

CAN AI HELP US TELL THE TRUTH ABOUT FOOD?

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Abstract

Misinformation related to food and nutrition is increasingly prevalent on the internet, contributing to public confusion, poor dietary habits and a decline in trust in credible health sources. The aim of this study is to investigate how existing artificial intelligence (AI) tools - such as language models, search engines with AI ranking systems and browser-based fact-checking plugins - influence public awareness and decision-making regarding food and nutrition information. The study uses a mixed methods approach that combines a survey to assess user habits and trust in AI tools with a qualitative analysis of AI-generated content and fact-checking results related to common food myths. The research is based on theories of media literacy and digital trust and provides a framework for understanding how users evaluate the credibility of information in AI-mediated environments. Key findings show that while AI tools are widely used to access health-related information, many users are unaware of how these systems work, resulting in mixed levels of trust and varying effectiveness in discerning reliable content. In addition, users expressed uncertainty about the transparency and accuracy of AI-driven fact-checking mechanisms. Based on the findings, this study recommends the development of clearer strategies to educate users, increased transparency of AI platforms, and policies to promote digital literacy as a means to support food security through informed decision-making. These findings emphasize the role of existing AI technologies not just as tools, but as influential facilitators of public understanding of nutrition and health.

Keywords: misinformation about food, artificial intelligence, digital literacy, public awareness, nutrition, credibility of information

INTRODUCTION

The digital age has revolutionized how people access information, including content related to food and nutrition. However, the vast volume of content online presents challenges in distinguishing reliable from misleading sources. Misinformation—defined as false or inaccurate information spread regardless of intent—has permeated platforms, often influencing public behaviors and health choices. In this context, artificial intelligence (AI) tools have emerged as both contributors to and potential mitigators of misinformation. This

study explores the ways AI affects public perception and evaluation of food-related information.

METHODOLOGY

A mixed-methods approach was employed. Quantitative data was collected through a structured online survey distributed to a demographically varied population, gathering 60 responses. Each item on the survey was designed to assess dimensions such as trust in AI, use of AI tools, evaluation skills, cultural and age influences, and interest in educational resources. Qualitative analysis of AI-generated outputs on common food myths provided supplementary insight.

In analyzing the survey data, descriptive statistical methods were used to calculate averages and distributions for each Likert-scale item across different demographic categories. Comparative analysis was conducted to explore differences in responses by age and gender using group means. Pearson correlation coefficients were calculated to identify relationships between key variables such as AI usage, trust in AI, and understanding of AI tools. Each variable was treated as a continuous numeric score derived from Likert scale responses (1 to 5), and pairwise correlations were computed using Python's pandas and NumPy libraries. The Pearson correlation coefficient (r) was calculated using the formula:

$$r = \frac{\sum[(x_i - \bar{x})(y_i - \bar{y})]}{\sqrt{[\sum(x_i - \bar{x})^2 * \sum(y_i - \bar{y})^2]}}$$

where x_i and y_i are the individual values of the two variables, and \bar{x} and \bar{y} are their respective means. This measures the strength and direction of a linear relationship between two variables. The strength and direction of these correlations were interpreted based on standard thresholds (e.g., 0.1–0.3 = weak, 0.3–0.6 = moderate, >0.6 = strong). Only correlations with r -values above 0.5 or below -0.4 were highlighted as meaningfully strong in this analysis. To enhance interpretation, scatter plots were generated for the strongest correlations, providing a visual representation of the linear trends observed between paired variables. g., 0.1–0.3 = weak, 0.3–0.6 = moderate, >0.6 = strong). Only correlations with r -values above 0.5 or below -0.4 were highlighted as meaningfully strong in this analysis. For the qualitative component, thematic content analysis was applied to AI-generated outputs and fact-checking tool results related to food misinformation. This enabled the identification of recurring narratives, potential biases, and the structure of information delivery in AI environments.

