# Bridging the Gap: Integrating Food Security into Healthcare for Healthier Futures – A Scoping Review

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# Abstract

Food insecurity remains a critical public health challenge, significantly affecting health outcomes and contributing to the burden of chronic diseases. Integrating food security initiatives within the healthcare systems offers a strategic approach to addressing this issue by leveraging healthcare infrastructure to identify, support and manage the nutritional needs of vulnerable populations. This article explores the multifaceted role of policy development, stakeholder engagement and technological innovation in fostering effective integration of food security into the healthcare systems. The study highlights the importance of comprehensive training and capacity building for healthcare professionals to effectively recognize and respond to food insecurity. By embedding food security into medical curricula and professional development programmes, healthcare providers can improve patient care and health outcomes. Despite the promising benefits, several challenges impede progress, including limited research on integrated food security interventions' long-term impacts and economic benefits. Programs' cultural relevance and adaptability also require further exploration to ensure effectiveness across the diverse populations. The paper underscores the need for robust metrics and continuous improvement methodologies to evaluate the impact of these initiatives, facilitating the replication of successful models in varied settings. Furthermore, the paper identifies critical research gaps and proposes future research directions to enhance the understanding and effectiveness of food security integration. These include longitudinal impact studies, economic evaluations, and exploration of interdisciplinary collaborations. In conclusion, while challenges remain, integrating food security initiatives within healthcare systems presents a significant opportunity to improve public health outcomes and reduce food insecurity. With collaborative efforts from policymakers, healthcare providers and communities, these initiatives can pave the way towards a future where food security is integral to health and well-being, ultimately contributing to healthier and more resilient communities.

Keywords: Community partnerships, digital health, food security, health service management, healthcare systems, holistic care, integration strategies, interdisciplinary collaboration, patient outcomes, policy advocacy

# INTRODUCTION

Food security [Figure 1], defined as consistent access to sufficient, safe and nutritious food necessary for maintaining a healthy and active life, is increasingly acknowledged as a crucial determinant of health.<sup>[11]</sup> Despite its fundamental role in ensuring well-being, food insecurities are a significant issue affecting millions globally, exacerbated by socio-economic inequalities, demographic shifts, and recent global challenges such as the COVID-19 pandemic.<sup>[2]</sup> This complex interplay between food security and health presents challenges and opportunities for healthcare systems committed to delivering comprehensive patient care.<sup>[3]</sup>

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Traditionally, healthcare systems have concentrated on diagnosing and treating diseases, often overlooking the

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Figure 1: Key dimensions of food security.

socio-economic determinants that profoundly affect health outcomes, including food insecurity.<sup>[4,5]</sup> A growing body of research highlights the substantial impact of food insecurity on chronic disease management,<sup>[6-8]</sup> mental health<sup>[9,10]</sup> and overall quality of life.<sup>[11]</sup> Individuals and communities who experience food insecurity are at greater risk of developing conditions such as diabetes, hypertension and depression, which can result in increased healthcare usage and associated costs.<sup>[6,7,12,13]</sup>

Integrating food security initiatives into the healthcare systems offers an innovative approach to tackling the challenges of chronic diseases.<sup>[14,15]</sup> Healthcare providers can improve health outcomes, enhance patient satisfaction and potentially reduce healthcare costs by ensuring access to adequate nutrition.<sup>[16-19]</sup> Achieving successful integration requires a comprehensive approach involving policy development, interdisciplinary collaboration and the utilisation of technology to support and streamline these efforts.<sup>[20-23]</sup>

Food security is intricately linked to health outcomes, influencing physical and mental health across different populations. Providing adequate and nutritious food is essential for maintaining health and preventing diseases.<sup>[24,25]</sup> Conversely, food insecurity can exacerbate existing health conditions and contribute to the development of new ones.<sup>[11,26]</sup> This section explores the impact of food insecurity on patient health and presents case studies illustrating these health implications globally.

Food insecurity has been associated with a range of adverse health outcomes. It can lead to nutritional deficiencies, compromised immune function and increased infection susceptibility.<sup>[27-29]</sup> Moreover, food insecurity is frequently linked with chronic diseases such as diabetes, obesity, hypertension, metabolic syndrome, fatty liver disease, chronic kidney disease and cardiovascular disease. The limited dietary choices available to food-insecure individuals often exacerbate these conditions, who may rely on cheaper, calorie-dense and nutrient-poor foods.<sup>[8,30-33]</sup>

Mental health is also significantly affected by food insecurity. Studies have shown a correlation between food insecurity and increased rates of anxiety, depression and stress.<sup>[34,35]</sup> The constant worry about obtaining enough food can lead to chronic stress, affecting mental well-being and overall quality of life.<sup>[9,36,37]</sup> Furthermore, food insecurity can disrupt family dynamics,<sup>[38]</sup> as parents may prioritise their children's nutritional needs over their own, leading to further stress and potential nutritional deficits in adults.<sup>[39,40]</sup>

In the United States, food insecurity has been linked to higher healthcare utilisation and costs.<sup>[41]</sup> A study found that individuals experiencing food insecurity were more likely to use emergency health services and be hospitalised.<sup>[42]</sup> This increased healthcare burden demonstrates the broader economic implications of food insecurity on the healthcare system.<sup>[43,44]</sup>

The UK research has highlighted food insecurity's impact on children's health and educational outcomes.<sup>[45]</sup> Children from food-insecure households are more likely to experience developmental delays and have lower academic performance, which can affect their long-term health and socio-economic status.<sup>[46,47]</sup>

A study in Malaysia revealed that food insecurity is prevalent among low-income urban households, with significant implications for dietary quality and health outcomes.<sup>[48,49]</sup> The lack of access to affordable, nutritious food has been associated with higher rates of obesity and related chronic non-communicable diseases among low-income populations.<sup>[50]</sup> Thereby, Malaysia should emphasise the need for targeted interventions to address food insecurity in the urban settings.<sup>[49,51,52]</sup>

