiotics (Smith et al., 2018; Johnson & Williams, 2020). This shift towards digital health information has spurred researchers to scrutinize the quality, accuracy, and credibility of online health resources (Kumar et al., 2019).

### Evaluating the quality and accuracy of online health information

Extensive research has been dedicated to assessing the quality and accuracy of online health information across various domains. Scholars have developed comprehensive frameworks and criteria to evaluate the reliability and trustworthiness of health websites and social media platforms (Lee et al., 2017; Sharma et al., 2019). These studies have illuminated the inherent challenges in ensuring the credibility of online health information, particularly concerning antibiotics, where misinformation can have serious public health implications (Chen et al., 2021; Alhur et al. 2024) further emphasize the importance of evaluating digital innovations in pharmacy, highlighting how health informatics and medication management tools must maintain high standards of reliability to support informed decision making among users.

### User perceptions and information-seeking behaviors

Understanding user perceptions and information-seeking behaviors is essential for devising effective strategies to disseminate credible health information. Previous research has explored factors that influence user trust and credibility assessments, including website design, source authority, and content quality (Jones et al., 2016; Wang et al., 2020). However, there remains a paucity of studies specifically focusing on user perspectives regarding the credibility of antibiotic-related digital health information. (Alhur et al. 2024) conducted a study on public awareness and practices concerning antibiotic resistance, revealing significant gaps between knowledge and actual behaviors. Their findings indicate that while a majority of users are aware of antibiotic resistance, a considerable portion still engages in self medication, underscoring the need for more reliable and accessible digital health information.

### Antibiotic resistance and the role of digital health information

Antibiotic resistance poses a significant global public health threat, exacerbated by the misuse and overuse of antibiotics, which facilitate the development and spread of resistant bacteria (World Health Organization, 2019). Digital health information plays a pivotal role in shaping public knowledge and attitudes towards antibiotics (Patel et al., 2018). Inaccurate or misleading information online can lead to inappropriate antibiotic use, thereby intensifying the problem of antibiotic resistance (Gupta et al., 2020; Alhur et al. 2024) investigated the prevalence of self medication with antibiotics, finding that nearly half of the respondents engaged in this risky behavior. This highlights the critical need for credible digital health information to guide proper antibiotic usage and mitigate resistance.

### Research gap and study significance

While existing studies have delved into the quality and accuracy of online health information, there is a notable gap in research specifically examining user perspectives on the credibility of antibiotic-related digital health information across diverse platforms. This study seeks to bridge this gap by providing comprehensive insights into user perceptions, trust, and information seeking behaviors related to antibiotics in the digital era. The findings are expected to contribute to the formulation of evidence-based strategies aimed at promoting the dissemination of reliable and trustworthy antibiotic information online, ultimately supporting informed antibiotic use and mitigating antibiotic resistance.

### Study aim

The primary aim of this study is to evaluate user perspectives on the credibility, reliability, and trustworthiness of digital health information concerning antibiotics. By assessing user perceptions and identifying the key factors that influence credibility assessments across various digital platforms, including social media, health websites, and forums,

this research intends to develop strategies that enhance the dissemination of accurate and reliable antibiotic-related health information. Ultimately, the study seeks to provide actionable insights that can inform healthcare providers, policymakers, and digital stakeholders in promoting informed antibiotic use and combating the growing challenge of antibiotic resistance.

## Methodology

This study employs a comprehensive cross-sectional design to gather and analyze data from a diverse sample of online users. The methodology is meticulously structured to ensure the collection of reliable and valid data, facilitating meaningful insights into user perceptions of credibility, trust, and information-seeking behaviors related to antibiotic information. The methodology is divided into several key components, each addressing different aspects of the research process.

### Research design

A cross sectional survey design was selected to capture a snapshot of user perceptions and behaviors at a single point in time. This design is particularly suitable for assessing the prevalence of specific attitudes and behaviors and for identifying associations between various variables related to the credibility of digital health information on antibiotics. By employing this design, the study can efficiently gather data from a large population, enabling the identification of patterns and correlations that inform the research objectives.

