Received: 16 March 2025 | Revised: 10 July 2025 | Accepted: 31 July 2025 | Published online: 24 September 2025

REVIEW

Journal of Data Science and Intelligent Systems
2025, Vol. 00(00) 1-10
DOI: 10.47852/bonviewJDSIS52025709

BON VIEW PUBLISHING

Exploring the Uses of Artificial Intelligence and ChatGPT in Therapeutic Diet and Nutrition

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Abstract: The integration of artificial intelligence (AI) into healthcare has revolutionized the field of therapeutic diet and nutrition by providing innovative tools for assessment, education, and personalized care. Among these advancements, conversational AI models, such as ChatGPT, have emerged as valuable assets in enhancing patient engagement and streamlining clinical workflows. This paper examines the utilization of AI in general, and ChatGPT in particular, in therapeutic diet and nutrition, including dietary assessment and planning, patient education, and real-time monitoring. The discussion highlights the benefits of AI-driven tools in improving adherence to dietary interventions and supporting evidence-based decision-making for clinicians and dietitians. These advancements are tempered, however, by ethical considerations including bias in recommendations, privacy concerns, and equitable access. Although challenges remain in ensuring accuracy and fostering trust among practitioners and patients, this paper identifies opportunities for future research for both researchers and practitioners. Through the integration of technology and human expertise, AI can accelerate advances in therapeutic nutrition.

Keywords: AI, ChatGPT, therapeutic diet, nutrition, healthcare technology, patient education

1. Introduction

The utilization of artificial intelligence (AI) in the healthcare profession continues to grow at an exponential rate. It is predicted that by next year, the United States will save over 150 billion dollars as a result of the implementation of AI applications [1]. Nutritional practice has embraced the role of AI both in terms of diagnoses and predictions, while the use of AI in therapeutic diet and nutrition is one of these developments that has the most potential to address difficult problems, including patient education, customized meal planning, and dietary adherence. The necessity for efficient nutritional interventions is highlighted by the rising incidence of chronic illnesses like diabetes, heart disease, and obesity.

AI has become increasingly integrated into improving dietary interventions and behaviors [2–4]. By automating repetitive tasks, providing data-driven insights, and promoting personalized treatment through advanced machine learning algorithms, AI integration addresses these challenges [2]. For instance, AI algorithms can be trained to analyze large datasets and then extract patterns, making it easier for users to develop customized meal plans based on their personal preferences and health data [5]. Generative AI (GenAI) models such as ChatGPT use natural language processing (NLP) to interact with patients in a manner that feels natural, making them helpful for patient education and engagement. AI is also being used to identify high-risk populations, predict disease progression, and improve resource management in healthcare systems. ChatGPT can help by explaining dietary guidelines, answering common questions, and keeping patients motivated to follow their prescribed diets; however, AI tools are not meant to replace human professionals. Rather, they are designed to support and complement the expertise of doctors, dietitians, and other specialists [6].

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This paper examines the diverse uses of and potential for AI in therapeutic diet and nutrition. Specifically, a systematic literature review followed a structured, three-phase framework to investigate the role of GenAI, particularly ChatGPT, in therapeutic diet and nutrition. This thematic synthesis allowed for the following: the identification of common uses and benefits of ChatGPT in nutritional contexts; gaps in the existing literature, including underexplored populations or ethical dimensions; emerging trends in AI-based dietetic tools and interventions; and recommendations for future research and policy development.

2. Background

2.1. Historical developments in AI and nutrition

The initial applications of AI in dietary and nutritional practices emerged through early tools like nutrition analysis software. These early systems enabled users to monitor calorie intake and nutrient consumption, but they were constrained by fixed datasets and inflexible algorithms [7–11]. Recent advancements incorporate machine learning algorithms to analyze biomarkers and genetic data, facilitating the development of AI-driven precision nutrition plans [4]. GenAI shows strong potential to overcome many of these constraints by enabling more dynamic and personalized systems that can adjust to user input in real time. Through the use of NLP, researchers have demonstrated promising capabilities in addressing healthcare challenges by enabling machines to interpret, analyze, and generate human language. In clinical contexts, NLP aids in extracting insights from unstructured medical notes, retrieving relevant patient data, and supporting decision-making processes [12].

By personalizing communications for patients from a variety of backgrounds and demythologizing complex information, NLP offers potential solutions to long-standing problems in dietary planning and adherence. NLP tools automate documentation, provide continuing support through reminders and educational materials, and analyze patient data, including food logs, to inform customized nutrition plans. Future research must address accuracy, cultural relevance, and data security issues through diverse training data and interdisciplinary collaboration. As NLP continues to evolve, its integration with technologies like computer vision promises more comprehensive nutritional support. To find patterns and trends that guide customized nutritional strategies, NLP makes it easier to analyze patient-generated data such as food diaries, meal logs, and inputs from health apps [13]. Clinical workflows are streamlined by NLP-enhanced systems, which automate time-consuming tasks like summarizing intricate research findings or recording patient interactions. Furthermore, by providing educational materials, motivational prompts, and reminders that go beyond in-person consultations, these tools serve as a link for ongoing patient support. In order to offer complete nutritional support, emerging applications include AI-driven platforms that combine NLP with other AI subfields like computer vision and reinforcement learning. Prototype systems using dynamic labels with QR codes have been developed to inform customers about shelf life and nutritional value [14]. Real-time interactions are becoming more accessible and interesting thanks to conversational AI tools like ChatGPT, which are revolutionizing communication between patients and healthcare professionals. These AI models, in contrast to more antiquated static systems, use sophisticated NLP to deliver answers that adapt dynamically to specific queries. They can provide recommendations based on evidence, simplify complicated medical information, and make health advice easier to understand. ChatGPT, for instance, may assist to help patients anticipate how chronic diseases will develop and then navigate dietary adjustments for the management of conditions like diabetes or hypertension [15, 16]. The information is presented in a way that is easy to understand and apply rather than overpowering users with technical jargon. Tools such as ChatGPT are shaping a possible future in which AI supports individualized health management by improving patient engagement and making medical advice more interactive.