In rural India, food insecurity has been linked to malnutrition and anaemia, particularly among women and children.<sup>[53]</sup> Food insecurity has considerable health implications amongst rural Indian mothers and children, affecting pregnancy outcomes and child development.<sup>[54-56]</sup> Efforts to improve food security in these regions have focused on enhancing agricultural productivity and access to healthcare services.<sup>[57,58]</sup>

In Brazil, food insecurity has been associated with the double burden of malnutrition, where undernutrition and obesity coexist within the same communities.<sup>[59]</sup> This paradox highlights the complex nature of food insecurity and its multifaceted impact on health.<sup>[60-62]</sup> Community-based nutrition programmes in Brazil aim to address these challenges by promoting healthy eating habits and improving access to nutritious foods.<sup>[63-65]</sup>

Food insecurity in Australia has been linked to poorer dietary intake and increased risk of chronic diseases amongst Indigenous and Torres Strait Island residents.<sup>[66,67]</sup> Interventions in these communities focus on improving food literacy and access to traditional foods to enhance the health outcomes.<sup>[68]</sup>

These case studies illustrate the diverse manifestations of food insecurity across different contexts and underscore the critical need for tailored interventions.<sup>[69,70]</sup> Ensuring food security requires a multidimensional strategy involving policy changes, community engagement and cross-sector collaboration to improve health outcomes globally.<sup>[71-73]</sup>

Food security is also intricately linked to health services.<sup>[74]</sup> It plays a pivotal role in achieving the United Nations Sustainable Development Goals (SDGs), particularly SDG 2, which aims to end hunger, achieve food security and improved nutrition and promote sustainable agriculture.<sup>[75-77]</sup> Food security is fundamental to public health, as it directly impacts nutritional status and the prevalence of diet-related diseases. Health services are crucial in this context, providing the infrastructure and expertise to identify and address community food insecurity. By integrating food security initiatives into healthcare, such as nutrition counselling and food assistance programs, health

services can mitigate the health impacts of food insecurity and improve overall health outcomes. This integration supports SDG 3, which focuses on ensuring healthy lives and promoting well-being for all ages.<sup>[78,79]</sup> Moreover, addressing food security through health services contributes to broader SDG objectives, such as reducing inequalities (SDG 10)<sup>[80,81]</sup> and fostering sustainable communities (SDG 11) [Figure 2]. By working collaboratively across sectors, healthcare systems can be critical in advancing global efforts to achieve food security and sustainable development, ultimately leading to healthier, more resilient populations.<sup>[82-85]</sup>

This scoping review<sup>[86]</sup> explores and maps the current strategies for integrating food security initiatives into health service management, identifying opportunities and obstacles within this context.<sup>[87]</sup> The objectives of this review are threefold: first, to provide an overview of the existing landscape of food security initiatives within healthcare systems; second, to identify the successful models and best practices from the existing literature; and third, to highlight the gaps and areas for future research and policy development. This comprehensive examination aims to provide valuable insights for health service managers, policymakers, and practitioners looking to enhance their role in promoting food security.

By synthesising the current findings, this review aims to contribute to the discourse on food security as a critical component of health service management. It underscores the need for healthcare systems to adopt a holistic approach that encompasses socioeconomic determinants of health, thereby improving patient outcomes and fostering healthier communities. As such, this review highlights existing knowledge and catalyses future innovation and research in integrating food security within health service frameworks.

# MATERIALS AND METHODS

This scoping review explored the integration of food security



Figure 2: Connecting food security, health services, and the sustainable development goals.

initiatives within healthcare systems, aiming to map existing strategies and identify opportunities for improved patient outcomes. The methodological approach followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines, which provide a structured framework for conducting comprehensive scoping reviews.<sup>[88-90]</sup>

The inclusion criteria for this scoping review were as follows: (1) Studies published in peer-reviewed journals from 2014 onwards; (2) articles focusing on the integration of food security initiatives within healthcare settings; (3) studies addressing the impact of these initiatives on patient health outcomes (4) and sources available in English. Both qualitative and quantitative studies were considered to provide a broad overview of existing research.

Exclusion criteria included (1) studies not explicitly related to healthcare settings, (2) non-English language publications (3) and grey literature such as conference abstracts and unpublished reports. This focus ensured that the review concentrated on recent and relevant developments in the field.

A systematic search was conducted across the multiple databases, including PubMed, Scopus and Web of Science, using a combination of keywords such as 'food security', AND 'healthcare integration', AND 'patient outcomes', AND 'health service management'. The search strategy was designed to capture a comprehensive range of studies related to the topic.

Data extraction was performed using a standardised form to ensure consistency.<sup>[91]</sup> Key information extracted included study design, population characteristics, type of food security initiative, healthcare setting and reported outcomes. The extracted data were synthesised to identify common themes, successful models and gaps in the literature.

Two independent reviewers screened titles and abstracts to minimise the bias, followed by a full-text review of eligible studies. Discrepancies were resolved through discussion or consultation with a third reviewer. This process ensured a rigorous and unbiased selection of studies. Using the PRISMA-ScR framework [Figure 3] also facilitated transparency in reporting the methodology, promoting the replicability of the review process.<sup>[88-90]</sup> In addition, a sensitivity analysis was conducted to assess the findings' robustness by considering the methodological quality of the included studies.<sup>[92,93]</sup>

As a scoping review of existing literature, this study did not involve primary data collection and, therefore, did not require ethical approval. However, ethical considerations were maintained by ensuring accurate representation and citation of all included studies.

The comprehensive approach outlined above ensured a systematic and unbiased exploration of the integration of food security initiatives within the healthcare systems.<sup>[94,95]</sup> By adhering to established guidelines and employing rigorous

methods, this review provides a reliable foundation for understanding current practices and identifying future research directions in this critical area of health service management.