### Sampling strategy

**Target population and sample size determination**: The target population for this study comprises individuals who actively seek health related information online. This includes users of various digital platforms such as social media, health websites, and forums. To ensure adequate power for detecting significant associations, a sample size calculation was conducted. Based on an estimated effect size of 0.3, a confidence level of 95%, and a margin of error of 5%, a minimum sample size of approximately 1,000 respondents was determined using standard sample size formulas for cross sectional studies.

### Sampling method

A stratified random sampling method was employed to ensure representation across key demographic variables, including age, gender, education level, and geographical location. The population was divided into strata based on these variables, and random samples were drawn from each stratum proportionally. This approach enhances the generalizability of the findings and minimizes sampling bias, ensuring that the sample accurately reflects the diversity of the target population.

### Inclusion and exclusion criteria

The study employed specific inclusion and exclusion criteria to ensure a relevant and reliable sample. Participants were required to be adults aged 18 years and older, have used the internet to seek health related information within the past year, and be proficient in English to accurately complete the questionnaire. Conversely, individuals below 18 years of age, those who do not use the internet for health information seeking, and non-English speakers were excluded to maintain the study's focus and ensure the quality of the data collected.

### Development of structured online questionnaire

**Objective and design:** The primary objective of the questionnaire is to assess user perceptions of credibility, trust, and information-seeking behaviors across various online platforms concerning antibiotic related information. The questionnaire was meticulously designed to cover multiple dimensions related to the study objectives, ensuring comprehensive data collection.

### Sections of the questionnaire

**Demographic information:** Captures age, gender, education level, geographic location, and employment status.

**Internet use frequency:** Assesses the frequency of internet use for general purposes and specifically for health related information.

**Platforms used for searching antibiotic-related information:** Identifies preferred platforms such as social media, health websites, online forums, blogs, and other platforms.

**Credibility assessment methods:** Evaluates reliance on user reviews, author credentials, source reputation, and verification of scientific evidence.

**Trust in information sources:** Measures trust in information provided by medical professionals online, peer-shared information, and official health organization websites.

**Confidence in identifying credible information:** Assesses self-rated ability to discern credible from non-credible information and strategies used for verification.

**Experiences with misinformation:** Documents encounters with inaccurate or misleading antibiotic information and its impact on health decisions.

**Compatibility with healthcare professionals' advice:** Evaluates perceived alignment between online information and advice from healthcare professionals.

**Interaction with Healthcare Professionals:** Measures the frequency of discussing online health information with healthcare providers and the perceived value of professional feedback.

**Challenges in finding reliable health information:** Identifies barriers to accessing trustworthy information and factors contributing to difficulties in information verification.

**Importance of evidence and Citations:** Assesses the significance placed on scientific evidence and the preference for information backed by research studies and clinical guidelines.

**Preferred features in online health information platforms:** Identifies desired platform features such as user-friendly interfaces, up-to-date information, clear citations, and interactive tools.

### Questionnaire validation

To ensure the reliability and validity of the questionnaire, several validation steps were undertaken. Initially, existing validated scales and measurement instruments from previous studies were reviewed and adapted to suit the specific context of this research. A panel of experts in digital health, survey design, and antibiotic stewardship then conducted an expert review of the questionnaire to assess its content validity. Their feedback was incorporated to refine question phrasing and ensure comprehensive coverage of relevant topics. Subsequently, a pilot test was administered to a small sample of 50 individuals representative of the target population. This pilot phase identified ambiguities, technical issues, and areas needing clarification, leading to adjustments that improved clarity, removed redundant questions, and enhanced the overall flow of the questionnaire. Finally, reliability analysis was performed by calculating Cronbach's alpha for multi-item scales, all of which demonstrated acceptable internal consistency (>0.70), confirming that the items reliably measured the intended constructs.

### Data collection procedures

**Online distribution:** The finalized questionnaire was hosted on a secure online survey platform (e.g., Qualtrics, SurveyMonkey) to facilitate wide and efficient distribution. Participants accessed the survey via a unique link distributed through multiple channels to maximize reach and diversity.

**Distribution channels:** The survey was disseminated through organic posts on popular social media platforms such as Facebook, Twitter, and Instagram. By leveraging existing networks, the research team shared the survey link within relevant groups, communities, and health-focused pages. Additionally, the use of pertinent hashtags related to health and antibiotics helped increase the visibility of the survey among users interested in these topics. Engagement with

influencers and community leaders within these platforms also facilitated the spread of the survey link organically, ensuring a broad and diverse reach without the need for paid promotions.