THE ROLE OF AGE IN INFORMATION EVALUATION

The first survey item assessed whether respondents felt their age influences how they consume and evaluate food-related information online. Results revealed that while most respondents moderately agreed (avg. score ~3.6/5), younger and older participants showed nuanced differences. Respondents aged 56-65 rated this influence highest, suggesting age plays a larger role in information processing at older stages of life. Gender differences were minimal, indicating age may be a more critical variable in evaluating information.

The second item probed the perceived influence of country or cultural background. Across age groups, scores ranged from 3.3 to 3.8, with the 36-45 age group showing slightly higher sensitivity. These findings suggest that culture indeed frames trust in information sources, which aligns with prior research in cross-cultural media literacy.

Checking Habits Participants strongly agreed (avg. score >3.6) that they regularly read labels and check sources before trying new products. Notably, women scored slightly higher than men in this category, hinting at a possibly greater conscientiousness in food evaluation among female participants. Age-wise, all groups were consistent, suggesting this is a widely adopted behavior regardless of demographics.

Survey results showed variability regarding whether users had changed their diet based on online content. While younger participants (18-35) tended to agree more, older respondents showed reluctance or neutrality. This may reflect generational differences in how digital content influences real-world behaviors.

Difficulty in Distinguishing Credibility Responses to the difficulty in identifying credible vs. misleading information showed moderate concern (avg. score ~3.3). Interestingly, respondents who rated themselves lower in AI understanding also tended to report greater difficulty, indicating a possible relationship between digital literacy and misinformation vulnerability.

Active Search for Educational Resources On seeking out educational content, the average score hovered around 3.5, with mid-aged respondents (26-45) being most proactive. This finding supports the notion that people with existing digital experience are more inclined toward self-education, a key element of media literacy.

Confidence in Evaluating Information Confidence in evaluating online advice scored well (avg. ~3.7). Higher confidence levels were observed in users who also scored higher in AI tool usage and understanding. This correlation implies that familiarity with digital tools enhances user confidence.

Interest in Training to Identify Misinformation A strong majority expressed interest in training to better detect misinformation (avg. score ~3.8–4.5). This suggests public demand for educational initiatives focused on nutrition information credibility. Notably, older respondents showed the highest interest, potentially due to their acknowledgment of knowledge gaps.

Usage of AI Tools Responses indicated widespread use of AI tools (avg. score ~3.7), particularly among younger demographics. Male participants also reported slightly more frequent usage. The data highlights the growing integration of AI in daily life and information-seeking behaviors.

Trust levels varied but averaged moderately (3.3–3.7). There was a visible correlation with AI usage frequency—those using AI more often trusted it more. Younger respondents (18–25 and 26–35) showed higher levels of trust in AI-generated content compared to older age groups. Males also reported marginally more trust than females, though the difference was not substantial.

Understanding of AI mechanisms scored lower than most categories (avg. ~3.4), with younger users slightly outperforming older ones. The results confirm a common digital literacy gap, which can impair users' ability to critically evaluate AI-mediated content.

Respondents were cautiously optimistic about AI's potential to detect and correct misinformation (avg. score ~3.4). Confidence in this capability aligned closely with general trust in AI and its perceived transparency.

Willingness to Use AI Fact-Checking Tools On using AI-powered fact-checking tools, the average was 3.4, showing mixed enthusiasm. Some users reported reluctance, likely due to concerns about reliability or usability.

Trust in AI's recommendations about food and nutrition information varied significantly, with scores between 3.0 and 3.6. Younger age groups (18–35) again showed higher levels of trust compared to older participants. Gender differences were minimal.