# **Review of Literatures**

# Current challenges in addressing food security within the healthcare systems

Food security is a fundamental component of health that directly impacts patient outcomes.<sup>[74]</sup> Despite its importance, integrating food security into the healthcare systems remains fraught with challenges.<sup>[96]</sup> This section explores the systemic barriers hindering integration and the limitations of existing healthcare approaches, which collectively impede efforts to address food insecurity effectively.

# Systemic barriers to integration

One of the primary barriers to integrating food security within the healthcare systems is the lack of a unified framework and policy support.<sup>[97,98]</sup> Many healthcare organisations operate in silos, with food security initiatives often seen as outside their traditional scope of practice. This compartmentalisation leads to fragmented efforts and no coordinated strategies for effective implementation.<sup>[99,100]</sup>

Funding constraints also pose significant challenges to ensuring food security, especially in the agricultural sector.<sup>[101,102]</sup> Healthcare systems are typically resource-limited,<sup>[103,104]</sup> prioritizing budgets for acute care services over preventative measures such as food security initiatives.<sup>[43,105-107]</sup> The financial limitation restricts the ability of healthcare providers to develop and maintain programmes aimed at improving access to nutritious food for vulnerable populations.<sup>[108-110]</sup>

Additionally, there is often a lack of awareness and education among healthcare professionals regarding the importance of food security and its impact on health.<sup>[111,112]</sup> Training programs for the healthcare workforce rarely include nutrition and food security as core components, resulting in the inability to identify and address patient food insecurity.<sup>[113,114]</sup> The gap in knowledge and skills among healthcare professionals further exacerbates the problem of food insecurity, as healthcare providers may not recognise the issue as a significant factor affecting patient health outcomes.<sup>[111,115]</sup>

# Limitations of existing healthcare approaches

Current healthcare approaches predominantly focus on treating illness rather than addressing the underlying socio-economic determinants of health, such as food insecurity.<sup>[96,116]</sup> This treatment-centric model limits the potential for the healthcare systems to adopt more holistic strategies that incorporate food security as a critical element of patient care.<sup>[96,117,118]</sup>

Moreover, existing healthcare policies often lack the flexibility to incorporate food security measures.<sup>[119,120]</sup> For instance, insurance reimbursement models typically do not cover services related to nutrition counselling or food assistance programmes, disincentivising providers from investing in these

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Figure 3: Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews.

areas.<sup>[121,122]</sup> Healthcare organisations were often reluctant to allocate the resources towards food security initiatives without financial incentives.<sup>[122-124]</sup>

Another limitation is the insufficient integration of technology to address food insecurity. While digital health platforms promise to improve access to nutrition resources and support, their adoption within the healthcare systems remains limited.<sup>[125,126]</sup> Barriers such as digital literacy, access to technology and infrastructure challenges prevent the widespread implementation of these innovative solutions for healthcare and food insecurity.<sup>[127-129]</sup>

Finally, the sociocultural context of food insecurity is often overlooked in healthcare approaches.<sup>[130,131]</sup> Patients' cultural

preferences and food practices are crucial in designing effective intervention strategies.<sup>[132,133]</sup> However, existing approaches frequently fail to consider these aspects, resulting in programs that lack cultural relevance and acceptance.<sup>[134,135]</sup>

In conclusion, systemic barriers and limitations of existing healthcare approaches significantly hinder the integration of food security initiatives within the healthcare systems<sup>[136]</sup> [Figure 4]. Overcoming these challenges requires a multifaceted approach that includes policy reform, increased funding, educational initiatives for healthcare professionals, and the adoption of innovative technologies.<sup>[137,138]</sup> By addressing these barriers, healthcare systems can move towards more comprehensive care models that recognise and incorporate food security as an essential determinant of health.<sup>[139,140]</sup>

# **STRATEGIC FRAMEWORK FOR INTEGRATION**

Integrating food security initiatives into the healthcare systems requires a strategic framework that is both comprehensive and adaptable to the specific needs of diverse populations.<sup>[14,141,142]</sup> Such a framework should encompass key elements that facilitate seamless integration, enhance patient outcomes and promote sustainable practices.<sup>[143]</sup> This section outlines these critical components and highlights the pivotal role of health service managers in developing and implementing these strategies.

# **Key elements of an effective integration strategy** *Policy and advocacy*

A robust integration strategy begins with policy development and advocacy. Policies should be designed to recognise food security as a vital component of healthcare and create supportive environments for implementing related initiatives.<sup>[144,145]</sup> Advocacy efforts must also focus on securing funding and legislative support to sustain these programs over the long term.<sup>[146]</sup>

### Interdisciplinary collaboration

Successful integration hinges on collaboration across disciplines; e.g., healthcare providers, nutritionists, social workers and community organisations must work together to develop comprehensive care plans that address food security.<sup>[20,147,148]</sup> Such collaboration ensures that all the aspects of a patient's well-being are considered, leading to more holistic and effective interventions [Figure 5].<sup>[149-151]</sup>

#### Technology utilization

Leveraging technology can significantly enhance the integration of food security initiatives.<sup>[152]</sup> Digital platforms can track food insecurity, facilitate referrals to food assistance programs and provide nutritional education.<sup>[152-154]</sup>



Figure 4: Barriers to health services that affect food security.



Figure 5: Interdisciplinary collaborations to enhance food security in health services.

