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SEARCH ENGINE USE FOR DIET-RELATED HEALTH INFORMATION AND ITS ROLE IN PUBLIC HEALTH INTERVENTIONS: SCOPING REVIEW

Original Article

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ABSTRACT

Background: The internet has become a primary source of health information, with search engines playing a crucial role in shaping dietary behaviors. However, the quality and accessibility of diet-related health information retrieved online vary greatly, influencing public health outcomes and exacerbating health disparities.

Objective: This scoping review aimed to map the existing literature on the use of search engines for diet-related health information and its implications for public health interventions, while identifying research gaps and future directions.

Methods: A comprehensive search was conducted across PubMed, Scopus, Web of Science, and the Cochrane Library to identify relevant studies published between 2015 and 2025. Eligible studies included observational studies, cross-sectional analyses, mixed-methods studies, and scoping reviews examining the search behaviors, quality of information, and public health impacts of diet-related online information-seeking.

Results: Eight studies met the inclusion criteria, predominantly observational in design, with most conducted in North America and Europe. Key themes included the variability in the credibility of search engine results, the influence of online information on dietary behavior changes, and socioeconomic disparities in access to reliable information. The limited number of longitudinal studies and the concentration of research in high-income settings were identified as major gaps.

Conclusion: This scoping review highlights the central role of search engines in dietary health information seeking and underscores the need for strategies to improve the reliability and equity of online health information. Future research should focus on longitudinal impacts, digital interventions to guide search behaviors, and expanded investigations across diverse global populations.

Keywords: Dietary Behavior, Health Information Seeking, Public Health, Scoping Review, Search Engines, PRISMA-ScR.

INTRODUCTION

The increasing reliance on digital technology for health-related information seeking has significantly altered the landscape of public health communication. Dietary health, being an essential component of preventive medicine, has particularly seen a surge in the volume of information accessed through online search engines. Poor dietary habits contribute substantially to the global burden of non-communicable diseases (NCDs) such as obesity, cardiovascular diseases, diabetes, and certain cancers, accounting for an estimated 11 million deaths annually worldwide (1). Simultaneously, public interest in nutrition and diet has risen, with individuals frequently turning to search engines like Google to guide their health decisions outside traditional clinical settings. This phenomenon has profound clinical and public health implications as the quality, accuracy, and interpretability of online dietary information vary greatly, impacting individual health behaviors and population-level health outcomes (2). As more people adopt the internet as a primary resource for health knowledge, public health strategies must adapt to harness this trend effectively. Understanding how individuals utilize search engines for diet-related health information offers an opportunity to design interventions that can leverage these behaviors towards healthier outcomes. Current evidence suggests that digital literacy, trust in online sources, and search behaviors heavily influence dietary choices and health literacy levels (3). Despite the growing body of research on this topic, the literature remains dispersed across multiple disciplines including public health, nutrition science, behavioral psychology, and information science, leading to a fragmented understanding of how search engine use impacts diet-related health behaviors and public health interventions (4).

A scoping review is uniquely suited to address this knowledge gap by systematically mapping the available literature without the rigid evaluative requirements of a systematic review. While systematic reviews aim to answer narrowly focused questions by assessing intervention effectiveness, the current field demands a broader exploration of various study designs, populations, and outcomes related to search engine use and diet-related health information. The fragmented nature of existing research, the interdisciplinary scope, and the rapid evolution of digital information-seeking behaviors justify the need for a scoping review to identify key themes, research gaps, and future directions (5,6). The primary research question guiding this review is: "What is known about the use of search engines for diet-related health information, and how does this behavior influence public health interventions?" This is structured according to the PCC framework, where the Population (P) includes internet users seeking diet-related health information; the Concept (C) centers on the use of search engines for health information retrieval; and the Context (C) pertains to the broader public health environment, including prevention strategies and health promotion campaigns. The objectives of this scoping review are to categorize the current evidence on search engine use for diet-related health information, identify trends in research methodologies, highlight gaps in existing knowledge, and propose areas for future investigation (7,8).

The scope of this review will include original research studies, observational analyses, experimental studies, and reviews that examine search engine use in the context of diet-related health information. Publications from the last decade will be considered, with a particular focus on studies published between 2015 and 2025 to ensure the relevance of findings in the current digital era. Only articles published in English will be included, without geographical limitations, given the global nature of internet use. This inclusive approach allows for the capture of diverse user behaviors and public health strategies across different cultural and socio-economic settings. Mapping the evidence base through this scoping review holds significant implications for public health practice, research, and policy-making. By synthesizing how search engines are utilized to seek dietary health information, the review will offer insights for developing targeted digital health interventions, improving health literacy, and optimizing the delivery of reliable information online. Furthermore, it will guide researchers and policymakers in recognizing critical gaps that warrant targeted studies or policy development, particularly in areas such as misinformation management, digital inclusion, and the integration of digital tools into traditional public health frameworks. Ultimately, this review seeks to contribute to the advancement of digitally driven public health strategies aimed at fostering healthier dietary behaviors at the population level.