2.2. Advancements in Data-Driven nutrition

Data is essential when applying AI to therapeutic nutrition. AI systems use data from wearable technology, electronic health records, and patient self-reports to generate insightful information. For instance, real-time data from continuous glucose monitors (CGMs) can be used to inform dietary modifications in order to optimize glycemic control for diabetics [4, 17]. Some AI-driven tools are being developed to look at behavioral patterns and psychosocial factors to address barriers to dietary adherence. In line with this holistic approach, contemporary patient-centered care models place a strong emphasis on the integration of the social, psychological, and physical facets of health.

2.3. Challenges in AI implementation

Despite the great potential of AI, there are obstacles to overcome before it can be used in therapeutic nutrition. In order to guarantee equitable results, ethical issues like the possibility of algorithmic bias must be resolved. Strong protections are also needed for data privacy and security issues, especially when private health information is at stake. The acceptance of AI tools by patients and clinicians is the final determinant of their adoption, so efforts must be made to establish credibility and prove their worth. Although a handful of studies to date have examined facets of GenAI's impact, there remains to cohesive collection of findings that identify systematic trends for patients as well as dieticians. Because GenAI technologies have evolved at a rapid pace, a gap exists between existing research and best practice approaches.

To address these gaps, this review employs a structured methodology guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, ensuring a rigorous, transparent, and systematic analysis of the literature. This approach facilitates comprehensive synthesis and highlights underexplored areas that warrant further scholarly investigation. The focus of the review is on studies published over the last six years, reflecting the rapid advancements of GenAI and ChatGPT in the area of diet and nutrition

3. Methodology

This systematic literature review followed a structured, three-phase framework to investigate the role of GenAI, particularly ChatGPT, in therapeutic diet and nutrition. The review was conducted in accordance with the PRISMA guidelines to ensure methodological rigor, transparency, and replicability throughout the process.

The initial phase focused on clarifying the scope of the review by identifying how ChatGPT contributes to advancements in therapeutic diet and nutrition. This included its applications in meal planning, patient education, monitoring, personalized feedback, and improved accessibility. Ethical considerations—such as data privacy, algorithmic bias, and responsible AI use—were also examined to contextualize the technology's impact.

In the second phase, studies were systematically categorized to assess ChatGPT's influence on dietary practice and its integration into current monitoring systems. This phase also evaluated the extent to which ethical frameworks are being developed to guide the responsible use of AI in diet and nutrition contexts.

The final phase involved consolidating and synthesizing the findings to identify major trends, challenges, and innovations. This analysis revealed research gaps and suggested future directions for advancing AI-driven nutrition practices, including the design of new technologies, policy frameworks, and methodologies to support sustainable, ethical AI integration.

The review followed the PRISMA framework which ensures methodological transparency and rigor. PRISMA provides a structured approach that supports thorough documentation of the review process—from data collection to analysis and interpretation—maximizing comprehensive and unbiased outcomes.

3.1. Search and filtering steps

To ensure a comprehensive review of the literature, a systematic search was conducted across four major academic databases as follows: Scopus, Web of Science, Google Scholar, and ScienceDirect. The search strategy was created to maximize relevance across different databases by adjusting search strings and filters according to each platform's capabilities. The search was limited to peer-reviewed articles, conference proceedings, and scholarly journals published between January 2019 and January 2025, with a focus on English-language publications.

The search string used was as follows: ("Generative AI" OR "ChatGPT" OR "large language models" OR "artificial intelligence") AND ("therapeutic diet" OR "clinical nutrition" OR "dietary planning" OR "nutrition counseling" OR "medical nutrition therapy") AND ("healthcare" OR "patient education" OR "meal planning" OR "diet monitoring"). In databases that allowed specific filtering, additional parameters such as "Peer-reviewed" and "Full text available" were applied to enhance the quality and relevance of the search results.

3.2. Inclusion and exclusion criteria

The inclusion criteria are as follows:

- Publications from January 2019 to January 2025.
- Studies written in English.

- Research that focused on the use of GenAI (e.g., ChatGPT or large language models; LLMs) in therapeutic diet, clinical nutrition, or related healthcare settings.
- Included applications such as meal planning, patient education, nutritional monitoring, or dietary counseling.
- Included studies that discussed ethical issues such as data privacy, algorithmic bias, or responsible use of AI in dietetics.
- Peer-reviewed journal articles, conference proceedings, or scholarly publications.

The exclusion criteria are as follows:

- Studies that did not address GenAI or large language models (e.g., focused only on traditional machine learning or general health apps without AI).
- Research not specifically focused on general AI in healthcare without a specific connection to diet or nutrition.
- Non-English publications.
- Non-scholarly sources such as editorials, opinion pieces, or news articles.
- Studies lacking sufficient methodological detail or duplicated across databases were excluded after deduplication.