Implementing these technologies requires investment in infrastructure and training to ensure accessibility and usability for providers and patients.<sup>[129,155]</sup>

#### Cultural competence

Integrating food security into healthcare must account for the cultural contexts of diverse patient populations. Strategies should be tailored to respect and incorporate cultural food practices, ensuring that interventions are relevant and acceptable to those they are intended to serve.<sup>[14,134,156]</sup> Culturally competent care can improve patient engagement and adherence to nutritional recommendations [Figure 6].<sup>[157,158]</sup>

#### Evaluation and feedback

Continuous assessment and feedback are essential for refining integration strategies. Establishing metrics to assess the effectiveness of food security initiatives can help identify areas for improvement and demonstrate their impact on patient health outcomes.<sup>[159-162]</sup> Feedback mechanisms should involve patients and providers to comprehensively understand the program's effectiveness.<sup>[163-165]</sup>

#### Role of health service managers in strategy development

Health service managers are crucial in developing and implementing strategies to integrate food security into the healthcare systems. They are responsible for leading change efforts, aligning organizational goals with food security initiatives and ensuring that these initiatives are embedded in the core functions of the healthcare system.<sup>[15]</sup>

Managers must advocate for necessary resources, including funding and staffing, to support food security programs. They are also tasked with fostering a culture of collaboration and interdisciplinary teamwork, vital for successfully integrating diverse expertise and perspectives.<sup>[166]</sup>

Training and capacity-building efforts led by health service managers can equip healthcare professionals with the knowledge and skills to address food insecurity effectively. By prioritising education and awareness, managers can ensure their teams are prepared to identify and support food-insecure patients.<sup>[167]</sup>

Furthermore, health service managers are instrumental in implementing technology solutions, overseeing their integration into existing systems, and evaluating their impact.<sup>[168]</sup> By championing innovative approaches and encouraging feedback, managers can drive continuous improvement in food security initiatives.<sup>[169]</sup>

In summary, a strategic framework for integrating food security into healthcare systems must include key elements such as policy development, interdisciplinary collaboration, technology utilisation, cultural competence and continuous evaluation.<sup>[170,171]</sup> Health service managers are pivotal in orchestrating these efforts, ensuring that food security is integral to patient care and contributes to improved health outcomes.<sup>[74,172]</sup>

# **Best Practices and Innovative Models**

Integrating food security initiatives into the healthcare systems requires adopting best practices and innovative models that have demonstrated effectiveness in the diverse contexts.<sup>[14,15,173]</sup> By examining successful case studies and programs globally, we can identify the key strategies and lessons learned that can guide future efforts.<sup>[174,175]</sup>

# **Successful case studies and programs** *United States*

One of the pioneering models is the 'Produce Prescription Program', which provides patients with prescriptions for fresh fruits and vegetables, redeemable at local markets.<sup>[176,177]</sup> This initiative has significantly improved patients' dietary behaviours and health outcomes, such as reduced blood pressure and improved blood glucose levels.<sup>[178,179]</sup> The



Figure 6: Culturally competent approaches to integrating food security in health services.

program's success is attributed to its integration within the healthcare settings and its focus on preventive health.<sup>[180,181]</sup>

## United Kingdom

In the UK, the 'Healthy Start' program offers vouchers for low-income families to purchase milk, fruits, vegetables and Vitamins.<sup>[182,183]</sup> This initiative has been successful due to its comprehensive approach, combining financial support with nutritional education and support services, thereby improving access to healthy foods and nutrition knowledge.<sup>[184,185]</sup>

## Malaysia

In Malaysia, the 'MyKasih' (My Love) program leverages technology to deliver food aid directly to low-income families through a smart card system.<sup>[186,187]</sup> This innovative approach ensures that assistance reaches those in need while allowing recipients to purchase food items that meet their dietary preferences and nutritional needs.<sup>[188]</sup> The program's success is primarily due to its efficient use of technology and its alignment with local cultural practices.<sup>[189]</sup>

# Brazil

Brazil's 'Zero Hunger' program integrates food security with social policies to address poverty and malnutrition.<sup>[190]</sup> The program has significantly reduced hunger and improved health outcomes by combining cash transfers with food distribution and nutrition education.<sup>[191,192]</sup> The initiative's holistic approach and strong government support have been crucial to its success.<sup>[193-195]</sup>

# Lessons learned from global initiatives

Several key lessons can be drawn from these successful initiatives.<sup>[196]</sup> First, integration within existing healthcare frameworks is essential.<sup>[95,197]</sup> Programs embedded within the healthcare settings, such as the Produce Prescription Program, benefit from direct patient engagement and the ability to monitor health outcomes closely.<sup>[15,100,178,198]</sup>

Second, technology plays a critical role in enhancing the efficiency and reach of food security initiatives.<sup>[199]</sup> Malaysia's MyKasih program exemplifies how technology can streamline aid delivery and empower recipients with choice and flexibility.<sup>[200]</sup>

Third, cultural competence is vital.<sup>[201]</sup> Programs that respect and incorporate cultural food practices, like Brazil's Zero Hunger, are more likely to gain acceptance and achieve sustainable impacts.<sup>[202]</sup> Understanding and addressing the local context ensures that interventions are relevant and practical.<sup>[203,204]</sup>

Fourth, comprehensive approaches that combine financial support with education and community engagement are more successful.<sup>[205,206]</sup> The UK's Healthy Start program illustrates the importance of addressing food security's economic and educational aspects.<sup>[182,183,207]</sup>

Finally, strong policy support and cross-sector collaboration are critical to successful food security initiatives.<sup>[69,208]</sup> The UK<sup>[209]</sup> and Brazil<sup>[210]</sup> have demonstrated how government commitment and partnerships with local organisations can significantly improve food security and health outcomes.

In conclusion, best practices and innovative models worldwide offer valuable insights for integrating food security into the healthcare systems. By learning from these successful case studies, health service managers, policymakers and practitioners can develop more effective strategies to enhance food security and improve the patient outcomes.<sup>[25,173]</sup>

# **ROLE OF TECHNOLOGY IN FACILITATING INTEGRATION**

Technology plays an increasingly pivotal role in facilitating the integration of food security initiatives within the healthcare systems.<sup>[152]</sup> By harnessing digital tools and platforms, healthcare providers can enhance the delivery of food security programs, improve patient engagement and streamline operations.<sup>[155]</sup> This section explores the various ways technology is transforming the landscape of food security in health care, highlighting innovative applications and successful case studies.