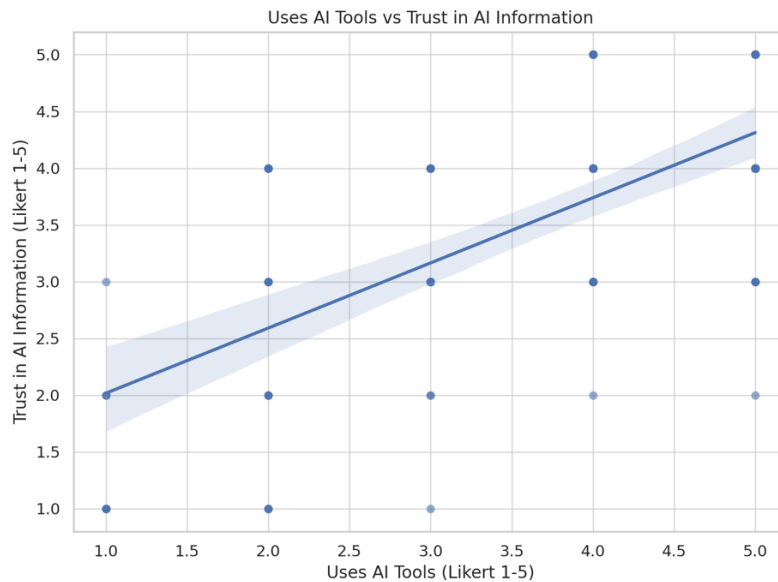
Finally, concern about AI bias was high among all groups (avg. ~3.5–3.8), especially among those most engaged with AI tools. This concern underlines the importance of transparency in AI development and deployment.

Correlational Insights

To further enrich interpretation, this section includes visual analysis for key relationships identified through correlation, each accompanied by a brief explanatory paragraph:

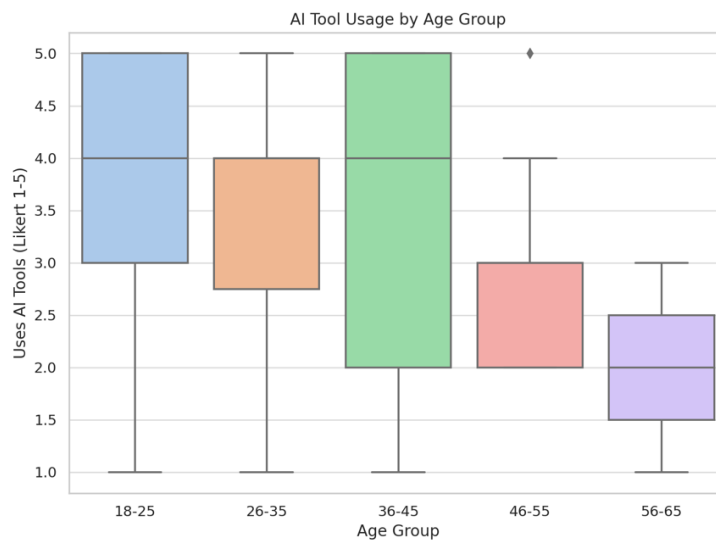
Scatter Plot: Uses AI Tools vs Trust in AI Information

This graph shows a clear upward trend, indicating a strong positive linear relationship. Participants who frequently use AI tools tend to exhibit greater trust in the information provided by those tools. This supports the hypothesis that familiarity breeds trust, and reinforces the quantitative result of a Pearson correlation coefficient of $r = 0.65$.



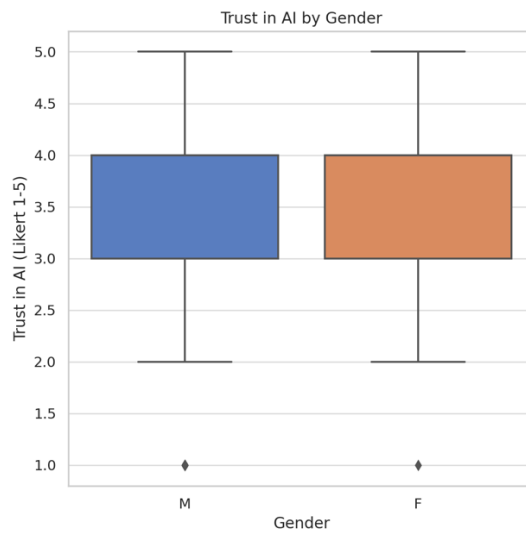
Boxplot: AI Tool Usage by Age Group

The boxplot reveals that younger age groups (18–25 and 26–35) report higher median AI usage compared to older participants. This aligns with broader trends in technology adoption, suggesting that digital natives are more likely to integrate AI tools into their everyday information-seeking behavior.