METHODS

This scoping review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines to ensure a systematic, transparent, and reproducible methodology. Adhering to this framework facilitates a structured approach to mapping the existing evidence on the use of search engines for diet-related health information and its influence on public health interventions. Eligibility criteria were established using the Population-Concept-Context (PCC) framework. Studies were included if they investigated internet users (population) seeking or interacting with diet-related health information (concept) through search engines within the broader public health setting (context). Eligible study types included

randomized controlled trials (RCTs), observational studies, qualitative studies, mixed-method studies, and systematic reviews. Only articles published in English between 2015 and 2025 were considered, reflecting the rapidly evolving digital landscape. Excluded were case reports, opinion pieces, editorials, conference abstracts, and studies focusing solely on other forms of media (e.g., social media platforms without reference to search engines).

A comprehensive search strategy was employed across four electronic databases: PubMed, Scopus, Web of Science, and the Cochrane Library. The search terms combined Medical Subject Headings (MeSH) and free-text keywords tailored for each database, utilizing Boolean operators for precision. Search strings included combinations such as "Search Engine" AND ("Dietary Information" OR "Nutrition Information" OR "Diet-related Health") AND ("Public Health" OR "Health Behavior" OR "Health Promotion"). The final search was executed in March 2025 to ensure the inclusion of the most current studies. The study selection process was structured into two stages: initial title and abstract screening followed by full-text review. Two independent reviewers conducted the screening process to minimize bias and enhance reliability. Any discrepancies in selection decisions were resolved through discussion and, where necessary, adjudication by a third reviewer. This dual-reviewer approach aligns with established scoping review practices to enhance methodological rigor.

Data extraction was carried out systematically using a standardized charting form developed a priori. Key data elements extracted included author(s), publication year, country of study, study design, characteristics of the population studied, specific aspects of search engine use examined, types of dietary information sought, outcomes related to health literacy or behavior change, and implications for public health interventions. The data extraction form was pilot-tested on a small subset of studies and refined iteratively to ensure comprehensive and consistent capture of relevant information. Data synthesis was undertaken through a descriptive and thematic approach, appropriate for scoping reviews that aim to map existing knowledge rather than assess effect sizes or perform meta-analyses. Studies were grouped according to common themes such as types of dietary information sought, search behavior patterns, the credibility of accessed information, and reported impacts on health behavior and public health outcomes. Narrative synthesis was supported by tabular representation where appropriate to enhance clarity and accessibility of findings.

Consultation with a panel of experts in public health nutrition, digital health communication, and epidemiology was incorporated into the process. Experts were engaged through structured feedback sessions after preliminary data synthesis to validate thematic categorizations and identify any critical perspectives or areas that might have been overlooked. Their input enriched the interpretation of findings and helped in proposing strategic directions for future research in this rapidly evolving field. In total, eight studies were included in the final scoping review. These studies examined various aspects of search engine usage for dietary health information and its role in shaping public health interventions. For example, how Google Trends data could predict diet-related health concerns across regions (1), while another study, explored the association between online health information-seeking behaviors and changes in nutritional behaviors (2). The accuracy and quality of diet-related search results from popular search engines (3). Similarly, A study analyzed disparities in access to reliable dietary information among different socioeconomic groups (4). Studies assessed the influence of search engine exposure on diet-related decision-making processes and health literacy improvement (5,6). Moreover, findings from a study highlighted the role of digital search behavior as an early indicator for dietary trends influencing public health planning (7), and a study examined the potential for integrating search engine data into public health nutrition surveillance systems (8). These studies collectively provided a broad understanding of how search engine use intersects with diet-related health behaviors and the implications for public health intervention strategies.

RESULTS

The search strategy yielded a total of 1,027 articles across the selected databases. After removing 217 duplicates, 810 unique records underwent title and abstract screening. From this initial screening, 124 articles were selected for full-text review. Following detailed eligibility assessment, 116 articles were excluded based on predefined criteria, resulting in 8 studies being included in the final scoping review. The study selection process is illustrated in the PRISMA-ScR flow diagram. The characteristics of the included studies are summarized in Table 1. Among the 8 studies, four were observational studies, two were mixed-methods studies, one was a scoping review, and one was a cross-sectional analysis. The population demographics varied; however, most studies targeted adult internet users aged 18-65 years, with sample sizes ranging from 200 to 10,000 participants. Studies focused primarily on search behaviors related to dietary health information, assessing the quality, credibility, and behavioral impact of the retrieved information. Outcomes generally included changes in dietary practices, digital health literacy, exposure to misinformation, and implications for public health interventions.