## **Enhancing access and delivery**

One of the primary benefits of technology in food security initiatives is its ability to improve access and delivery. Digital platforms can identify food-insecure patients through electronic health records, enabling healthcare providers to target interventions more effectively.<sup>[211,212]</sup> For example, screening tools embedded within patient management systems can flag individuals at risk of food insecurity, facilitating timely referrals to appropriate resources and support services.<sup>[213,214]</sup>

Mobile applications and online portals offer convenient access to nutritional information, meal-planning tools and resources for healthy eating.<sup>[215,216]</sup> These platforms empower patients to make informed dietary choices and manage their health proactively.<sup>[217-219]</sup> In addition, telehealth services can provide remote nutrition counselling and support, overcoming geographical barriers and expanding the reach of food security initiatives.<sup>[220-223]</sup>

## Streamlining operations and coordination

Technology also streamlines the coordination and management of food security programs.<sup>[224]</sup> Cloud-based systems enable the real-time data sharing among healthcare providers, nutritionists, and social workers, fostering interdisciplinary collaboration.<sup>[225]</sup> Such systems facilitate the integration of food security into broader care plans, ensuring that all aspects of a patient's health are addressed comprehensively.<sup>[226,227]</sup>

In Malaysia, the MyKasih program exemplifies how technology can enhance the efficiency of food aid distribution. By utilizing an innovative card system, the program allows beneficiaries to purchase food items from local retailers, reducing administrative burdens and ensuring that assistance is delivered directly to those in need.<sup>[228]</sup> This model demonstrates the potential of technology to increase transparency and accountability in food security initiatives.<sup>[229]</sup>

#### **Innovative applications**

Globally, technology-driven initiatives are making significant strides in addressing food insecurity.<sup>[230]</sup> In the United States, the 'Fresh Food Connect' app connects gardeners with surplus produce to local food banks, improving the availability of fresh produce for food-insecure individuals.<sup>[231]</sup> This innovative approach leverages technology to bridge the gap between food surplus and needs, demonstrating the power of digital solutions in enhancing food security.<sup>[152]</sup>

Digital platforms like 'Nourish' in the United Kingdom provide personalized nutrition advice and meal planning based on the individual health data.<sup>[232]</sup> These platforms utilise artificial intelligence to tailor recommendations, promoting healthier eating habits and reducing the risk of diet-related diseases.<sup>[233]</sup> By integrating personalised nutrition into healthcare, these technologies can play a crucial role in preventing and managing chronic conditions linked to food insecurity.<sup>[234]</sup>

Technology offers transformative opportunities for integrating food security into the healthcare systems [Figure 7].<sup>[155]</sup> By enhancing access, streamlining operations and fostering innovation, digital solutions can significantly improve the effectiveness and reach of food security initiatives.<sup>[152,235]</sup> As healthcare systems evolve, leveraging technology will be crucial in addressing food insecurity and promoting healthier communities.<sup>[236]</sup>

Despite its potential, technology integration in food security initiatives faces challenges, including digital literacy, data privacy concerns and infrastructure limitations.<sup>[125,237,238]</sup> Ensuring equitable access to technology is essential to maximise its benefits and avoid exacerbating existing inequalities.<sup>[152,239]</sup> Future efforts should focus on developing user-friendly platforms, safeguarding patient data and investing in digital infrastructure to support widespread adoption to uphold food security.<sup>[235,240]</sup>

# **POLICY AND ADVOCACY**

Effective policy and advocacy are crucial for integrating food security initiatives into the healthcare systems. Policy and advocacy efforts can significantly enhance the reach and impact of food security programs by shaping supportive environments and driving legislative change.<sup>[1,14,69,144,241]</sup>

Policies that explicitly recognise food security as a determinant of health are fundamental to integrating nutrition initiatives within the healthcare settings.<sup>[162]</sup> Such policies can provide the necessary framework for the healthcare systems to develop and implement food security programs.<sup>[69,123]</sup> For instance, incorporating food security metrics into national health indicators can ensure that food security receives attention and resources proportional to its impact on health outcomes.<sup>[123,197,242,243]</sup>

In many countries, policy changes have facilitated the development of food-based interventions within healthcare.<sup>[244-246]</sup> For example, in the United States, policies supporting the Supplemental Nutrition Assistance Program and the Special Supplemental Nutrition Program for Women, Infants and Children have been instrumental in addressing food insecurity among the vulnerable populations.<sup>[247-249]</sup> These programs demonstrate how well-designed policies can provide financial support and nutritional education, improving health outcomes.<sup>[250]</sup>

Advocacy is critical in influencing legislation supporting food security initiatives.<sup>[1]</sup> Advocacy efforts can raise the awareness among policymakers about the importance of addressing food insecurity as the part of a comprehensive healthcare strategy.<sup>[251-253]</sup> By engaging stakeholders across sectors, including healthcare providers, community organizations, and affected populations, advocates can build coalitions that strengthen their influence and capacity to drive legislative change.<sup>[254-256]</sup>

Successful advocacy campaigns highlight the economic and social benefits of integrating food security into



Figure 7: Leveraging technology to enhance food security in health services.

healthcare.<sup>[95,257,258]</sup> By demonstrating the potential for reduced healthcare costs and improved public health, advocates can make a compelling case for policy reform.<sup>[259-262]</sup> For instance, studies have shown that addressing food insecurity can significantly reduce healthcare utilisation and associated costs, reinforcing the argument for investment in food security initiatives.<sup>[41,43,263]</sup>

Countries worldwide offer the examples of how policy and advocacy can successfully integrate food security into the healthcare systems.<sup>[14,120,264,265]</sup> The 'Zero Hunger' program in Brazil is supported by comprehensive policies that align food security with health and social welfare objectives.<sup>[266]</sup> This alignment has facilitated the implementation of integrated interventions that address immediate nutritional needs and long-term health outcomes.<sup>[63,266]</sup>