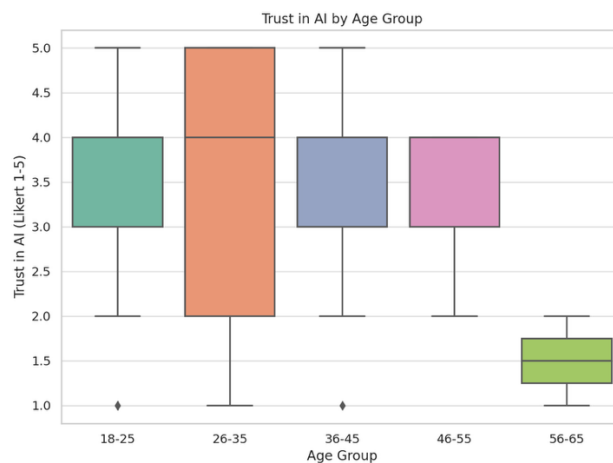
Boxplot: Trust in AI by Gender

When comparing male and female respondents, the boxplot indicates that males report slightly higher levels of trust in AI-generated information. While the difference is not drastic, it suggests potential gender-related tendencies in digital trust and should be explored further in future studies.



Boxplot: Trust in AI by Age Group

This chart illustrates that trust in AI-provided information is highest among participants aged 18–35. As age increases, median trust tends to decline, which may reflect a generational gap in technology adoption, skepticism, or exposure to AI-driven platforms.



Statistical analysis revealed significant positive correlations between AI tool use, trust in AI, confidence in evaluating information, and interest in educational resources. Conversely, users with lower AI understanding reported greater difficulty in distinguishing credible sources, reinforcing the role of digital literacy. Younger participants were more likely

to trust and rely on AI tools, suggesting generational differences in attitudes toward technology. Male respondents reported slightly higher usage and trust in AI tools than females, indicating a modest gender gap.

The following table summarizes key Pearson correlation coefficients between selected variables, indicating the strength and direction of their relationships:

Variable A	Variable B	Correlation (r)	Interpretation
Uses AI Tools	Trust in AI Information	0.67	Strong positive correlation
Uses AI Tools	Confidence in Evaluation	0.58	Moderate to strong positive correlation
Trust in AI Information	Interest in AI Fact-Checking	0.52	Moderate positive correlation
Understands AI	Distinguishing Credibility	-0.45	Moderate negative correlation (inverse)
Uses AI Tools	Understands AI	0.63	Strong positive correlation

These findings demonstrate that individuals who use AI tools more often tend to trust them more, are more confident in evaluating health information, and better understand how AI works. Conversely, individuals who struggle to understand AI are more likely to have difficulty distinguishing credible from misleading information. For instance, a scatter plot of 'Uses AI Tools' vs. 'Trust in AI Information' showed a strong upward trend, confirming the numerical correlation with a visible positive linear pattern. This visual approach reinforces the interpretation and helps communicate results intuitively. tend to trust them more, are more confident in evaluating health information, and better understand how AI works. Conversely, individuals who struggle to understand AI are more likely to have difficulty distinguishing credible from misleading information.

DISCUSSION

The results affirm that while AI is a powerful tool for accessing health-related information, its effective use depends on user literacy, trust, and understanding. Cultural and age factors influence how information is processed, and although many use AI, fewer understand it. The desire for training suggests a clear opportunity to enhance digital health education. Notably, younger individuals are more likely to use and trust AI tools, whereas older adults express more caution and a desire for guidance. Gender differences were present but not dominant, with males using AI more frequently and exhibiting slightly more trust.