3.3. Data extraction and synthesis

After the initial screening based on titles and abstracts, full-text articles that met the inclusion criteria were retrieved for detailed review. A standardized data extraction form was developed to ensure consistency and to capture key information from each study. The extracted data included the following:

- Bibliographic details (author(s), year of publication, source)
- Study objectives and design
- Type of AI used (e.g., ChatGPT, LLMs).
- Application content (e.g., meal planning, nutritional education, and patient monitoring)
- Target population (e.g., patients, clinicians, dieticians)
- Key findings and outcomes
- Ethical considerations
- Limitations and implications for practice or research

The synthesis process followed an integrative approach, allowing for both qualitative and thematic analysis of findings. Studies were grouped by application domain (e.g., patient education, clinical decision support, and dietary planning) and analyzed for recurring patterns, innovations, challenges, and ethical concerns.

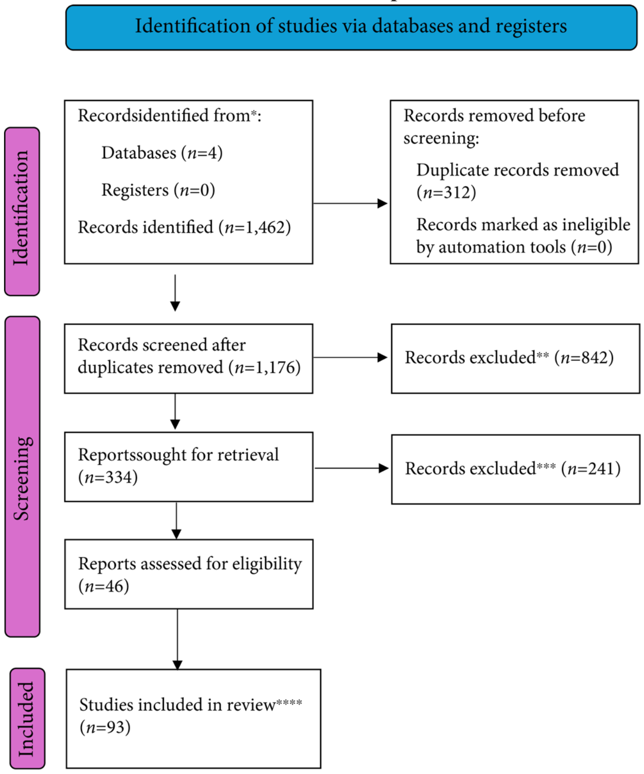
4. Results

A total of 1,462 records were identified through searches across four academic databases: Scopus, Web of Science, Google Scholar, and ScienceDirect. An additional 26 records were retrieved through manual searches of reference lists and related literature. After removing 312 duplicates, 1,176 records remained for title and abstract screening. Of these, 842 were excluded due to irrelevance, lack of AI focus, or failure to meet the inclusion criteria.

The remaining 334 full-text articles were reviewed for eligibility. Of these, 241 were excluded due to inadequate methodological detail, insufficient relevance to therapeutic diet or nutrition, or overlap with other included studies. Ultimately, 93 studies met all inclusion criteria and were included in the qualitative synthesis. A PRISMA flow diagram detailing the screening process is presented in Figure 1.

The 93 included studies were published between 2019 and 2025 and primarily originated from North America, Europe, and East Asia. Study designs included experimental research (n = 22), observational or cross-sectional analyses (n = 18), systematic reviews (n = 12), and conceptual or theoretical papers (n = 41). GenAI models, particularly ChatGPT and other LLMs, were the primary focus in all studies.

Figure 1
PRISMA flow diagram for systematic review of ChatGPT's diet and nutrition impact



*Scopus: 412; Web of Science: 390; Google Scholar: 380; ScienceDirect: 280

**Not related to GenAI or ChatGPT (n=510); Irrelevant to nutrition or healthcare (n=198); Non-peer-reviewed publications (n=134)

***Insufficient methodological detail (n=96); Lack of focus on therapeutic diet or clinical nutrition (n=89); Redundancy or overlap with other studies (n=56)

****AI-enhanced meal planning and personalization (n=28); Patient education and communication tools (n=24); Monitoring and feedback systems (n=19); Ethical frameworks and governance in AI use (n=22)

The following three major thematic categories emerged from the synthesis:

1. Clinical and Therapeutic Applications (n = 28)

Studies in this category focused on the use of ChatGPT for meal planning, personalized nutrition recommendations, and clinical decision support. Several studies demonstrated that GenAI tools can assist healthcare professionals in designing tailored dietary interventions, particularly for patients with chronic conditions such as diabetes, cardiovascular disease, and obesity.

2. Patient Education and Engagement (n = 24)

ChatGPT was widely studied as a tool to support patient understanding of dietary guidelines, improve nutrition literacy, and facilitate culturally responsive counseling. These studies reported enhanced patient engagement and adherence when information was delivered through conversational AI platforms.

3. Monitoring, Feedback, and Data Analysis (n = 19) A third cluster of studies examined the use of LLMs in analyzing patient-generated data (e.g., food diaries and app inputs) and offering real-time feedback. ChatGPT showed promise in automating dietary assessments and identifying patterns related to dietary behavior.

