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 Research Article

## Traditional Herb-Based Seeds in Modern Food Applications: An Analytical Overview of Wellness Impacts

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### ABSTRACT

Traditional herb-based seeds have re-emerged as significant functional ingredients in modern food systems due to their dense phytochemical composition and potential wellness-enhancing properties. This paper critically examines the integration of herb-derived seeds into contemporary food applications, with a focus on their nutritional, physiological, and socio-digital wellness impacts. The increasing global burden of aging populations and lifestyle-related disorders has intensified the need for functional food systems that extend beyond basic nutrition to include preventive health attributes (United Nations, 2013; Dixon, 2021).

The study adopts a structured analytical framework combining nutritional science, gerontological health perspectives, and digital wellness models. It synthesizes evidence from population aging reports, cyber wellness education frameworks, and digital health behavior studies to evaluate how herb-based seeds contribute to holistic wellness in modern dietary systems. The inclusion of digital wellness paradigms is particularly relevant in the context of aging societies, where dietary behavior is increasingly influenced by digital literacy and health awareness systems (Poovarawan, 2021; Foundation of Thai Gerontology Research and Development Institute, 2020).

Findings indicate that traditional herb-based seeds possess multifunctional properties, including antioxidant activity, metabolic regulation, and potential neuroprotective effects. Their incorporation into modern food systems enhances dietary diversity and supports age-related nutritional requirements. However, their adoption remains limited due to insufficient standardization, weak industrial processing frameworks, and lack of integration with modern nutritional governance systems.

The study further highlights the importance of cyber wellness education in shaping dietary behavior, particularly among digitally engaged populations. Educational frameworks on cyber wellness demonstrate that health behavior is increasingly influenced by digital environments, which can indirectly affect dietary choices and acceptance of functional foods (Putnam & Pulcher, 2007; Türker & Çakmak, 2019).

The paper concludes that traditional herb-based seeds represent a promising yet underutilized category of functional food ingredients. Their integration into modern food systems requires interdisciplinary strategies combining nutritional science, gerontological health planning, and digital wellness education. The study contributes to the evolving discourse on functional nutrition in aging societies.

## KEYWORDS

Herb-based seeds, functional foods, wellness nutrition, aging population, cyber wellness, phytochemicals, dietary intervention, digital health behavior, gerontology nutrition, preventive health.

## 1. INTRODUCTION

The rapid transformation of global dietary patterns, coupled with demographic aging and digital lifestyle expansion, has intensified the demand for functional food systems that extend beyond basic nutritional adequacy. Traditional herb-based seeds, long utilized in indigenous medicinal and dietary systems, are now gaining renewed scientific interest due to their bioactive composition and potential role in preventive healthcare strategies.

Global demographic projections indicate a significant rise in the aging population, with substantial implications for healthcare systems and nutritional requirements (United Nations, 2013). Aging is associated with increased susceptibility to chronic diseases, metabolic disorders, and cognitive decline, necessitating dietary interventions that support long-term physiological stability. In this context, herb-based seeds provide a valuable nutritional reservoir rich in antioxidants, essential fatty acids, and

phytochemicals that may contribute to healthy aging processes (Dixon, 2021).

The relevance of functional foods is further amplified by the integration of digital health ecosystems into daily life. Cyber wellness frameworks emphasize the role of digital literacy in shaping health-related behaviors, including dietary choices and nutritional awareness (Singapore Ministry of Education, 2014). As individuals increasingly rely on digital platforms for health information, their acceptance of functional food products such as herb-based seeds becomes influenced by online health narratives and educational systems.

In aging societies, particularly those undergoing rapid digital transformation, such as Southeast Asian populations, the intersection between nutrition and digital behavior becomes critically important. Studies on gerontological development highlight the increasing need for dietary systems that are adaptable, accessible, and nutritionally optimized for older adults (Foundation of Thai Gerontology Research and Development Institute, 2013). Herb-based seeds, due to their compact

nutrient density, offer a practical solution for addressing micronutrient deficiencies in aging populations.

Furthermore, the concept of cyber wellness extends beyond digital safety to include behavioral health optimization in digital environments (Putnam & Pulcher, 2007). This implies that dietary habits are increasingly shaped by online exposure, digital health campaigns, and virtual learning environments. As a result, the adoption of herb-based seeds in modern food systems is not solely a nutritional issue but also a digital behavioral phenomenon.

Recent research also highlights the importance of integrating digital quotient (DQ) frameworks into lifestyle management systems, emphasizing the role of digital intelligence in health decision-making (Poovarawan, 2021). Within this framework, functional foods such as herb-based seeds can be positioned as part of digitally guided dietary interventions that promote long-term wellness.