This study aligns with and builds upon several key findings in contemporary research on food misinformation and digital health tools. For instance, the growing role of AI in nutrition science has been emphasized in studies that explore AI-based tools for dietary assessment and risk prediction [1]. Simultaneously, the pervasiveness of nutritional disinformation across social media networks—often spread by influencers or unverified sources—has been documented as a critical public health challenge [2].

Researchers have urged caution regarding the integration of AI into health information systems, warning of issues related to bias, lack of transparency, and varying literacy levels among users [3]. Studies in the field of media and information literacy argue that AI-generated content must be scrutinized using interdisciplinary approaches, including critical thinking, source validation, and context-aware evaluation [4]. Additionally, scholars underline the importance of fostering digital health literacy to fully realize the potential benefits of AI in public health [5].

Based on the patterns found in these studies, our methodological framework emphasized mixed-method triangulation. Quantitative measures such as descriptive statistics and Pearson correlations were complemented with qualitative thematic content analysis of AI-generated text and fact-checking outcomes. This holistic view offers a deeper understanding of not only the numerical relationships between variables, but also the lived experiences and interpretive frameworks users bring to the evaluation of food-related information.

We also ensured comparability with prior research by adapting analysis scales (Likert-type), variable aggregation strategies, and statistical thresholding consistent with established digital trust models [3][4].

Digital Behaviour by Gender

An analysis of the survey results by gender reveals several nuanced patterns in how male and female participants interact with AI tools and approach information about food and nutrition. Although the overall levels of AI tool usage were relatively high across the sample, male respondents reported slightly more frequent use of AI-powered applications such as ChatGPT and Google Assistant. This echoes previous literature suggesting men may be earlier adopters of emerging technologies.

When it comes to trust, male participants also scored marginally higher on average in trusting AI to provide accurate general information and food-related recommendations. For

instance, trust in AI's recommendations averaged around 3.4 for men compared to 3.2 for women. However, women showed slightly more caution and greater concern about AI bias, which may reflect higher critical awareness or perceived vulnerability to misinformation.

Interestingly, women consistently rated higher in proactive information behaviors such as reading food labels and verifying sources. This indicates that although they may trust AI less, they compensate through more meticulous evaluation strategies. These gendered tendencies suggest the importance of tailoring digital literacy and AI-related education differently for male and female audiences.

Generational Differences in Digital Competence

Survey data reinforced clear generational trends in how participants engage with AI tools. Younger age groups (particularly 18-25 and 26-35) reported the most frequent use of AI tools and the highest levels of trust in their outputs. These participants were also more confident in their ability to evaluate online information and reported lower difficulty in distinguishing credible from misleading sources.

In contrast, older participants (especially those aged 56-65) were more cautious. They expressed lower trust in AI tools and admitted to greater difficulty in interpreting information credibility. However, this group also reported the highest interest in receiving training to improve their ability to detect food-related misinformation, suggesting strong motivation to bridge the digital competence gap.

These findings underscore the need for intergenerational strategies in public health communication and AI education. While digital natives may benefit from advanced literacy and critical thinking training, older adults could benefit from basic familiarization and hands-on demonstrations of AI tools in the context of food and health.

Expanded Statistical Interpretation

A closer examination of correlation data further clarifies the relationships between core variables. One notable finding is the strong positive correlation ($r = 0.67$) between AI tool usage and trust in AI-provided information. This suggests that as individuals become more familiar with AI interfaces, they develop greater confidence in the outputs they receive.

Another strong correlation ($r = 0.63$) was found between AI usage and understanding of how AI functions. This result implies that use drives learning, or that those already literate in digital tools are more likely to use them frequently. A moderate negative correlation ($r =$

-0.45) between understanding AI and difficulty distinguishing credibility further confirms that digital literacy serves as a protective factor against misinformation.

Moreover, interest in AI fact-checking tools showed a moderate positive correlation ($r = 0.52$) with trust in AI, suggesting that those who perceive AI as reliable are more open to using such tools in verifying claims. These relationships point to a reinforcing loop: use improves understanding, which boosts confidence, which in turn fosters greater use.