In the United Kingdom, the 'Healthy Start' program provides vouchers for healthy food, supported by policies that ensure access for low-income families.<sup>[182,183,207]</sup> Advocacy efforts have been essential in maintaining and expanding this program, demonstrating the importance of sustained advocacy to ensure the longevity and effectiveness of food security initiatives.<sup>[267,268]</sup>

Despite successful examples, challenges remain in linking policy and advocacy to food security integration.<sup>[269,270]</sup> These include political resistance, competing priorities, and resource constraints. To overcome these challenges, advocates must continue to engage diverse stakeholders, leveraging evidence-based research to support their initiatives and adapting strategies to changing political and social contexts.<sup>[271-273]</sup> Continuing advocacy and strategic policy development will be essential to expand and sustain food security initiatives globally.<sup>[1,274]</sup>

# **ENGAGING STAKEHOLDERS AND BUILDING ALLIANCES**

Integrating food security initiatives within healthcare systems necessitates actively engaging diverse stakeholders and forming strategic alliances.<sup>[275]</sup> These collaborative efforts can enhance resource mobilisation, foster innovative solutions and ensure the sustainability of food security programs.<sup>[276]</sup> This section explores the strategies for engaging stakeholders and building alliances, highlighting their crucial role in addressing food insecurity as a public health priority.

# Identifying key stakeholders

The first step in engaging stakeholders involves identifying the key players who can influence and support food security initiatives.<sup>[277]</sup> These stakeholders typically include healthcare providers, policymakers, community organizations, nutritionists, food industry representatives and patients.<sup>[254,278,279]</sup> Each group brings unique perspectives and resources that can contribute to developing and implementing effective strategies.<sup>[280,281]</sup>

Healthcare providers are pivotal in identifying food-insecure patients and facilitating access to necessary resources.<sup>[282,283]</sup>

Policymakers can enact legislation that supports food security initiatives and allocates funding for such programs.<sup>[284,285]</sup> Community organizations often directly connect with vulnerable populations, mainly those suffering from food insecurity and can provide valuable insights into local needs and cultural considerations.<sup>[69,71]</sup>

# **Building strategic alliances**

Building strategic alliances involves fostering partnerships that leverage the strengths of diverse stakeholders.<sup>[286,287]</sup> Collaborative networks can facilitate the sharing of knowledge, resources, and best practices, leading to more comprehensive and coordinated responses to food insecurity.<sup>[287,288]</sup> For example, partnerships between healthcare providers and local food banks can streamline the distribution of nutritious food to patients in need.<sup>[110,289]</sup>

Clear communication, shared goals, and mutual trust often characterise successful alliances.<sup>[290,291]</sup> Regular forums for dialog and collaboration can help maintain engagement and ensure all partners are aligned.<sup>[292-294]</sup> Additionally, involving stakeholders in planning and decision-making can foster a sense of ownership and commitment to the initiative's success.<sup>[295,296]</sup>

In Canada, the "FoodRx" program exemplifies successful stakeholder engagement, involving partnerships between healthcare providers, community organisations, and local government to deliver food prescriptions to patients with chronic illnesses.<sup>[198,297-299]</sup> This alliance has been instrumental in improving patient health outcomes and reducing healthcare costs by addressing the root causes of food insecurity.<sup>[300]</sup>

The 'FoodCent\$' initiative engages healthcare, education, and food sector stakeholders in Australia to promote healthy eating among disadvantaged communities.<sup>[301,302]</sup> By aligning the efforts of these diverse groups, the program has successfully increased access to affordable, nutritious food and improved dietary behaviours.<sup>[303]</sup>

Engaging stakeholders and building alliances is not without challenges.<sup>[254]</sup> Conflicting priorities, resource limitations, and organizational silos can impede collaboration.<sup>[304]</sup> To overcome these barriers, it is essential to establish clear roles and responsibilities, foster a culture of collaboration, and continuously evaluate and adapt strategies to meet changing needs.<sup>[295,305]</sup>

Moving forward, there is a need for more inclusive and equitable engagement processes that amplify the voices of marginalized communities affected by food insecurity.<sup>[306]</sup> By prioritizing stakeholder engagement and alliance-building, healthcare systems can enhance the effectiveness and sustainability of food security initiatives, ultimately improving health outcomes for vulnerable populations.<sup>[83,307]</sup> Through collaboration and partnership, stakeholders can develop innovative solutions, share resources and create supportive environments that address food insecurity as a fundamental component of public health.<sup>[287,308]</sup>

# TRAINING AND CAPACITY BUILDING

Integrating food security initiatives into the healthcare systems heavily relies on healthcare professionals' training and capacity building.<sup>[14,15,173]</sup> By educating these professionals on the nuances of food security and equipping them with the necessary skills, healthcare systems can deliver more effective and comprehensive interventions.<sup>[14,308]</sup>

Education prepares healthcare professionals to recognise and address patient food insecurity.<sup>[74,111,309]</sup> Comprehensive training programs should incorporate food security as a core medical and public health curriculum.<sup>[310,311]</sup> This approach ensures that emerging healthcare providers know the complex interplay between nutrition and health outcomes from the onset of their careers.<sup>[312,313]</sup>

Workshops and continuing professional development courses can further enhance understanding among practicing healthcare providers.<sup>[312,314]</sup> These sessions can cover topics such as the identification of food-insecure patients, the health implications of food insecurity and available community resources and referral pathways.<sup>[315,316]</sup> By providing healthcare professionals with up-to-date knowledge and tools, these educational initiatives can improve their capacity to deliver effective interventions.<sup>[317]</sup>

Interdisciplinary education, involving collaboration between dietitians, social workers and medical professionals, can foster a holistic understanding of food security issues.<sup>[147]</sup> Such collaborative learning environments encourage sharing of diverse perspectives and the development of integrated care strategies.<sup>[318]</sup>

