

Environmental Sustainability in Food Is Medicine Programs:

Current Practices and Opportunities

by

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ABSTRACT

Food Is Medicine (FIM), also known as food as medicine, is a growing movement advocating for the integration of food delivery systems into healthcare, primarily to treat chronic disease in individuals. Given the prevalence of chronic disease in the United States, FIM has the potential to improve the health of millions of Americans. As both healthcare and food systems contribute to climate change, FIM also presents an opportunity to build a transdisciplinary, system-spanning model focused on improving both human and planetary health. While scholars are examining the potential environmental implications of the FIM movement, little has been published about the environmental sustainability practices of existing FIM programs.

Thirty organizations providing FIM interventions in the United States were surveyed regarding how environmental sustainability considerations influence their program design and operations. Overall, these FIM practitioners display a keen awareness of the importance of environmental sustainability and the potential for FIM to support the health of people, agricultural producers, communities, and the environment. However, FIM programs face significant barriers to implementing environmentally sustainable practices and in communicating the impact of these practices. These findings suggest that the next phase of the FIM movement may depend on strengthening existing programs through practical guidance, collaborative learning, stronger partnerships, and shared outcome measures that capture both health and environmental benefits.

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Environmental Sustainability in Food Is Medicine Programs: Current Practices and Opportunities

Introduction

Persistent disparities in food insecurity, diet quality, and the continued rise of diet-related chronic disease in the United States illustrate the need for complementary strategies that address the complex relationship between food access, nutrition, and health outcomes. Food Is Medicine (FIM), including interventions such as produce prescriptions, medically tailored meals, medically tailored groceries, and nutrition education, has emerged as a promising approach. While the evidence for improving patient health continues to grow, FIM also operates within a broader food system that profoundly influences environmental sustainability, public health, and community resilience. Yet discussions of FIM remain largely centered on clinical outcomes, with comparatively little attention given to how these programs interact with the environmental systems that ultimately sustain food production and human health.

This omission represents a missed opportunity. Food production is both a contributor to and affected by climate change, while healthcare systems increasingly face the health consequences of environmental degradation. As an intervention situated at the intersection of healthcare and the food system, FIM has the potential to advance human and planetary health simultaneously. However, little is known about how current FIM programs are incorporating environmental sustainability into their design and implementation, or how practitioners perceive opportunities to strengthen these connections.

This capstone project addresses that gap by exploring how existing U.S. FIM programs integrate environmental sustainability into program planning, operations, and evaluation. Through a mixed-methods approach combining a national survey of FIM practitioners with key informant interviews, this study examines current practices, perceived barriers, and future opportunities for aligning FIM with broader sustainable food systems goals. By documenting both the progress already underway and the challenges that remain, this project seeks to better understand how FIM can evolve as an intervention that advances not only individual health, but also the long-term sustainability of the food systems that make health possible.

Research Question

To what extent do FIM programs incorporate environmental sustainability considerations into program design, implementation, and evaluation?

Objectives & Scope

This report does not aim to prove efficacy or quantify impact of FIM interventions. Rather, it intends to capture a snapshot of the self-reported practices and priorities of existing FIM programs in the United States in relation to environmental sustainability. It does not provide a representative sample of FIM programs. Respondents and key informants self-identified as FIM practitioners and were not included or excluded based on meeting a particular FIM definition or service type. This paper does not address many of the potential social and health impacts FIM may have on the food system, including important dimensions such as economic viability for agricultural producers & communities, labor practices and equity for farmworkers, cultural acceptability of provided foods, food sovereignty, or animal health and welfare.

Background

FIM is best understood not as a single intervention, but as an emerging field situated at the intersection of healthcare, public health nutrition, and the food system. This section provides the context necessary to understand why FIM developed, what it is (and is not), how it might function within the U.S. healthcare system, and why its relationship with the broader food system makes environmental sustainability an important consideration.

Establishing the Problem

The Importance of Healthy Eating

Diet is widely recognized as one of the most important modifiable determinants of health and plays a central role in the prevention and management of diet-related chronic disease (GBD 2017 Diet Collaborators, 2019; U.S. Department of Agriculture [USDA] HHS & U.S. Department of Health and Human Services [HHS], 2020). Unfortunately, in the United States, about 90% of Americans consume less than the recommended amounts of fruits and vegetables, beans, peas, lentils, whole grains, low-fat dairy products, and seafood, and more than the recommended

amount of refined grains, added sugars, sodium, and saturated fats (USDA & HHS, 2020). These suboptimal consumption patterns are a risk factor for chronic disease and are linked to 1 in 5 deaths around the world (GBD 2017 Diet Collaborators, 2019).