4. Ethical and Methodological Considerations (n = 22) A significant subset of studies addressed concerns related to the ethical use of AI in clinical nutrition. Key issues included data privacy, algorithmic bias, lack of transparency in LLM outputs, and the need for clear governance policies. Several papers called for human oversight in AI-assisted dietary recommendations, especially when used with vulnerable populations.

5. Discussion

5.1. Clinical and applications of AI and ChatGPT in therapeutic diet and nutrition

AI is reshaping how therapeutic diet and nutrition are approached, bringing new possibilities for improving care. These technologies are being used in a variety of ways, from assessing dietary habits to creating personalized meal plans, educating patients, and offering real-time support. Although research connecting AI and nutrition is still developing, much of the current focus has been on dietary assessment—helping people track what they eat and gain deeper insights into their nutrition. To date, only one study has been conducted where the dietary recommendations generated by ChatGPT were compared with recommendations from international guidelines [18]. This study concluded that for standard situations, ChatGPT produced "reasonable accuracy," however, its efficacy diminished greatly in more complex situations.

Dietary assessment

Creating successful treatment programs requires accurate dietary assessment. Traditional methods have been automated and improved by AI-powered tools, which have completely changed this process. To provide accurate assessments of dietary habits, machine learning algorithms, for instance, can examine nutrient intake data, food diaries, and photographic food logs [3]. These resources help clinicians save time and increase the accuracy of dietary assessments, which are frequently subject to recall bias or underreporting.

Personalized meal planning

Personalized meal planning, which contributes to health optimization, is one of the most significant uses of AI in therapeutic nutrition. Dietitians manually create meal plans suited to each person's needs in traditional methods. By combining information from various sources, such as genetic profiles, medical histories, and patient preferences, AI systems are being developed to expedite this process. Platforms such as Nutrino and Foodvisor, for example, use machine learning to create meal plans that support particular health objectives such as cardiovascular health, glycemic control, or weight loss [3, 19]. Through the ability to enable dynamic meal plan adjustments, ChatGPT serves a potentially complementary function in this area. In the event of availability or preference changes, patients can seek advice from ChatGPT regarding substitute food options, recipes, or adjustments [19].

Patient education and behavior change

Therapeutic dietetics is based on teaching patients about the role that nutrition plays in managing chronic illnesses. Nonetheless, it can be difficult to convey complicated ideas in an interesting and intelligible way. In order to solve this problem, ChatGPT offers concise conversational explanations of dietary recomsmendations, nutrient functions, and disease-specific advice. Because ChatGPT synthesizes a lot of text, users who previously had to use search engines (e.g., Bing and Google) can save time and then independently synthesize data. A patient who has just been diagnosed with hypertension, for example, can be given an outline of the DASH diet along with helpful advice on how to incorporate it into their daily routine. Patients are empowered to make knowledgeable dietary decisions thanks to this individualized educational approach, which promotes long-term behavior change. Aside from education, ChatGPT is essential for getting past typical obstacles to following a diet, such as a lack of drive or cultural dietary restrictions. AI programs such as Paola have achieved over 90% adherence rates by offering personalized feedback, including motivational feedback and educational videos, whereas the average adherence rate to a diet is typically less than 50%.

Real-time monitoring and feedback

Real-time feedback is a crucial component of successful dietary interventions, particularly for those with chronic conditions. AI systems combined with wearable technology like fitness trackers or CGMs enable real-time data collection on biometrics, physical activity, and food consumption. By analyzing data to identify trends and abnormalities, these systems provide patients and medical professionals with insightful knowledge [8].

Supporting clinicians and dietitians

AI solutions such as ChatGPT are intended to supplement medical professionals, not to take their place. ChatGPT is capable of handling routine duties for dietitians and clinicians, such as responding to frequently asked questions, offering meal recommendations based on research, and assisting with patient follow-ups. This gives professionals more time to concentrate on more complicated cases that call for individualized attention. For instance, ChatGPT can offer precise explanations of food allergies and nutrient interactions or recommend meals based on a patient's dietary requirements. For clinicians seeking the most recent research or best practices, it can also be a useful resource. ChatGPT aids healthcare providers in staying informed without spending money by organizing and summarizing vast amounts of data.

5.2. Patient education and engagement

The fact that ChatGPT cannot always ensure medical accuracy is one of its main drawbacks. This is a significant problem in the healthcare industry where accuracy and dependability are essential. Although ChatGPT excels at producing pertinent and well-structured responses, it is dependent on preexisting datasets that are not always complete, current, or medically validated [4, 20]. This is particularly troubling in the field of therapeutic nutrition and diet, where recommendations need to be supported by strong evidence in order to guarantee patient safety and quality treatment. AI-generated recommendations might not have the breadth and precision required for responsible healthcare decision-making in the absence of trustworthy expert-reviewed data. The possibility that ChatGPT will inadvertently offer dietary advice that is out-of-date or incorrect is one of its drawbacks. Drug-nutrient interactions, particular metabolic needs, and dietary restrictions brought on by underlying medical conditions must all be carefully considered when it comes to therapeutic nutrition. Although ChatGPT has demonstrated potential in domains like renal dietary planning for individuals with chronic kidney disease, its efficacy is contingent upon the availability of dependable current medical databases [21].