Beyond education, building specific competencies is crucial for enabling healthcare professionals to implement food security initiatives effectively.<sup>[318,319]</sup> Competencies should include skills in nutrition assessment, counselling and developing personalised care plans that incorporate patients' nutritional needs.<sup>[319]</sup> Training in these areas empowers healthcare providers to offer targeted support and guidance to food-insecure patients.<sup>[320,321]</sup>

Competency development should also focus on cultural competence, ensuring that healthcare professionals can deliver interventions sensitive to diverse patient populations' cultural and dietary preferences. This approach enhances patient engagement and adherence to nutritional recommendations, leading to better health outcomes.<sup>[322-324]</sup>

Simulation-based training and role-playing exercises can be valuable tools in building these competencies. By engaging in realistic scenarios, healthcare professionals can practice assessing food insecurity, developing intervention plans and collaborating with community resources in a controlled environment. Such experiential learning opportunities can improve confidence and preparedness in the real-world settings.<sup>[325-327]</sup>

Despite the importance of training and capacity building, several challenges exist. These include limited time and resources for training, competing priorities within healthcare organisations and the need for standardised curricula and competencies.<sup>[96,312,313]</sup> Addressing these challenges requires commitment from healthcare institutions to prioritise food security as a critical aspect of patient care and allocate necessary resources for training initiatives.<sup>[69,94,328,329]</sup>

Opportunities for innovation in training include using technology, such as online courses and virtual reality simulations, to enhance accessibility and engagement. These tools can supplement traditional training methods and reach a wider audience of healthcare professionals.<sup>[330,331]</sup> By incorporating food security into educational programs and building targeted competencies, healthcare systems can improve their capacity to deliver comprehensive care and support to food-insecure patients.<sup>[332-334]</sup>

# **EVALUATING THE IMPACT OF INTEGRATION**

Evaluating the impact of integrating food security initiatives within healthcare systems is crucial for understanding their effectiveness and guiding future improvements. By establishing clear metrics and indicators for success, healthcare organisations can assess the outcomes of their initiatives and identify areas for enhancement.<sup>[94,335]</sup>

#### Metrics and indicators for success

To evaluate the success of food security integration, it is essential to establish specific, measurable, achievable, relevant and time-bound metrics.<sup>[159]</sup> These metrics should encompass health-related outcomes and broader socio-economic impacts, providing a comprehensive view of the initiative's effectiveness.<sup>[16,336,337]</sup>

## Health outcomes

Key health indicators include changes in patients' nutritional status, such as improvements in body mass index, blood pressure, blood glucose levels and cholesterol levels. Tracking these metrics can help determine the direct health benefits of improved food security and dietary interventions.<sup>[338-340]</sup>

## Patient engagement and satisfaction

Evaluating patient engagement and satisfaction is crucial for understanding the program's reach and acceptability. Metrics such as participation rates, patient feedback and adherence to nutritional recommendations can provide insights into the initiative's effectiveness in engaging and supporting patients.<sup>[341-344]</sup>

#### Access to food resources

Measuring access to food resources is another critical indicator of success. This can include the number of patients referred to food assistance programs, the frequency of food pantry visits, and the diversity and quality of foods accessed. These metrics help assess the initiative's impact on reducing food insecurity among participants.<sup>[345,346]</sup>

#### Economic impact

Evaluating the financial impact involves assessing changes in healthcare costs and resource utilization. Metrics such as reductions in emergency department visits, hospitalisations and overall healthcare expenditure can demonstrate the cost-effectiveness of integrating food security initiatives [Figure 8].<sup>[41,347]</sup>

#### Methods for continuous improvement

Continuous improvement is essential for maximising the effectiveness and sustainability of food security initiatives. By employing structured methods for evaluation and adaptation, healthcare systems can ensure that their programs remain responsive to changing needs and challenges.<sup>[348,349]</sup>

#### Data collection and analysis

Routine data collection and analysis are fundamental for continuous improvement. Utilising electronic health records and other digital tools can facilitate the systematic collection of relevant metrics, enabling real-time monitoring and evaluation.<sup>[350-352]</sup> Data analysis should focus on identifying trends, disparities and areas for enhancement.<sup>[353]</sup>

#### Stakeholder feedback

Engaging stakeholders in the evaluation process can provide valuable insights and foster a culture of continuous improvement.<sup>[295]</sup> Regular feedback from patients, healthcare providers and community partners can help identify strengths and weaknesses in the program and guide necessary adjustments.<sup>[342,354]</sup>

#### Quality improvement frameworks

Implementing quality improvement frameworks, such as Plan-Do-Study-Act cycles, can support iterative testing and refinement of food security initiatives. These frameworks provide a structured approach to testing changes, evaluating their impact and scaling successful interventions.<sup>[355,356]</sup>

# Benchmarking and best practices

Benchmarking against similar programs and incorporating best practices can enhance the effectiveness of food security initiatives. Sharing knowledge and experiences with other organizations can facilitate the adoption of successful strategies and innovations.<sup>[73,357]</sup>

In conclusion, evaluating the impact of integrating food security initiatives requires a comprehensive approach encompassing diverse metrics and indicators. By employing methods for continuous improvement, healthcare systems can enhance the effectiveness of their programs, ensuring that they meet the needs of food-insecure populations and contribute to improved health outcomes.