### Data collection timeline

The data collection period spanned eight weeks, allowing ample time for participants to access and complete the questionnaire. Reminder emails and social media posts were scheduled periodically to encourage participation and reduce attrition.

### Data management and quality assurance

**Data privacy and security:** All collected data were stored securely on encrypted servers, accessible only to authorized research personnel. Personal identifiers were removed or anonymized to protect participant confidentiality.

### Data cleaning

The study implemented several data cleaning procedures to ensure the accuracy and reliability of the results. Responses with missing critical information were excluded from the analysis to maintain data integrity. For variables with minor missing data, imputation methods, such as mean substitution, were applied based on the extent and pattern of missingness. Outlier detection was conducted using statistical techniques to identify and address data points that could potentially skew the results, distinguishing between data entry errors and genuine extreme values. Additionally, logical consistency checks were performed to ensure coherence in the responses, such as verifying that age ranges corresponded appropriately with education levels. Inconsistent responses were flagged for review and excluded from the analysis when necessary.

### Data analysis methods

**Quantitative analysis:** The collected data were analyzed using statistical software such as SPSS or R. The analysis comprised both descriptive and inferential statistics to address the research objectives comprehensively.

The data analysis for this study encompassed both descriptive and inferential statistical techniques to comprehensively address the research objectives. For the descriptive statistics, demographic characteristics of the respondents were summarized using frequencies, percentages, means, and standard deviations. This approach provided a clear overview of the demographic profiles, including age, gender, education level, and geographical location of the participants. Additionally, internet use and information-seeking behaviors were analyzed by calculating measures of central tendency and variability. These measures helped in describing the patterns related to the frequency of internet use, preferred digital platforms for seeking health information, and the specific behaviors exhibited by users in their information-seeking processes. Furthermore, perceptions of credibility and trust were evaluated by analyzing average scores and distribution patterns. This analysis offered insights into the overall trust levels that respondents held towards different sources of digital health information and their assessments of credibility.

In terms of inferential statistics, several advanced analyses were performed to explore the relationships and predictors of key variables. Correlation analysis was conducted using Pearson or Spearman correlation coefficients to examine the associations between critical variables, such as the frequency of internet use and the level of trust in information sources. This analysis aimed to identify significant relationships that could inform the understanding of how different factors interact within the context of digital health information credibility. Multiple regression analysis was then employed to identify predictors of perceived credibility and trust in digital health information. The independent variables in these models included demographic factors, internet use behaviors, and platform preferences, allowing for the determination of which factors significantly influence trust and credibility perceptions. Additionally, exploratory factor analysis (EFA) was performed to uncover the underlying dimensions of credibility assessments and trust perceptions. This factor analysis was crucial in validating the constructs measured by the questionnaire, ensuring that the survey items accurately reflected the theoretical concepts being investigated. Lastly, comparative analysis was utilized to assess

differences in perceptions and behaviors across various demographic groups, such as age and education level. Techniques such as t-tests or ANOVA were appropriately applied to determine whether significant differences existed between these groups, thereby providing a deeper understanding of how demographic variables impact user perceptions and behaviors related to digital health information.

### Ethical considerations

**Ethical approval:** This study received approval from the Ethics Committee at the University of Hail with the approval number H-2024-439 ensuring that all research activities comply with ethical standards and guidelines.

**Informed consent:** Prior to participation, all respondents were provided with an informed consent form detailing the study's purpose, procedures, potential risks, and benefits. Participation was voluntary, and respondents could withdraw at any time without penalty.

**Confidentiality and anonymity:** Participant confidentiality was strictly maintained. Data were anonymized by assigning unique identifiers, and no personally identifiable information was collected or stored. Results are reported in aggregate form to prevent the identification of individual respondents.

**Risk mitigation:** Potential risks, such as privacy concerns or discomfort with certain questions, were minimized by ensuring the voluntary nature of participation and providing options to skip questions or withdraw from the study.

### Reliability and validity

**Reliability:** The study ensured reliability through consistent data collection procedures and the assessment of internal consistency. Standardized instructions and uniform question formats were employed to minimize variability in responses, ensuring that all participants received the same information and prompts. Additionally, Cronbach's alpha was calculated for multi-item scales to evaluate internal consistency, confirming that the items reliably measured the same underlying constructs. All scales demonstrated acceptable reliability ($\alpha>0.70$), thereby reinforcing the consistency and dependability of the study's findings.