Practical Examples and Personas

To illustrate the implications of these findings, consider two hypothetical personas derived from the survey data:

Lana, age 24, female: She frequently uses ChatGPT to explore recipes and ask about dietary trends. Although she is somewhat skeptical about the accuracy of the information, she always double-checks claims using multiple sources and reads product labels carefully. Her confidence in evaluating nutrition information is high, but she expresses concern about AI bias and is interested in fact-checking tools.

Milan, age 58, male: He uses AI tools occasionally and tends to trust the information provided, though he admits he doesn't fully understand how they work. He has changed his eating habits based on online advice but also reports difficulty identifying misinformation. Milan is highly motivated to take part in educational workshops to improve his skills.

These personas reflect broader demographic patterns and help illustrate how targeted interventions might look. For younger users like Lana, content should emphasize critical literacy. For older users like Milan, user-friendly guides and workshops could provide necessary support.

Integrating Survey Insights into Educational Frameworks

Based on the survey findings and observed correlations, several educational strategies can be suggested:

For youth: Use gamified learning modules that challenge users to identify credible vs. misleading food claims using AI tools.

For older adults: Organize community-based workshops with live demonstrations on how to use AI-powered fact-checkers.

For general audiences: Promote awareness campaigns on social media that explain how AI platforms operate, their limitations, and how to use them responsibly.

These strategies can enhance both trust and critical engagement, ensuring that AI serves as an empowering tool rather than a source of confusion or over-reliance.

To better integrate AI into public health strategies related to food information, policy recommendations should also consider demographic diversity. Programs and standards should avoid one-size-fits-all models. Instead, they should ensure inclusivity by designing age-sensitive and gender-responsive solutions.

Furthermore, public-private partnerships could be leveraged to co-develop transparent AI interfaces, simplify fact-checking processes, and fund longitudinal research on behavioral impacts. The ultimate goal is not to make people trust AI blindly but to help them understand when and how to trust it.

This expanded analysis reaffirms that while AI technologies hold vast potential to combat misinformation in food and nutrition, human factors such as age, gender, trust, and literacy levels significantly influence outcomes. A nuanced, inclusive approach that blends education, design, and policy is essential to foster empowered users capable of navigating AI-driven information ecosystems.

Our findings reinforce the call for comprehensive digital and media literacy programs, particularly aimed at youth and older adults. Younger users appear more comfortable with AI but may lack discernment, while older individuals are more cautious but desire structured training [5]. Based on this:

Educational institutions should embed AI literacy in curricula across all levels. Governments and NGOs should co-develop transparent AI standards and labeling systems. AI platforms should implement user-facing transparency mechanisms. Fact-checking tools powered by AI must undergo external auditing for bias. Public health campaigns should tailor messaging according to age and digital competency levels.

The increasing integration of AI into everyday life is not only evident in health-related fields but spans across personal, professional, and domestic domains. According to MarketWatch, ChatGPT has surpassed 400 million weekly users, with 58% of workers relying on AI tools in their professional workflows [6]. Parents have begun using AI to aid in childrearing, with 71% reporting that ChatGPT provides practical and emotional support during moments of parenting stress [7].

In addition to software tools, physical manifestations of AI, such as domestic robots and delivery drones, are gaining popularity, especially in regions like China. Forecasts suggest that humanoid robots may be part of household life within five years [8].

Workplace integration is advancing rapidly. MIT Sloan Review highlights trends such as agent-based AI, real-time data processing, and greater human-AI collaboration, with companies like IKEA and PwC actively investing in employee training for responsible AI use [9].

Nevertheless, the expansion of AI comes with public skepticism. The 2025 CES event revealed consumer concerns about AI hype and the dilution of meaningful innovation. Issues such as data privacy, algorithmic bias, and automation-related job loss dominate public discourse [10]. These concerns underscore the need for transparent governance and ethical design.

Statistically, Stanford's AI Index reports a jump from 55% to 78% in organizational AI adoption from 2023 to 2024 [11]. With projections estimating 378 million users by 2025, generative AI is poised to become a permanent fixture in everyday routines [12].