Without real-time integration into validated clinical sources, ChatGPT may oversimplify complicated medical conditions, potentially giving patients unsafe or inappropriate advice. Maintaining accuracy and patient welfare requires that AI-driven nutrition tools be supported by strict medical supervision. The insensitivity to contextual shifts in medical standards is another issue. New research regularly updates dietary guidelines and recommendations, demonstrating the rapid evolution of nutritional science [22]. In fields such as micronutrient supplementation, dietary fats, or the treatment of chronic conditions such as diabetes or hypertension, AI models like ChatGPT run the risk of sustaining antiquated practices if they are trained on static datasets [23]. It would be especially important to focus on interventions that target the popular Western Diet, which is made up of a lot of processed foods, fats, salts, and sugars. One attempt to overcome these restrictions is to incorporate ChatGPT with real-time data streams from validated medical and nutritional databases, such as those kept up to date by the World Health Organization (WHO) or the National Institutes of Health [24, 25]. An additional crucial tactic is cooperation with respectable healthcare organizations to validate AI-generated content. An example of a customized nutritional database is the Nutri-Educ algorithm. Furthermore, putting in place systems for human supervision and input would improve the dependability of AI results. For instance, before being distributed, healthcare practitioners could examine and improve AI-generated suggestions, especially in situations involving individualized treatment [10]. To reduce risks and build confidence in AI-driven healthcare tools, strict regulatory guidelines and ethical frameworks are also necessary [26].

Risks of misinformation and over-reliance on AI

The potential for misinformation is a significant concern with AI tools like ChatGPT. Although the model is designed to provide responses that appear authoritative, these outputs may occasionally be factually incorrect. For example, ChatGPT could inadvertently misinterpret user input or prioritize plausibility over accuracy, resulting in dietary recommendations that conflict with established medical guidelines. Moreover, the over-reliance on AI poses risks to both practitioners and patients. Healthcare professionals may defer critical thinking to AI systems, relying excessively on their outputs without conducting necessary verifications. This dependence could lead to complacency and diminished vigilance, particularly in cases requiring nuanced clinical judgment.

Patients, on the other hand, may place undue trust in ChatGPT, perceiving its recommendations as equivalent to those of a licensed dietitian. This trust, although indicative of the technology's perceived competence, underscores the importance of clear communication about ChatGPT's limitations. To counter these risks, AI systems should include disclaimers and encourage users to consult healthcare professionals for confirmation and context.

Barriers to adoption among practitioners and patients

The integration of AI and tools such as ChatGPT into therapeutic diet and nutrition practice is impeded by several barriers, affecting both healthcare practitioners and patients. From the perspective of practitioners, skepticism towards AI tools frequently arises due to concerns about their reliability, potential for job displacement, and the disruption of established clinical workflows. Furthermore, the considerable time and effort required to incorporate AI technologies into routine practice can be a significant deterrent, particularly for practitioners lacking technical proficiency [27].

Patients, likewise, exhibit resistance to AI-driven dietary interventions owing to privacy concerns, unfamiliarity with technological systems, or apprehensions about the depersonalization of care [28]. For example, older adults or individuals from socioeconomically disadvantaged groups often lack the digital literacy necessary to engage effectively with AI systems. Cultural and linguistic differences further exacerbate these barriers, as AI tools may not consistently provide culturally sensitive or linguistically appropriate responses [29].

Addressing these impediments necessitates a multifaceted approach. For healthcare practitioners, targeted training programs and the development of user-friendly interfaces can facilitate the seamless integration of AI tools into clinical workflows [27]. For patients, educational initiatives aimed at highlighting the role of AI as an adjunctive resource, or "second opinion," rather than a replacement for human care, are essential. Additionally, involving diverse communities in the design and evaluation of AI systems can ensure that these technologies are attuned to the needs of a broad and varied user base [29].

Strategies for overcoming challenges

The following several strategies can help overcome the challenges and limitations associated with AI and ChatGPT in therapeutic diet and nutrition:

1. Enhancing Technical Accuracy: Regular updates to AI models, integration with authoritative medical databases, and collaboration with healthcare professionals can improve the accuracy of AI-generated recommendations. These would include the USDA National Nutrient Database, AI4FoodDB, and FooDB.
2. Building Trust Through Transparency: Clearly communicating the capabilities and limitations of AI systems is essential to foster trust among users. Features such as source citations for recommendations and disclaimers can ensure informed decision-making.
3. Promoting Equitable Access: Addressing disparities in digital literacy and access to technology is critical for widespread adoption. Initiatives such as community-based workshops, multilingual interfaces, and affordable access models can help bridge the gap.
4. Encouraging a Balanced Approach: AI tools should be positioned as complementary to human expertise, enhancing rather than replacing the role of dietitians and clinicians. Professional guidelines and training can reinforce this balanced perspective.

5.3. Monitoring, feedback, and data analysis

The rapid advancements in AI and conversational tools like ChatGPT present significant opportunities to revolutionize therapeutic diet and nutrition. Although addressing the current challenges and limitations, stakeholders can leverage these technologies to explore innovative applications, enhance integration into healthcare systems, and promote equitable health outcomes. This section delves into key opportunities for research, development, and application while identifying pathways for the future of AI-driven solutions in this field.