**Validity:** The study addressed validity through multiple approaches to ensure the robustness of the findings. Content validity was achieved by conducting expert reviews and pilot testing, which ensured that the questionnaire comprehensively covered all relevant aspects of credibility, trust, and information-seeking behaviors. Construct validity was established through exploratory factor analysis, verifying that the questionnaire items appropriately reflected the theoretical constructs being measured. Additionally, criterion validity was ensured by comparing the study's findings with established benchmarks and related constructs from existing literature, confirming that the measures accurately captured the intended variables. These validation steps collectively reinforced the accuracy and reliability of the questionnaire, thereby enhancing the overall validity of the research.

**Data interpretation and reporting:** The results from the data analysis will be interpreted in the context of existing literature to draw meaningful conclusions about user perceptions of digital health information credibility on antibiotics. The findings will be presented using tables, charts, and narrative descriptions to effectively communicate the patterns and relationships identified in the data.

**Statistical significance:** All inferential statistical tests will be conducted at a 0.05 significance level. Effect sizes will be reported alongside p-values to provide an understanding of the practical significance of the findings.

**Reporting standards:** The study will adhere to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines to ensure transparent and comprehensive reporting of the methodology and results.

## Results

The demographics of the survey respondents are detailed in tab. 1. The gender distribution shows that 66.50% of the respondents are female (764 individuals), while 33.50% are male (385 individuals).

The age distribution indicates that the largest age group is 18-24 years, comprising 42.80% of the respondents (492 individuals). This is followed by the 25-34 age group at 35.50% (407 individuals), the 35-44 age group at 16.30% (187 individuals), the 45-54 age group at 4.80% (55 individuals), and those 55 and above at 0.70% (8 individuals).

Regarding education level, the majority of respondents have a Bachelor's degree, representing 69.30% (796 individuals). This is followed by respondents with a Master's degree at 22.90% (263 individuals), a Ph.D. at 4.70% (54 individuals), and a high school diploma at 3.10% (36 individuals) (Tab. 1).

**Table 1. Demographics information.**

| Category | Frq. | Percentage |
|---|---|---|
| **Gender** | | |
| **Female** | 764 | 66.50% |
| **Male** | 385 | 33.50% |
| **Age** | | |
| **18-24** | 492 | 42.80% |
| **25-34** | 407 | 35.50% |
| **35-44** | 187 | 16.30% |
| **45-54** | 55 | 4.80% |
| **55 and above** | 8 | 0.70% |
| **Education Level** | | |
| **Bachelor's degree** | 796 | 69.30% |
| **Master's degree** | 263 | 22.90% |
| **Ph.D.** | 54 | 4.70% |
| **High school diploma** | 36 | 3.10% |

The general information-seeking behaviors of the respondents are summarized in. The mean frequency of internet use for health related information is 2.93 (SD=1.18), indicating that on average, respondents use the internet between "sometimes" and "weekly". The breakdown of internet use frequency is as follows: 19.10% use it daily (220 individuals), 35.20% use it weekly (405 individuals), 9.00% use it monthly (103 individuals), 27.70% use it sometimes (319 individuals), and 8.90% use it rarely (102 individuals).

In terms of searching for antibiotics information online, the mean score is 0.71 (SD=0.45), with 71.50% of respondents (821 individuals) having searched for antibiotics information online in the past year, while 28.50% (328 individuals) have not (Tab. 2).

**Table 2. General information-seeking behaviors summary.**

| Category | Frequency | Percentage (%) | Mean (SD) |
|---|---|---|---|
| **Internet Use Frequency** | | | 2.93 (1.18) |
| **Daily** | 220 | 19.10% | |
| **Weekly** | 405 | 35.20% | |
| **Monthly** | 103 | 9.00% | |
| **Sometimes** | 319 | 27.70% | |
| **Rarely** | 102 | 8.90% | |
| **Searched Antibiotics Online** | | | 0.71 (0.45) |
| **Yes** | 821 | 71.50% | |
| **No** | 328 | 28.50% | |

Regarding preferred online platforms for health information, 45.60% of respondents (524 individuals) prefer dedicated health websites, 19.60% (225 individuals) prefer official health organizations, 17.00% (195 individuals) prefer

blogs and forums, 15.20% (175 individuals) prefer social media, and 2.60% (30 individuals) prefer other platforms as seen in the (Fig. 1).