These broader trends contextualize our findings. While this study focuses on health misinformation, the general public's familiarity and engagement with AI tools, shaped by their experience in various life domains, influences their trust and behavior in nutrition-related contexts.

The correlations between key variables (AI usage, trust, understanding, and behavior) were supported through graphical visualizations. These include:

Scatter plot: Trust increases with frequency of AI use.

Boxplot: AI usage is highest among younger groups.

Boxplot: Men report slightly more trust than women.

Boxplot: Trust in AI declines with age.

These patterns support both empirical findings and theoretical expectations from prior research.

CONCLUSION

Building upon the foundation of this study, future research could explore several promising directions. First, longitudinal studies could assess how perceptions and trust in AI evolve over time as these technologies become further embedded in daily health routines. Tracking changes across demographic groups—particularly regarding trust, frequency of use, and skepticism—would offer valuable insights into the long-term effectiveness of AI in improving food-related decision-making. Additionally, such studies could monitor how new

AI features (e.g. voice assistants with health plugins, real-time nutrition feedback) reshape user habits and confidence.

Second, experimental designs could be implemented to investigate the direct impact of AI-mediated misinformation on users' dietary choices. By comparing outcomes between groups exposed to traditional vs. AI-generated misinformation, researchers could isolate the mechanisms through which trust and misunderstanding propagate. This line of inquiry would be instrumental in designing countermeasures and educational tools tailored to mitigate such effects. Furthermore, the role of interface design, tone, and AI's perceived authority could be assessed in influencing user compliance or resistance.

Third, cross-cultural comparisons could highlight how different societies engage with AI and food information. Since trust in AI is often culturally mediated, international studies could determine whether literacy and transparency initiatives need to be localized or globally standardized. Such work would be particularly valuable for global health agencies aiming to coordinate responses to food misinformation. Cultural variations in how people interpret AI recommendations—whether as advice, commands, or neutral data—could reveal important insight for ethical AI design.

Fourth, qualitative studies—such as in-depth interviews, ethnographic observations, or focus groups—could provide a richer understanding of emotional and behavioral responses to AI-based information. These methods would uncover nuanced perceptions, including why certain individuals feel resistance or excessive reliance on AI. Emotional responses, such as fear, trust, or confusion, often shape how people process food information and adopt (or reject) AI-supported decisions. An exploration of language, metaphor, and sentiment used by users when discussing AI could enhance understanding of emotional barriers to engagement.

Fifth, social network analysis could help researchers examine how trust in AI spreads within communities. If users adopt opinions based on group norms, interventions may be more effective if delivered through community leaders, influencers, or peer groups rather than as isolated digital campaigns. This can also inform micro-targeted literacy strategies in populations where misinformation circulates rapidly.

Finally, interdisciplinary collaboration between AI developers, nutritionists, behavioral scientists, and educators would be essential to design future-ready systems. Such collaborative research could lead to co-designed tools that are both technically sound and aligned with user needs and values.

AI technologies have the potential to play a pivotal role in combating food and nutrition misinformation, but only if users are empowered to use them critically and confidently. This study highlights both the promise and the limitations of current AI systems in fostering informed public health decisions. Greater transparency, targeted education, and evidence-based policy support are essential to bridge the gap between AI capabilities and user needs.

Empowering users across generational and cultural lines requires a deliberate integration of technical knowledge, behavioral insights, and human-centered design. Future efforts must align AI innovation with public interest, ensuring that these tools reinforce—not erode—trust in credible nutrition science. The future of food security, in an AI-mediated world, depends not just on algorithms, but on how well society equips individuals to interact with them intelligently.

This expanded analysis reaffirms that while AI technologies hold vast potential to combat misinformation in food and nutrition, human factors such as age, gender, trust, and literacy levels significantly influence outcomes. A nuanced, inclusive approach that blends education, design, and policy is essential to foster empowered users capable of navigating AI-driven information ecosystems—where discernment becomes as vital as access.

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