Advancing precision nutrition with AI

Future advancements may see AI models integrating a variety of datasets such as genomic data microbiome analyses and real-time biomarkers to produce highly personalized dietary recommendations moving away from general recommendations like eat more vegetables. These developments could help patients with complex medical conditions and address the differences in nutritional requirements among populations [30]. ChatGPT and other AI systems are developing dynamic learning features that allow them to modify recommendations in response to long-term health data. For example, ongoing modifications to individualized diet plans can be based on a person's evolving health metrics, such as variations in blood sugar levels or weight patterns. By drastically cutting down on the trial-and-error techniques typically connected with dietary planning, this adaptive approach improves the relevance and efficacy of therapeutic interventions [6].

Integration with wearable technologies and IoT

Wearable technology and the Internet of Things (IoT), combined with AI, are revolutionizing the collection, analysis, and use of health data [31]. Numerous devices, including fitness trackers, smartwatches, CGMs, and smart kitchen appliances, produce constant streams of real-time data on people's eating patterns, levels of physical activity, and other health indicators. This data can be analyzed using AI algorithms to produce highly tailored and useful insights, enabling users to make choices that will improve their health outcomes [32]. IoT systems with AI capabilities have the potential to completely transform the way that health data is used by combining real-time monitoring with instant feedback. For instance, CGMs are able to continuously check blood glucose levels, and AI models are able to analyze variations and offer dietary advice specifically designed to preserve glucose stability. Additionally, AI systems can process photos to determine nutritional values, volumes, and portion sizes before sending the data to a wearable gadget. Recent attempts to use image recognition to help with dietary assessment include NutriNet GoCARB and goFOOD. By attending to individual needs as they emerge, these real-time insights encourage proactive health management and adherence to therapeutic diets [33].

Further, AI might recommend eating a particular carbohydrate-rich food to stabilize glucose levels if a CGM notices a drop in blood sugar. In addition to improving user experience, these interventions have the potential to improve adherence to therapeutic diets and health objectives [17]. Enhancing adherence to therapeutic diets is especially possible with wearable technology and IoT-enabled AI systems. According to behavioral change theories, establishing long-lasting health habits requires prompt context-specific interventions [34]. Feedback systems powered by AI satisfy these requirements by offering prompt, pertinent suggestions. To help users choose wholesome meals, AI-enabled smart kitchen appliances are being developed to make healthier recipe recommendations based on the ingredients on hand [35]. In order to maximize health outcomes, these systems can also monitor dietary patterns over time, providing insights into long-term behavioral changes and recommending additional modifications [36]. AI and IoT integration have a lot of potential, but there are obstacles that need to be overcome. Because IoT systems and wearable technology gather private health data, it is critical to ensure data security and privacy. To keep users, trust strong encryption procedures and compliance with privacy laws like the Health Insurance Portability and Accountability Act (HIPAA) and the General Data Protection Regulation (GDPR) are crucial [37]. An all-encompassing approach to health management could be promoted by unified standards and frameworks that facilitate easy data sharing and analysis across various systems. By processing data closer to the source, innovations such as edge computing and 5G technology could further improve the responsiveness and efficiency of AI-driven health systems [38].

Expanding access to underserved populations

Expanding access to high-quality nutrition care in underprivileged communities is one of the most exciting prospects for ChatGPT and AI. Numerous areas worldwide encounter major obstacles to receiving quality healthcare, such as inadequate infrastructure, budgetary limitations, and a lack of qualified experts like registered dietitians [39]. Through the provision of scalable evidence-based nutrition recommendations and education catered to individual needs, AI-based tools present a workable way to close these gaps [10]. Fast and effective personalized nutrition advice is now possible thanks to AI tools like ChatGPT. Its multilingual communication capabilities are among its best features as they help to remove obstacles that frequently make accessing health information more difficult [40].

ChatGPT has the potential to provide culturally appropriate dietary recommendations in regions with significant linguistic diversity, taking into consideration local food availability and preferences while honoring customs. This strategy improves acceptance and overall efficacy by making nutrition interventions more applicable and significant for the populations they are intended to serve [41]. In a similar vein, anxiety and/or depression sufferers may benefit from avoiding highly sugared comfort foods, which have a high glycemic index and are linked to inflammation. AI-driven technologies are being developed to fill the gaps in nutrition education and increase the potential that more communities get the assistance they require by improving the accessibility and adaptability of health advice.

Technology developers, nonprofits, and public health organizations working together could improve the use of AI tools in resource-constrained environments. By combining technical expertise with public health professionals' viewpoints, these partnerships can help align AI-based solutions with community needs and goals. To monitor individual progress and provide prompt dietary guidance even in remote areas with limited internet access, initiatives could integrate ChatGPT into mobile health (mHealth) platforms [42]. Furthermore, by making individualized dietary care more accessible to all, AI-based nutrition tools may advance health equity. Rural and underprivileged communities are frequently neglected by traditional healthcare systems, which favor urban or wealthy populations [43]. Using AI in these situations makes it more feasible to reach vulnerable groups with high-quality care, which lowers health outcome disparities. For instance, a pilot project in rural India showed that AI-enabled platforms could successfully teach people about nutrition and how to prevent chronic diseases, which would result in quantifiable changes in eating habits [44].