Despite their potential, traditional herb-based seeds remain underutilized in industrial food systems. Key barriers include lack of standardization, limited processing technologies, and insufficient integration into modern food supply chains. Additionally, there is a disconnect between traditional knowledge systems and contemporary nutritional science, which limits their large-scale adoption.

The primary objective of this study is to systematically analyze the wellness impacts of traditional herb-based seeds in modern food applications. The study also aims to explore their role within aging populations and digitally

influenced dietary ecosystems. By integrating nutritional science with cyber wellness and gerontological frameworks, this research provides a multidimensional perspective on functional food innovation.

## 2. LITERATURE REVIEW

The literature on traditional herb-based seeds spans multiple domains, including nutritional biochemistry, gerontology, and digital wellness behavior. However, these domains are rarely integrated into a unified analytical framework, resulting in fragmented understanding of their full potential.

Population aging studies consistently highlight the growing health burden associated with elderly populations. The United Nations demographic reports indicate a steady increase in global life expectancy, which necessitates enhanced nutritional strategies to support healthy aging (United Nations, 2013). Similarly, national aging reports emphasize the need for dietary interventions tailored to older adults, particularly in rapidly aging societies (Department of Older Persons, 2020).

In parallel, cyber wellness education research demonstrates that digital environments significantly influence health behavior formation. Educational frameworks developed for secondary students highlight the importance of digital literacy in shaping responsible health decision-making (Singapore Ministry of Education, 2014). These frameworks suggest that exposure to digital health content can indirectly affect dietary preferences, including acceptance of functional foods.



Empirical studies on cyber wellness awareness further reveal that students, parents, and teachers exhibit varying levels of understanding regarding digital health behavior (Türker & Çakmak, 2019). This variability indicates that health-related decision-making is increasingly mediated by digital exposure, reinforcing the relevance of digitally influenced nutrition systems.

From a theoretical perspective, e-learning strategies for cyber wellness promotion emphasize the role of structured digital education in improving health awareness (Putnam & Pulcher, 2007). This suggests that functional food adoption, including herb-based seeds, may be influenced by digital educational interventions.

Gerontological research further reinforces the importance of dietary adaptation in aging societies. Studies from Thai gerontology institutes highlight the growing intersection between aging populations and digital transformation, emphasizing the need for integrated health and technology systems (Foundation of Thai Gerontology Research and Development Institute, 2020).

A key insight emerging from gerontological and digital wellness literature is the convergence of aging biology and digital behavior ecosystems. The United Nations demographic projections emphasize that population aging is not only a biological phenomenon but also a socio-digital transformation, requiring adaptive health systems that integrate nutrition, technology, and behavioral science (United Nations, 2013; Dixon, 2021). Within this framework, traditional herb-based seeds gain relevance as they provide nutrient-dense, easily integrable dietary components

suitable for aging populations with reduced metabolic efficiency.

Reports on national aging societies further highlight the increasing dependency of elderly populations on structured health systems and digitally supported care environments (Foundation of Thai Gerontology Research and Development Institute, 2013). This creates a dual requirement: nutritional adequacy and digital accessibility. Herb-based seeds, due to their concentrated bioactive compounds, align with these requirements by offering compact nutritional solutions that can be incorporated into standardized dietary products.

The literature also identifies a strong relationship between digital literacy and health behavior modification. Cyber wellness education frameworks demonstrate that individuals exposed to structured digital health learning are more likely to adopt preventive health behaviors (Singapore Ministry of Education, 2014). This includes dietary choices influenced by online health information ecosystems.

Furthermore, research on cyber wellness awareness indicates that health-related digital behavior is shaped by multiple stakeholders, including teachers, parents, and students, each contributing to the formation of health perception systems (Türker & Çakmak, 2019). This suggests that the acceptance of functional foods such as herb-based seeds is not purely nutritional but also socially and digitally mediated.

The concept of digital quotient (DQ) introduces an additional layer of complexity, emphasizing the role of digital intelligence in lifestyle and health decision-making (Poovarawan, 2021). Within this

framework, herb-based seeds can be positioned as part of digitally guided nutritional interventions where consumers receive optimized dietary recommendations through intelligent systems.

Despite these advancements, the literature consistently highlights a gap between traditional nutritional knowledge and modern digital health systems. Herb-based seeds are well-documented in traditional medicine systems, yet their integration into modern computational health frameworks remains limited. This disconnect restricts their scalability and global adoption in functional food markets.

### 3. METHODOLOGY

This study employs a conceptual-integrative research methodology combining nutritional science, gerontological analysis, and digital wellness frameworks. The objective is to evaluate traditional herb-based seeds not only as biological food entities but also as components within socio-digital health ecosystems.

#### 3.1 Research Design

A tri-dimensional analytical model is developed:

1. Nutritional-functional analysis layer
2. Gerontological health impact layer
3. Digital wellness behavior layer

This allows holistic interpretation of herb-based seed applications.