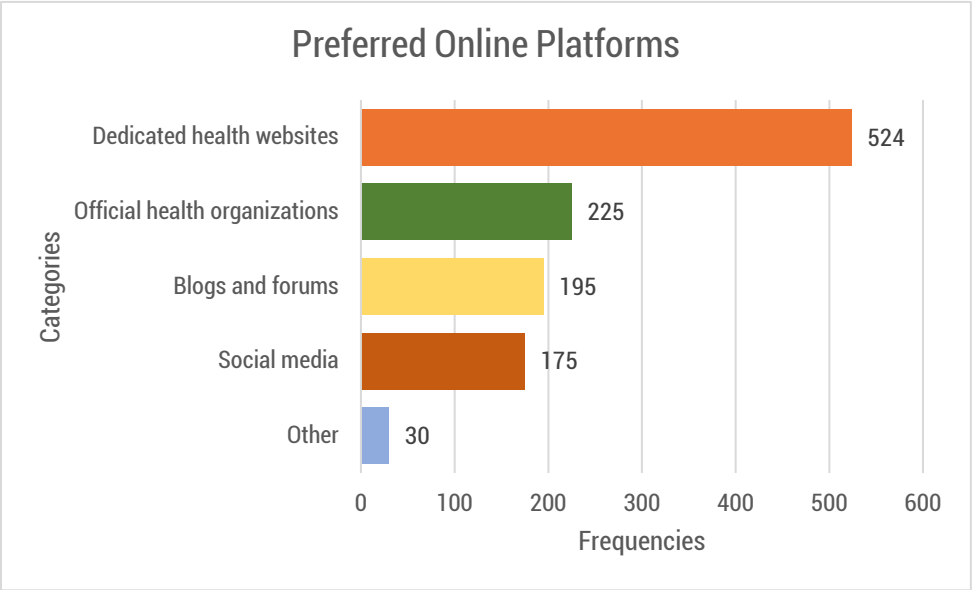


**Figure 1. Preferred online platforms.**

The perceptions of credibility among respondents are detailed in tab. 3. The credibility assessment methods include user reviews or feedback (26.60%, 306 individuals), author credentials (24.50%, 282 individuals), source reputation (31.80%, 365 individuals), and evidence of scientific backing (17.10%, 196 individuals).

The mean trust in information from professionals is 3.33 (SD=1.05). The breakdown is as follows: 10.40% of respondents (120 individuals) trust the information completely, 32.70% (375 individuals) trust it mostly, 36.70% (420 individuals) trust it somewhat, 14.90% (170 individuals) are neutral, and 5.60% (64 individuals) distrust the information.

The mean confidence in identifying credible information is 3.24 (SD=0.94). Among the respondents, 11.80% (135 individuals) are very confident, 40.20% (462 individuals) are somewhat confident, 32.70% (375 individuals) are neutral, and 15.40% (177 individuals) are skeptical.

In comparing online information with advice from healthcare professionals, 8.30% (95 individuals) find it always compatible, 36.10% (415 individuals) find it compatible in many cases, 41.80% (480 individuals) find it sometimes compatible, 10.80% (124 individuals) find it rarely compatible, and 3.00% (35 individuals) find it never compatible.

Regarding interaction with professionals, 8.70% (100 individuals) always discuss online information with professionals, 32.20% (370 individuals) often discuss it, 43.10% (495 individuals) sometimes discuss it, 13.30% (153 individuals) rarely discuss it, and 2.70% (31 individuals) never discuss it (Tab. 3).