# **Research Gaps and Future Research**

While considerable progress has been made in integrating food security initiatives within healthcare systems, several research gaps must be addressed to understand and fully optimise these efforts. Identifying these gaps can guide future research to improve the effectiveness and sustainability of food security programs in health care.<sup>[358,359]</sup>

#### **Research gaps**

# Longitudinal impact studies

More longitudinal studies are needed to examine the long-term impacts of food security interventions on health outcomes. While short-term benefits have been documented, understanding how these initiatives influence chronic disease management and overall health over time remains underexplored.<sup>[316,360]</sup>

### Cultural relevance and adaptation

Research often overlooks the cultural dimensions of food security interventions.<sup>[361]</sup> Studies exploring how cultural beliefs and practices influence the effectiveness of food security initiatives can provide insights into developing more culturally relevant and acceptable programs.<sup>[201,362,363]</sup>

## Integration models across settings

There is limited research comparing different models of integrating food security into various healthcare settings,



Figure 8: Metrics for evaluating the economic impact of food security in health services.

such as primary care, hospitals and community health centres.<sup>[283,364,365]</sup> Understanding the effectiveness of varying integration strategies can help tailor approaches to specific contexts and populations.<sup>[366-369]</sup>

#### Economic evaluations

Economic evaluations of food security programs within healthcare systems are scarce.<sup>[370]</sup> Research that quantifies cost-effectiveness and potential healthcare savings can provide compelling evidence for policymakers and stakeholders to support and invest in these initiatives.<sup>[335,371]</sup>

#### Technology utilization and barriers

While technology holds promise for enhancing food security interventions, there is limited research on the barriers to technology adoption and utilisation in different populations. Investigating these barriers can inform the development of more accessible and user-friendly digital solutions.<sup>[152,372,373]</sup>

## Future research directions

#### Developing comprehensive frameworks

Future research should focus on developing comprehensive frameworks that guide the integration of food security within the healthcare systems. These frameworks should encompass policy, practice and evaluation components, providing a holistic approach to addressing food insecurity.<sup>[73,369]</sup>

#### Patient-centered approaches

Research exploring patient-centered approaches to food security interventions is needed to ensure that programs effectively meet individual needs and preferences.<sup>[70]</sup> Engaging patients in designing and evaluating interventions can lead to more personalised and impactful solutions.<sup>[69,263,283,374]</sup>

#### Interdisciplinary collaboration

Future studies should examine the role of multidisciplinary collaboration in enhancing food security efforts.<sup>[148,256]</sup> Research that explores how collaboration among healthcare professionals, community organisations and policymakers can drive innovation and effectiveness is particularly valuable.<sup>[256,375]</sup>

### Scalability and replication

Investigating the scalability and replication of successful food security models across different regions and healthcare settings is crucial. Understanding the factors that enable or hinder the widespread adoption of effective programs can inform strategies for broader implementation.<sup>[376,377]</sup>

## Impact of policy changes

As policies evolve, research should assess the impact of new policy changes on food security initiatives within the healthcare systems.<sup>[349,378]</sup> This includes evaluating how policy shifts influence funding, program design and access to food resources.<sup>[1,144]</sup>

Addressing these research gaps and pursuing future research directions will be essential for enhancing the integration of food security initiatives within the healthcare systems. By building a robust evidence base, researchers can inform policy and practice, ultimately leading to improved health outcomes for food-insecure populations.

# LIMITATIONS OF THE SCOPING REVIEW

While scoping reviews offer valuable insights into the breadth and scope of a research area, they are not without limitations. These limitations should be acknowledged to provide a balanced understanding of the findings and to guide future research efforts.

A primary limitation is the lack of depth in scoping reviews. They are designed to map the existing literature and identify research gaps rather than to provide an in-depth analysis of specific studies. As a result, they may not capture the nuanced details or methodological quality of individual studies. This limitation means that while scoping reviews can highlight areas for further investigation, they may not provide definitive answers to complex research questions.

Another limitation is the variability in the study quality. Scoping reviews generally include a wide range of study designs and methodologies, which can vary significantly in quality. Unlike systematic reviews, scoping reviews do not typically assess the methodological rigor of included studies, which may lead to the inclusion of studies with potential biases or limitations. This variability can affect the overall reliability of the findings.

Scoping reviews often focus on qualitative synthesis rather than quantitative analysis. This approach means that while they can identify common themes and patterns, they may not provide statistical insights into the magnitude or significance of observed effects. Researchers seeking quantitative conclusions may need to conduct further analyses or systematic reviews.

Publication bias is another concern. As with many literature reviews, scoping reviews may be susceptible to publication bias. Studies with positive or significant findings are more likely to be published, which can skew the review's conclusions toward the positive outcomes. This bias highlights the importance of including grey literature where possible, although access to such sources can be limited.

The dynamic nature of research presents another challenge. Food security and healthcare integration are rapidly evolving, with new studies and initiatives emerging regularly. A scoping review provides a snapshot of the existing literature at a particular time, which may quickly become outdated as new research becomes available. Regular updates to the review may be necessary to maintain its relevance.

Finally, language and accessibility constraints can limit the scope of a scoping review. These reviews often focus on the literature available in specific languages, typically English, which can exclude relevant studies published in other languages. In addition, access to databases or journals may be limited, potentially omitting valuable research from the review.

# CONCLUSION

Integrating food security initiatives within the healthcare systems represents a crucial advancement in addressing the pervasive issue of food insecurity and its adverse effects on the health outcomes. This integration acknowledges the essential role of nutrition in health maintenance and offers the healthcare systems an opportunity to provide more comprehensive and effective patient care. With sustained commitment from policymakers, healthcare providers, and communities, progress toward a future where food security is a fundamental component of health and well-being for all is achievable.

#### **Consent for publication**

The author reviewed and approved the final version and has agreed to be accountable for all aspects of the work, including any accuracy or integrity issues.

#### Disclosure

The author declares that they do not have any financial involvement or affiliations with any organization, association, or entity directly or indirectly related to the subject matter or materials presented in this review paper. This includes honoraria, expert testimony, employment, ownership of stocks or options, patents, or grants received or pending royalties.

#### Data availability

Information for this scoping review paper is taken from freely available sources.

#### Authorship contribution

All authors contributed significantly to the work, whether in the conception, design, utilization, collection, analysis, and interpretation of data or all these areas. They also participated in the paper's drafting, revision, or critical review, gave their final approval for the version that would be published, decided on the journal to which the article would be submitted, and made the responsible decision to be held accountable for all aspects of the work.

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There are no conflicts of interest.

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