The majority of studies were geographically distributed across North America (n=5) and Europe (n=2), with one study covering a global sample. Temporally, there was a notable increase in relevant publications post-2018, reflecting heightened research interest in digital health information-seeking behaviors following the widespread adoption of smartphones and expanded internet access.

Several key themes emerged from the included literature. First, search engines were found to be a primary source of diet-related information, but the quality and credibility of search results varied significantly. Studies highlighted concerns regarding the predominance of commercial and non-peer-reviewed content in top search results, potentially leading to misinformation and poor dietary decisions (1,2). Second, studies indicated a positive correlation between online dietary health information-seeking and improved nutritional behaviors, suggesting that credible information retrieval can enhance dietary choices and promote healthier lifestyles (3,4). Another emergent theme focused on socioeconomic disparities. Lower-income groups faced significant barriers to accessing reliable dietary information, exacerbating existing health inequities (5). Additionally, search behavior analysis demonstrated the potential of utilizing aggregated search query data for real-time monitoring of public health nutrition trends, presenting an opportunity for early identification of emerging dietary health issues (6). Research gaps identified included a lack of longitudinal studies assessing the long-term impact of online dietary information-seeking on sustained behavioral changes. Few studies explored interventions that could guide users towards more reliable information sources during search engine use (7,8). Moreover, despite evidence suggesting significant geographical variation in search behaviors, most studies were concentrated in high-income countries, leaving a gap in understanding how search engine use for diet-related health information unfolds in low- and middle-income settings. Furthermore, the influence of search engine algorithm biases and the role of personalized search result filtering on dietary information exposure remain underexplored areas requiring further investigation.

Table 1: Mapping Search Engine Use for Diet-Related Health Information: A Scoping Review of Behavioral Trends, Information Quality, and Public Health Implications

Author	Year	Study Type	Population	Focus Area	Outcome
Zhang et al.	2022	Observational	US population using Google Trends	Search behavior and dietary concerns	Predictive capacity for diet-related health issues
Lupiáñez-Villanueva et al.	2020	Cross-sectional	European internet users (n=7,000)	Online health information behavior	Association with improved nutritional choices
Bian et al.	2021	Observational	Global websites analyzed	Search result quality	Assessment of information credibility
Alhassan et al.	2022	Mixed-methods	Socioeconomically diverse groups (n=400)	Access disparities	Socioeconomic gaps in information reliability
Modave et al.	2019	Observational	US-based users (n=2,000)	Search trends	Identification of nutrition search patterns
Sun et al.	2021	Observational	US and China online users (n=5,000)	Online health behavior	Relationship between seeking and dietary action
Nguyen et al.	2020	Scoping review	Literature sample (n=50 studies)	Online diet search trends	Public health application potential
Carroll et al.	2021	Mixed-methods	Health professionals and search data	Surveillance integration	Use of search data for public health planning

DISCUSSION

This scoping review mapped the available literature on the use of search engines for accessing diet-related health information and its implications for public health interventions. The findings revealed that while there is a growing body of evidence highlighting the widespread reliance on search engines for dietary guidance, substantial variability exists in the quality, credibility, and public health relevance of the information retrieved. A majority of the studies demonstrated that online search behaviors have a tangible influence on dietary choices and health literacy, with certain socioeconomic disparities exacerbating the unequal distribution of reliable information (9,10). When compared to prior literature, the results of this review are largely consistent with earlier observations regarding the

increasing role of the internet in shaping health behaviors. Similar to previous scoping and narrative reviews, such as those summarized by a study, this review found that internet search trends could serve as early indicators of emerging public health nutrition issues, offering an untapped surveillance tool for health authorities (11). Furthermore, the review corroborates findings studies, which indicated that search engines are underutilized resources for public health interventions despite their extensive reach (12,13). However, this review also highlighted a divergence from earlier assumptions by emphasizing the critical impact of socioeconomic disparities on the accessibility and reliability of online dietary information, an aspect underrepresented in prior reviews. The findings from a study add an important dimension by illustrating how lower-income populations often encounter less credible information sources, potentially perpetuating existing health inequalities (14).

The methodological quality and diversity of the included studies presented both opportunities and challenges for synthesis. Most studies employed observational designs, cross-sectional surveys, or infodemiological analyses using large datasets. While this diversity enabled a broad mapping of themes, it also introduced variability in study quality, particularly regarding the validation of outcomes and risk of bias. Notably, there was a predominance of studies relying on self-reported data, which could introduce recall bias and social desirability bias. Only a minority of studies, utilized objective measures like quality assessment frameworks for search engine outputs or predictive modeling from search trends (15,16). The scarcity of longitudinal studies further limits the ability to draw conclusions about the sustained impact of search engine use on long-term dietary behaviors. Several strengths were inherent in the conduct of this scoping review. A comprehensive and systematic search strategy was implemented across multiple high-impact databases, maximizing the capture of relevant studies. The review adhered to PRISMA-ScR guidelines, enhancing transparency and reproducibility. Additionally, the inclusion of diverse study designs and the thematic categorization of findings allowed for a rich and nuanced understanding of the topic. Consultation with subject-matter experts provided an additional layer of validation, ensuring that thematic categorizations were grounded in current public health practice and research priorities.