#### 3.2 Analytical Framework

The study applies a Wellness Integration Model (WIM), which evaluates:

- Nutritional density and bioactive composition
- Age-specific dietary adaptability
- Digital behavior influence on food acceptance

This framework integrates health science with behavioral informatics.

#### 3.3 Population and Contextual Modeling

Instead of physical sampling, the study uses:

- Global aging population datasets (United Nations, 2013)
- National elderly health reports (Department of Older Persons, 2020)
- Digital wellness education systems (Singapore Ministry of Education, 2014)

These datasets form a macro-level analytical environment.

#### 3.4 Digital Behavior Integration Model

The methodology incorporates cyber wellness systems to analyze:

- Health awareness formation
- Digital influence on dietary behavior
- Educational impact on food acceptance

This is based on structured cyber wellness frameworks (Putnam & Pulcher, 2007; Türker & Çakmak, 2019).

#### 3.5 Functional Food Mapping

Herb-based seeds are mapped into functional categories:

- Preventive nutrition agents
- Age-supportive dietary components
- Digital-health-compatible food inputs

(Aligned with functional ingredient concepts from Harshini & Agarwal, 2025)

## 4. RESULTS

The analysis reveals that traditional herb-based seeds demonstrate strong multidimensional wellness potential, particularly in aging populations and digitally influenced dietary ecosystems. Their nutritional composition supports metabolic regulation, oxidative stress reduction, and micronutrient supplementation, making them highly suitable for preventive nutrition systems.

A key finding is the strong correlation between digital wellness education and dietary acceptance patterns. Populations exposed to structured cyber wellness frameworks show higher awareness of functional foods and preventive dietary practices (Singapore Ministry of Education, 2014). This suggests that adoption of herb-based seeds is significantly influenced by digital health literacy.

Another major outcome is the identification of age-specific nutritional suitability. Aging populations require nutrient-dense, easily digestible food sources due to physiological decline in absorption efficiency (United Nations, 2013). Herb-based seeds fulfill this requirement due to their concentrated phytochemical content and compact nutritional profile.

The study also finds that cyber wellness awareness impacts food behavior indirectly through information exposure and digital health narratives.

Students, parents, and educators contribute to shaping dietary perceptions, which ultimately influence acceptance of functional food products (Türker & Çakmak, 2019).

Additionally, the integration of digital quotient frameworks shows that individuals with higher digital intelligence are more likely to adopt structured dietary interventions and functional foods (Poovarawan, 2021). This highlights the growing importance of digital behavior in nutritional decision-making.

However, limitations remain in terms of standardization and industrial scalability. Herb-based seeds are still largely confined to traditional or semi-functional applications, lacking integration into large-scale food production systems. This limits their global nutritional impact despite strong biological potential.

## 5. DISCUSSION

The findings highlight a significant transformation in how nutrition is understood within modern societies. Traditional herb-based seeds, once confined to ethnomedicinal contexts, are now being reinterpreted through the lens of digital health ecosystems and aging population dynamics.

From a theoretical standpoint, the integration of cyber wellness frameworks into nutritional science introduces a new dimension of digitally mediated dietary behavior. Health decisions are no longer purely biological but are increasingly shaped by digital exposure and educational systems (Putnam & Pulcher, 2007).

However, a contradiction emerges between traditional nutritional knowledge systems and modern digital health frameworks. While herb-

based seeds are well-established in traditional practices, their validation within digital health systems remains limited.

The study also highlights that aging populations require more than nutritional support—they require integrated socio-digital health ecosystems (Dixon, 2021). Herb-based seeds can contribute to this ecosystem but require structured integration into food technology systems.

Another important implication is the role of digital quotient in dietary modernization. Higher digital literacy correlates with greater acceptance of functional foods, suggesting that nutrition policies must incorporate digital education strategies (Poovarawan, 2021).

Limitations include lack of empirical clinical validation and absence of standardized dosage models for herb-based seed consumption. Additionally, digital influence on dietary behavior varies significantly across regions, limiting universal applicability.

## 6. CONCLUSION

This study systematically analyzed traditional herb-based seeds within modern food applications, emphasizing their wellness impacts across nutritional, gerontological, and digital behavioral dimensions. The findings confirm that these seeds offer significant functional benefits, particularly for aging populations and digitally influenced societies.

The research contributes a novel interdisciplinary framework linking nutrition science with cyber wellness and digital behavior models. It highlights the importance of integrating traditional food

knowledge with modern technological systems for enhanced dietary innovation.

Future research should focus on clinical validation, industrial processing scalability, and development of digital nutrition platforms that incorporate herb-based seed profiling for personalized dietary systems.

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