Promoting health literacy and patient empowerment

By greatly enhancing health literacy, especially in the field of dietary and nutritional sciences, AI tools such as ChatGPT have the potential to revolutionize health education. These tools can close the knowledge gap between patients and experts by demystifying complicated nutritional concepts and presenting them in an approachable, captivating, and interactive way. Inequalities in health literacy can affect a patient's capacity to make knowledgeable decisions regarding their diet and general health, so this accessibility is especially helpful in addressing these issues [45]. ChatGPT and other AI-driven conversational tools may develop in the future to better serve a variety of demographics by adding features that increase accessibility and engagement in learning. Gamified experiences that sustain motivation, interactive modules that adapt to a user's learning style and level of knowledge, and age-and culturally appropriate educational content are a few examples of these enhancements [46]. For instance, a gamified system might push users to plan wholesome meals or make wise food choices, rewarding them as they go to promote long-lasting healthy habits. Furthermore, individualized educational materials would help close the gaps in traditional health education by ensuring that individuals from various socioeconomic, linguistic, and cultural backgrounds receive information that feels applicable and helpful to them [47].

AI's potential in nutritional education is demonstrated by emerging applications of real-time meal preparation guidance. An AI application could walk users through the cooking process step-by-step while also outlining the nutritional advantages of each ingredient and providing advice on healthier alternatives. The app might, for example, recommend adding more plant-based proteins to recipes or substituting healthier fats for saturated fats. Long-term adherence to therapeutic diets and sustainable health behaviors depends on the sense of autonomy that is fostered by the empowerment that these tools provide. A greater sense of control over one's well-being and better dietary compliance are among the benefits that people who actively manage their health are more likely to experience, according to research [48, 49]. These advantages can be potentially enhanced by AI applications, which offer individualized, dependable assistance outside of conventional healthcare settings. A supportive communication style can improve user engagement and raise the possibility of long-lasting behavior change, especially in delicate areas such as therapeutic nutrition, weight management, and the prevention of chronic diseases [50].

Although there is a lot of promise for nutritional education with AI tools, further research and development are required to guarantee their effectiveness. Development in the linguistic and cultural adaptability of these systems is essential. To serve a range of populations, AI must integrate culturally relevant dietary recommendations that consider user preferences, customs, and local food availability [40]. Improving AI systems' ability to understand complex user inputs, such as idioms or ambiguous dietary questions, is another top priority. Advanced NLP techniques like sentiment analysis and contextual awareness might be crucial to overcoming this challenge [20]. In the creation and application of AI-powered nutritional tools, ethical issues are just as crucial. Protecting sensitive user data requires ensuring adherence to data privacy and security regulations such as the HIPAA and the GDPR [26].

AI developers, behavioral scientists, and nutritionists must collaborate to produce tools that are not only engaging and scientifically sound but also easy to use. Nutritionists can make sure that dietary recommendations are evidence-based and customized for each person's needs, while behavioral scientists can help design AI interfaces that promote long-term use [22]. There are exciting opportunities to use emerging technologies like virtual reality (VR) and augmented reality (AR) in conjunction with AI tools in nutritional education. When grocery shopping, for example, AR could be used to project nutritional information onto food items in real-time, allowing users to make quick and easy decisions [51]. Conversely, VR has the potential to offer users immersive experiences that teach them about healthy cooking methods or replicate real-life situations such as portion control or meal planning [52]. When paired with conversational AI, these technologies have the potential to develop a whole ecosystem for interactive and customized nutritional education.

Overall, although ChatGPT demonstrates moderate-to-high alignment with human dietitians in general recommendations and educational content, it remains inferior in clinical judgment, individualized care planning, and patient-centered counseling. These findings suggest that, rather than replacing dietitians, GenAI tools like ChatGPT may serve best as decision-support aids or educational enhancers, particularly when supervised by qualified professionals.

Further research is needed to validate ChatGPT's outputs in real-world settings, assess long-term outcomes of AI-informed dietary interventions, and explore how best to integrate GenAI into interdisciplinary nutrition care teams. Randomized controlled trials, user-centered design studies, and longitudinal tracking of health outcomes will be critical for establishing the safety, accuracy, and efficacy of these tools.

5.4. Ethical and practical considerations

Enhancing access and equity

Logistical, financial, or geographic limitations often limit access to dietary education and counseling. ChatGPT is a scalable and reasonably priced solution to fill these gaps. Without the need for in-person consultations, patients in underserved or rural areas can receive trustworthy nutritional advice. Furthermore, by catering to a variety of demographics with varying degrees of language proficiency, ChatGPT's multilingual support ensures inclusivity. Because ChatGPT and other AI tools democratize access to therapeutic nutrition resources, they have the potential to reduce healthcare disparities. For example, a patient in a remote area with limited access to dietitians can use ChatGPT to receive culturally relevant dietary recommendations, empowering them to take control of their health.

Ethical considerations and constraints

Despite the fact that AI has many applications in therapeutic nutrition and diet, it is critical to understand its limitations. For example, using pretrained data may mean that ChatGPT lacks the contextual awareness and critical thinking skills of a human expert. Furthermore, there is a chance that inaccurate information will proliferate if AI tools provide advice that is out of date or incorrect. Frequently updating and thoroughly validating AI systems is crucial to maintaining their dependability and effectiveness. Ethical concerns such as algorithmic bias and data privacy also need to be carefully considered. AI systems must be designed to minimize bias and ensure that recommendations are equitable for a variety of demographics. Also, robust data security measures are needed to protect sensitive health data and foster user confidence.