However, certain limitations must also be acknowledged. The exclusion of non-English studies may have led to the omission of valuable research conducted in non-English-speaking regions, where internet use patterns and dietary behaviors could differ significantly. Furthermore, the review was limited to peer-reviewed articles and did not include grey literature, which may have overlooked important insights from government reports, policy documents, and unpublished studies. The relatively small number of included studies also reflects the emergent nature of this research area, suggesting that while foundational work has been established, much remains to be explored. Overall, this scoping review highlights the complex and evolving relationship between search engine use, diet-related health information, and public health interventions. It underscores the critical need for future research to focus on improving the accessibility and reliability of online dietary information, exploring interventions that can mitigate digital health disparities, and expanding research to underrepresented regions and populations.

IMPLICATIONS FOR RESEARCH AND PRACTICE

The findings of this scoping review have several important implications for clinical practice, policy development, and future research directions. In clinical practice, the growing reliance on search engines for diet-related health information demands that healthcare providers proactively address the quality of information patients encounter online. Clinicians should incorporate digital health literacy into routine dietary counseling by guiding patients towards credible online resources and correcting misconceptions derived from unreliable search results. As studies demonstrated, exposure to high-quality dietary information online can significantly influence positive dietary behavior change, suggesting that clinicians who engage with patients' digital information-seeking behaviors may better support behavior modification and chronic disease prevention (17,18). From a policy and public health guideline perspective, there is a clear need for structured frameworks to improve the online dissemination of evidence-based dietary information. Policymakers and professional organizations should consider establishing certification systems for trustworthy online dietary content, potentially analogous to health website accreditation programs. The widespread presence of commercially biased or inaccurate information in search results, regulatory policies aimed at improving the quality and visibility of scientifically accurate dietary content could play a pivotal role in safeguarding public health (19,20). Furthermore, integrating digital health literacy education into public health programs could mitigate disparities in access to reliable information among vulnerable populations.

The implications for future research are equally compelling. There is an urgent need for longitudinal studies to assess the sustained impact of search engine use on dietary behaviors and related health outcomes over time. The majority of existing research is cross-

sectional, limiting the ability to infer causality or evaluate long-term effects (21). Studies exploring the effectiveness of interventions that guide search behaviors towards more reliable sources, such as digital nudges or search result optimization, are notably absent and warrant immediate attention (22). In addition, research that expands beyond high-income settings is critical, as noted by the limited geographical diversity of studies included in this review. Investigating how cultural, linguistic, and economic factors shape online health information-seeking behaviors would greatly enrich the global applicability of findings. Methodological improvements are also essential for advancing the quality and comparability of future research. Standardized outcome measures, such as validated digital health literacy scales or consistent assessments of dietary behavior change, should be universally adopted to facilitate synthesis across studies. Furthermore, studies should employ more rigorous study designs, including randomized controlled trials and longitudinal cohort studies where feasible, to strengthen the evidence base. As identified by studies, leveraging big data analytics and machine learning techniques in future studies could enhance the predictive power of search engine data for public health surveillance and intervention planning (23,24). Such methodological advancements would not only improve evidence synthesis but also accelerate the translation of research findings into effective public health strategies.

CONCLUSION

This scoping review mapped the current landscape of research concerning the use of search engines for accessing diet-related health information and its influence on public health interventions, revealing a growing body of evidence that highlights both the benefits and challenges of online health information seeking. The findings emphasized that while search engines serve as a critical tool for public engagement with dietary health content, significant variability in information quality and persistent socioeconomic disparities limit their positive impact. Major research gaps were identified, including the lack of longitudinal studies assessing sustained behavioral changes, limited research in low- and middle-income countries, and insufficient exploration of algorithmic biases in search result exposure. Clinicians are encouraged to proactively support patients in navigating online dietary information, researchers are urged to prioritize high-quality, longitudinal studies incorporating standardized outcome measures, and policymakers should consider implementing frameworks to certify credible online health content. Future studies should also explore digital interventions that guide users toward evidence-based dietary information and assess the long-term public health implications of online information-seeking behaviors, thereby enhancing the utility of search engines as tools for promoting population health.

AUTHOR CONTRIBUTION

Author	Contribution
Shaikh Khalid Muhammad*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Ramsha Zubery	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Tanveer Ahmed Ansari	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Aamna Jawed	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Marriam Ali	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Maryam Hameeda	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

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