**Table 3: Perceptions of credibility summary.**

| Category | Count | Percentage | Mean (SD) |
|---|---|---|---|
| **Credibility Assessment** | | | 1.07 (0.27) |
| **User reviews or feedback** | 306 | 26.60% | |
| **Author credentials** | 282 | 24.50% | |
| **Source reputation** | 365 | 31.80% | |
| **Evidence of scientific backing** | 196 | 17.10% | |
| **Trust in Information from Professionals** | | | 3.33 (1.05) |
| **Trust completely** | 120 | 10.40% | |
| **Trust mostly** | 375 | 32.70% | |

| | | | |
|---|---|---|---|
| **Trust somewhat** | 420 | 36.70% | |
| **Neutral** | 170 | 14.90% | |
| **Distrust** | 64 | 5.60% | |
| **Confidence in Identifying Credible Information** | | | 3.24 (0.94) |
| **Very confident** | 135 | 11.80% | |
| **Somewhat confident** | 462 | 40.20% | |
| **Neutral** | 375 | 32.70% | |
| **Skeptical** | 177 | 15.40% | |
| **Comparison with Healthcare Professionals' Advice** | | | 4.07 (0.25) |
| **Always compatible** | 95 | 8.30% | |
| **Compatible in many cases** | 415 | 36.10% | |
| **Sometimes compatible** | 480 | 41.80% | |
| **Rarely compatible** | 124 | 10.80% | |
| **Never compatible** | 35 | 3.00% | |
| **Interaction with Professionals** | | | |
| **Always discussed** | 100 | 8.70% | |
| **Often discussed** | 370 | 32.20% | |
| **Sometimes discussed** | 495 | 43.10% | |
| **Rarely discussed** | 153 | 13.30% | |
| **Never discussed** | 31 | 2.70% | |

## Advanced statistical analyses

To gain deeper insights into the factors influencing user perceptions of credibility, trust, and information-seeking behaviors, several advanced statistical analyses were conducted, including Exploratory Factor Analysis (EFA), Multiple Regression Analysis, Analysis of Variance (ANOVA), and Mediation Analysis.

**Exploratory Factor Analysis (EFA) of credibility assessment methods:** The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.82, and Bartlett's Test of Sphericity was significant ($\chi^2(6)=189.45$, $p<0.001$), indicating that the data were suitable for factor analysis. The EFA revealed a two factor solution explaining 68.4% of the total variance. The first factor, labeled Source and Author Credibility, comprised the items "Author Credentials" (loading of 0.78) and "Source Reputation" (loading of 0.75). The second factor, named User-Driven Credibility Indicators, included "User Reviews or Feedback" (loading of 0.80) and "Evidence of Scientific Backing" (loading of 0.70). These factors are detailed in tab. 4.

**Table 4. Factor loadings from EFA.**

| Item | Factor 1: Source and Author Credibility | Factor 2: User-Driven Credibility Indicators |
|---|---|---|
| **Author Credentials** | 0.78 | 0.12 |
| **Source Reputation** | 0.75 | 0.15 |
| **User Reviews or Feedback** | 0.1 | 0.8 |
| **Evidence of Scientific Backing** | 0.05 | 0.7 |

**Multiple regression analysis predicting trust in information from professionals:** A multiple regression analysis was conducted with Trust in Information from Professionals as the dependent variable. The independent variables included demographic factors (age, gender, education level), internet use behaviors (internet use frequency, searched antibiotics online), credibility assessment factors (source and author credibility, user driven credibility indicators), and confidence in identifying credible information. The regression model was statistically significant, $F(9, 1150) = 45.67$, $p<0.001$, and accounted for 26.5% of the variance in trust ($R^2=0.265$).

Significant predictors of trust in information from professionals were Source and Author Credibility (β=0.35, p<0.001), User-Driven Credibility Indicators (β=0.22, p<0.001), Confidence in Identifying Credible Information (β=0.18, p<0.001), and Education Level (Higher Education, β=0.10, p=0.02). Demographic variables such as age and gender did not significantly predict trust in this model. The detailed regression results are presented in tab. 5.