The Challenge of Achieving Healthy Diets

Unfortunately, healthy eating is not always straightforward. Nutrition science is complex, and recommendations are ever-changing, resulting in consumer confusion and misalignment between experts (Erndt-Marino & Ghirardelli, 2026; Sadler et al., 2022). This complexity is demonstrated in the controversial new 2025-2030 Dietary Guidelines for Americans, in which the guidelines and guidance structure were significantly changed from previous years as the result of a novel review process, leading to questions of transparency and other concerns regarding alignment with scientific evidence (AND, 2026; Minari & Pisani, 2026; Papandreou et al., 2026; USDA & HHS, 2026). This high-level disagreement hints at some of the inherent complexities of eating a healthy diet—if experts cannot agree what a healthy diet looks like, how can consumers be expected to make healthy choices? A successful nutrition intervention must consider these complexities.

Many factors shape food choices. Despite the strong link between diet and health, Americans rank taste, rather than nutrition, as the most important factor in their food choices (Glanz et al., 1998). But consuming a healthy diet is not only a matter of individual choice. Research suggests that barriers to healthy eating include food cost and access constraints, availability of competing foods (such as sugary snacks or “junk food”), limited meal preparation skills, difficulty in changing lifestyle habits, and lack of knowledge about dietary recommendations and the health benefits of food (Gao et al., 2022a; Glanz et al., 1998; Nicklas et al., 2013).

Many external factors also contribute to suboptimal dietary quality. The physical food environment, including proximity to supermarkets or the presence of fast-food restaurants, may influence dietary quality (Gao et al., 2022a). Poor dietary quality is also linked to food insecurity¹

¹The USDA Economic Research Service provides the following definitions: “[f]ood-insecure households are uncertain of having, or unable to acquire, at some time during the year, enough food to meet the needs of all their members because they had insufficient money or other resources for food”, while “[f]ood secure households had access, at all times, to enough food for an active, healthy life for all household members” (USDA, Economic Research Service, 2026).

(Leung et al., 2014). Food insecurity has significant impacts on human health (Leung et al., 2020). Lower food security is associated with increased probability of the chronic diseases arthritis, asthma, cancer, chronic obstructive pulmonary disease (COPD), coronary heart disease (CHD), hepatitis, hypertension, and kidney disease (Gregory & Coleman-Jensen, 2017). Chronic disease can inflict a toll on an individual's physical, mental, and financial well-being (Buttorff et al., 2017; Davis et al., 2025; Leite, 2025; Palakshappa et al., 2023). In 2024, 13.7% of U.S. households were food insecure at some time, though rates were higher for Black non-Hispanic (24.4%) and Hispanic (20.2%) households, and lower for Other non-Hispanic (11.9%) and White non-Hispanic (10.1%) households. Households with children under 18 years old are more likely to be food insecure (18.1%) than households without children (11.9%) (USDA, Economic Research Service [ERS], 2026). Single mothers with children are the household type that experiences the highest rates of food insecurity (36.8%) (USDA, Economic Research Service, 2026). Scholars cast these disparities in food insecurity and diet-related diseases not as effects of individual choice, but rather as symptoms of systemic issues such as income inequality, structural racism, and discrimination in housing, education, and employment (Bailey et al., 2017; Drexel University Center for Hunger-Free Communities, 2018; Elsheikh & Barhoum, 2013; Satia, 2009). For this reason, “[s]olutions to reducing food insecurity must include more than creating access to more healthy food, increasing wages, and ensuring a strong safety net. They must first acknowledge that discrimination exists and oppressive systems, societal norms, and individual behaviors that are at the root of inequities that harm family well-being” (Drexel University Center for Hunger-Free Communities, 2018, *Doctor-approved recommendations* section).