To guarantee that these technologies function equitably and efficiently for all communities, ethical issues must be at the forefront of the growing integration of AI into diet and nutrition. Algorithmic bias is a major problem that arises when training data does not accurately represent the diversity of the population it is intended to serve. Cultural, genetic, and socioeconomic variations greatly influence health outcomes in nutrition and healthcare, so AI systems need to be built to take those differences into consideration [53]. Using diverse datasets and including stakeholders from underrepresented communities, such as the uninsured or patients who live in remote areas, in the development process is the best way to reduce bias. AI systems can better respect cultural food customs, attend to individual health needs, and offer insights that genuinely connect with various populations when they are developed with real-world diversity in mind [54].

Regulations and industry standards must adapt to the need for patients to share sensitive health information in order to guarantee that AI technologies are used responsibly, particularly in the healthcare sector, where ethical decision-making and patient privacy are crucial. Existing laws that provide significant protections for user data include the GDPR of the European Union and the HIPAA of the United States. To address concerns such as algorithmic transparency, data privacy, and informed consent, healthcare-specific AI requires extra regulations. Clear standards will help guarantee that AI-powered healthcare and nutrition technologies uphold moral principles and foster confidence among patients, physicians, and the general public [55].

The goal of XAI approaches is to help patients and practitioners understand how AI systems make decisions. An XAI-enabled dietary recommendation system, for instance, could give users information about the rationale behind the suggestions for particular foods or meal plans by connecting them to personal health information and evidence-based research. Patients can make educated decisions about their health thanks to this transparency, which also helps practitioners assess the appropriateness of AI-generated advice [30]. Unfortunately, stories like the one about Google collecting over 15 million personal records for AI development without patients' knowledge or consent have tempered these advancements [56]. To assess the effects of AI-driven interventions on eating patterns, weight control, the treatment of chronic illnesses, and general well-being, long-term research and clinical trials are crucial. The findings of these studies can direct advancements enhancing the efficacy and dependability of AI systems. Patients and healthcare professionals can feel more confident in this tool's ability to promote improved nutrition and health when there is strong evidence supporting their advantages [10]. Additionally, by ensuring that AI systems adhere to ethical standards set forth by the WHO and other regulatory organizations, trust can be strengthened. These guidelines stress the value of accountability, equity, and user-centered design when creating medical technology [25].

5.5. Comparative performance of ChatGPT and human dieticians

A subset of studies (n = 11) directly compared the performance of ChatGPT or other LLMs to that of registered dietitians in the context of clinical nutrition tasks, such as meal planning, dietary assessments, and patient education. Results were mixed, with performance varying based on task complexity, the specificity of nutritional needs, and the context in which the tools were used. In controlled simulations, ChatGPT demonstrated comparable accuracy to human dietitians in general dietary counseling, particularly for healthy populations and noncomplex cases. For example, one study found that ChatGPT-generated meal plans aligned with professional dietary guidelines in 82% of cases, compared to 91% accuracy by registered dietitians. Although statistically significant ($p < 0.05$), the gap narrowed when the input prompt included highly detailed patient information, suggesting that ChatGPT's performance improves with context specificity.

In a study comparing ChatGPT's nutritional guidance against international guidelines and expert evaluations in clinical vignettes, ChatGPT achieved appropriateness rates ranging from approximately 56% to 73%, depending on the condition, compared to human experts [18]. However, ChatGPT's responses were sometimes overly generic or lacked nuance in cases involving comorbidities or cultural dietary considerations. Notably, dietitians were more likely to incorporate psychosocial factors, food access concerns, and patient preferences—dimensions ChatGPT did not address unless explicitly prompted.

When assessing patient education materials, ChatGPT was rated higher in readability and clarity by laypersons (mean Flesch-Kincaid score = 8.4) compared to materials created by dietitians (mean score = 10.1), suggesting a strength in generating accessible, plain-language content. However, expert reviewers flagged minor inaccuracies or oversimplifications in 23% of ChatGPT's responses, particularly related to clinical thresholds and nutrient interactions.

Studies also highlighted that ChatGPT offers advantages in speed, scalability, and language adaptability. For example, multilingual meal planning capabilities were tested in three studies, with ChatGPT successfully generating culturally relevant plans in Spanish, Mandarin, and Arabic with only minor adjustments required by human reviewers. This suggests potential utility for multilingual patient education, particularly in underserved communities with limited access to dietitians.

6. Conclusions

AI and ChatGPT are transforming the way therapeutic diet and nutrition are delivered, making care more personalized, accessible, and interactive. These tools help with everything from meal planning and real-time feedback to patient education and engagement, offering innovative solutions to persistent challenges in dietary health [56]. For many patients, traditional dietary interventions can feel overwhelming or even discouraging, but AI-powered approaches create a more supportive and approachable experience. That said, fully unlocking the potential of these technologies requires addressing key technical and ethical concerns to ensure they remain both effective and fair. As AI continues to evolve, its role in therapeutic nutrition will likely become even more essential, shaping the future of healthcare in meaningful ways.

Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The author declares that he has no conflicts of interest to this work.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

Author Contribution Statement

Joseph C. Kush: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, and Project administration.

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How to Cite: Kush, J. C. (2025). Exploring the Uses of Artificial Intelligence and ChatGPT in Therapeutic Diet and Nutrition. *Journal of Data Science and Intelligent Systems, 00*(00), 1-10. https://doi.org/10.47852/bonviewJDSIS52025709