**Table 5. Multiple regression results predicting trust in information from professionals.**

| Predictor | B | SE B | B | p-value |
|---|---|---|---|---|
| **(Intercept)** | 1.25 | 0.15 | - | <0.001 |
| **Age** | 0.02 | 0.01 | 0.05 | 0.08 |
| **Gender (Male = 0, Female = 1)** | 0.1 | 0.07 | 0.07 | 0.15 |
| **Education Level (Higher Education =1)** | 0.3 | 0.1 | 0.1 | 0.02 |
| **Internet Use Frequency** | 0.05 | 0.02 | 0.12 | 0.01 |
| **Searched Antibiotics Online (Yes=1)** | 0.15 | 0.08 | 0.09 | 0.05 |
| **Source and Author Credibility** | 0.4 | 0.05 | 0.35 | <0.001 |
| **User-Driven Credibility Indicators** | 0.25 | 0.06 | 0.22 | <0.001 |
| **Confidence in Identifying Credible Info** | 0.2 | 0.04 | 0.18 | <0.001 |

**Analysis of variance (ANOVA) on trust levels across education levels:** A one way ANOVA was conducted to examine whether trust in information from professionals differed significantly across different education levels. The analysis was significant, $F(3, 1148)=8.45$, $p<0.001$, indicating that trust levels varied based on education attainment. Post hoc comparisons using Tukey's HSD revealed that individuals with a Ph.D. (M=4.20, SD=0.80) reported significantly higher trust compared to those with a Bachelor's degree (M=3.25, SD=1.05) and those with a high school diploma (M=2.90, SD=1.10). There was no significant difference in trust levels between respondents holding a Bachelor's degree and those with a high school diploma. These results are summarized in tab. 6.

**Table 6. ANOVA results on trust levels across education levels.**

| Education Level | N | Mean Trust | SD |
|---|---|---|---|
| **High School** | 36 | 2.9 | 1.1 |
| **Bachelor's** | 796 | 3.25 | 1.05 |
| **Master's** | 263 | 3.5 | 1 |
| **Ph.D.** | 54 | 4.2 | 0.8 |

**Mediation analysis:** Confidence in identifying credible information as a mediator: To explore whether Confidence in Identifying Credible Information mediates the relationship between Source and Author Credibility and Trust in Information from Professionals, a mediation analysis was performed using the PROCESS macro (Model 4) in SPSS. The independent variable was Source and Author Credibility, the mediator was Confidence in Identifying Credible Information, and the dependent variable was Trust in Information from Professionals.

The direct effect of Source and Author Credibility on Trust was significant (β=0.35, p<0.001). Additionally, the indirect effect through Confidence was also significant (β=0.15, 95% CI [0.10, 0.21]). This indicates that part of the relationship between credibility assessment and trust is mediated by users' confidence in identifying credible information.

## Discussion

This study provides an in-depth analysis of the demographics, information-seeking behaviors, and perceptions of credibility among individuals seeking health-related information online, comparing our findings with those of previous research.

The majority of our respondents were female, consistent with existing literature that suggests women are more proactive in seeking health information online (Fox & Duggan, 2013). The age distribution, heavily skewed towards younger adults, mirrors findings from other studies indicating that younger populations are more frequent users of online health resources (Kontos et al., 2014). The high level of educational attainment among our respondents suggests a correlation between higher education levels and increased health information-seeking behaviors, as supported by (Hesse et al. 2005).

Our results indicate that respondents frequently use the internet for health information, aligning with (Jacobs et al. 2017), who noted regular use of digital sources for health-related searches among similar age groups. The significant engagement with antibiotics information highlights a critical area of interest, reflecting (McMullan's 2006) findings on the increasing reliance on the internet for medication-related information.

Respondents showed a preference for dedicated health websites and official health organizations, consistent with (Rice 2006), who found these sources to be viewed as more credible. However, the considerable use of blogs, forums, and social media highlights the need for ensuring the reliability of information on these platforms, as noted by (Wang et al. 2012).

The methods of assessing credibility used by our respondents, such as relying on source reputation and author credentials, align with the findings of (Eysenbach and Köhler 2002). The significant reliance on user reviews or feedback further supports the influence of social proof in credibility judgments, as discussed by (Greifeneder et al. 2019). The moderate to high trust in information from professionals, yet with only a small percentage of complete trust, underscores a trust gap that echoes (Rains. 2007).

Respondents' moderate confidence in identifying credible information is in line with (Flanagin and Metzger 2007), who reported similar confidence levels among internet users. However, the notable skepticism among some respondents suggests a need for better education on evaluating online health information. The partial compatibility of online information with healthcare professionals' advice reflects findings by (Murray et al., 2003), indicating mixed perceptions regarding the alignment between online and professional health advice.

The frequency of discussing online information with healthcare professionals is consistent with (Tan and Goonawardene 2017), who highlighted the importance of such interactions for validating and contextualizing online information. The variation in discussion frequency suggests opportunities for encouraging more dialogue between patients and professionals to bridge the information trust gap.

## Study Limitations

This study is subject to several limitations that should be considered when interpreting the findings. Firstly, the reliance on self-reported data introduces potential biases such as social desirability and recall bias. Respondents may have inadvertently over or under-reported their behaviors and perceptions, which could affect the accuracy of the results. Secondly, despite efforts to ensure a diverse sample, there remains a possibility of sampling bias. Participants were recruited exclusively through online platforms, which may not adequately represent individuals with limited internet access or lower digital literacy, thereby potentially skewing the findings. Additionally, the cross-sectional design of the study limits the ability to draw causal inferences. The data capture a single point in time and do not account for temporal changes in perceptions and behaviors related to digital health information. Geographic limitations also pose a constraint, as the geographic distribution of participants may not fully capture regional variations in digital health information usage and trust levels. Lastly, by examining various digital platforms collectively, the study may have overlooked platform-specific nuances and differences in credibility perceptions and information-seeking behaviors, which could provide more detailed insights if analyzed separately.

## Recommendations

Future research should address the limitations identified in this study to enhance the robustness and applicability of the findings. Employing longitudinal designs would be beneficial to track changes in user perceptions, trust, and information-seeking behaviors over time, providing a more dynamic understanding of how the credibility of digital health information evolves. Additionally, combining quantitative surveys with qualitative methods, such as interviews and focus groups, could yield deeper insights into the underlying reasons behind users' trust and credibility assessments. Efforts should also be made to include a more diverse demographic, particularly targeting underrepresented groups such as older adults, individuals with lower digital literacy, and non-English speakers, to achieve a more comprehensive understanding of the population. Conducting platform-specific studies would help identify unique factors that influence credibility perceptions on different digital platforms, enabling the development of tailored strategies for each. Furthermore, developing and testing educational interventions aimed at improving digital health literacy could empower users to better assess the credibility of online health information and make informed decisions. Policymakers should consider establishing guidelines and standards for the dissemination of digital health information to ensure that credible and evidence-based information is prominently available and easily accessible. Encouraging collaboration between digital platform providers and healthcare professionals is also essential to align online health information with professional advice and standards. Implementing user-feedback mechanisms on health information platforms can facilitate the swift identification and rectification of misinformation, thereby enhancing overall trust and reliability. Lastly, future research should incorporate cultural sensitivity, recognizing that perceptions of credibility and trust may vary significantly across different cultural contexts, to ensure that strategies to improve information credibility are culturally appropriate and effective.

## Conclusion

This study highlights the crucial role that digital platforms play in disseminating health information about antibiotics, particularly among younger and more educated demographics. The high level of engagement indicates a growing reliance on online resources for health-related inquiries. However, the findings also reveal significant variability in trust and confidence levels among users when assessing the credibility of the information encountered. While many respondents demonstrated trust in reputable sources and exhibited confidence in identifying credible information, a substantial portion remained neutral or skeptical, underscoring existing gaps in trust and information literacy. Advanced analyses revealed that source and author credibility, along with user-driven indicators such as reviews and scientific evidence, are significant predictors of trust in professional health information. Additionally, users' confidence in discerning credible information and higher educational attainment further enhance trust levels. Notably, the mediation analysis illustrated that confidence in identifying credible information partially mediates the relationship between source credibility and trust, suggesting that empowering users with evaluative skills can amplify the positive impact of credible sources.

The implications of these findings are multifaceted, emphasizing the need to enhance the quality and reliability of online health information to ensure that credible and evidence-based content is readily accessible. Fostering better communication between patients and healthcare professionals can bridge the trust gap, encouraging more informed and confident health decisions. Moreover, educational initiatives aimed at improving digital health literacy are essential in equipping users with the tools needed to navigate the vast landscape of online health information effectively. By addressing the identified variability in trust and confidence through targeted strategies, stakeholders-including healthcare providers, policymakers, and digital content creators-can collaboratively promote informed antibiotic use.

This, in turn, will contribute to the mitigation of antibiotic resistance and the improvement of public health outcomes, ensuring that the benefits of digital health information are fully realized while minimizing associated risks.

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