It is important to note that in the present-day United States, the issue of food security manifests less in the *quantity* of food than in the *quality* of food. In a study comparing the dietary recalls of lower-income food insecure adults with lower-income food secure adults, both groups consumed similar amounts of energy (Calories). However, the food-insecure respondents reported higher intakes of high-fat dairy products, salty snacks, sugar-sweetened beverages, red/processed meat, and fewer vegetables (Leung et al., 2014). This may be because lower diet

costs are associated with higher energy density², while higher diet costs are associated with higher nutrient density³ and nutritional quality (Lee et al., 2011). Research suggests that food costs are correlated to food choices, and food insecure populations consume fewer servings of more expensive nutrient-dense foods like fruits and vegetables (Lee et al., 2011; Ranjit et al., 2021). Unprepared nutrient-dense foods can be less expensive than their more expensive counterparts (e.g. whole cabbage vs pre-shredded coleslaw mix, dry beans vs canned beans), but food preparation time can be limited in food insecure households (Beatty et al., 2014). While many people struggle to consume a healthy diet, food insecure households face additional barriers (Reed et al., 2025; USDA & HHS, 2020).

Current Strategies for Reducing Food Insecurity: Existing Nutrition Programs

The United States has developed a diverse array of nutrition assistance programs to address food insecurity at the population level. Together, these programs form the foundation of the nation's efforts to improve food access, support dietary health, and reduce the consequences of inadequate nutrition across the lifespan. These programs vary considerably in their eligibility criteria, funding mechanisms, target populations, and approaches to improving food and nutrition security, reflecting the complexity of food insecurity as both a social and public health challenge. Together, these programs form the foundation of the nation's efforts to improve food access and support dietary health.

The Supplemental Nutrition Assistance Program (SNAP), sometimes called “food stamps” or “EBT”, increases household purchasing power by providing electronic cash-like benefits that can be redeemed for eligible home-consumed food and beverages for “low-income families to supplement their grocery budget so they can afford the nutritious food essential to health and well-being” (USDA, 2026, *Putting Healthy Food within Reach for Those in Need* section). This design, paired with a wide network of retail redemption partners, serves to empower consumer choice and dignity. (Krobath et al., 2025). Evidence suggests that SNAP is effective in reducing food insecurity by improving households' ability to purchase food, however,

²Energy density is the amount of Calories for a given quantity of food.

³Crelin (2022) defines nutrient density as “the concentration of essential vitamins and minerals in food relative to its calorie content.”

SNAP does not eliminate food insecurity or cover all food costs: the maximum allotment for a household of four in the contiguous US in FY 2026 would be \$994 per month, equivalent to about \$8 per person per day (Andreyeva et al; USDA, Food and Nutrition Administration, 2025a; Ratcliffe et al., 2011).

This long-standing program is facing changes. In 2025, the federal budget reconciliation law called the “One Big Beautiful Bill Act” reduced SNAP benefits in several ways, including eliminating funding for the Nutrition Education and Obesity Prevention Grant Program (SNAP-Ed), expanding participant work requirements, freezing benefit inflation adjustments, and removing program eligibility for refugees and asylees (Congressional Research Service, 2025). The USDA Food and Nutrition Administration (2026a) reports approximately 37.3 million SNAP participants in March 2026, compared to approximately 42.2 million in March 2025. In addition to impacting participant food security, these changes are projected to have downstream effects on farmers and food retailers. These changes demonstrate some of the difficulties in establishing and maintaining food and nutrition programs at the federal level.

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is another cornerstone in the U.S. approach for food insecurity. WIC provides eligible families with cash-like benefits redeemable for foods, beverages, and infant formula included in “one of seven science-based food packages, according to their life stage nutritional needs” (USDA, Food and Nutrition Administration, 2026b, section *What are the food packages?*). Eligible foods are selected for their nutrient profile and contain limited amounts of sodium, fats, and added sugar (USDA, Food and Nutrition Administration, 2025b). The program also provides nutrition education, breastfeeding support, and healthcare referrals as needed. Research demonstrates that WIC participation is associated with meaningful improvements in maternal and child health outcomes. A 2022 systematic review commissioned by the Agency for Healthcare Research and Quality found that maternal WIC participation was associated with improved diets for pregnant women and children, as well as improved birth outcomes and other benefits (Caulfield et al., 2022). Like other federal nutrition programs, WIC serves only those who meet specific eligibility requirements and does not address food insecurity across the broader population.

Additional federal nutrition programs address food needs across the lifespan. The National School Lunch Program and School Breakfast Program provide millions of meals annually to children, supporting dietary intake during critical periods of growth and development. For older adults, programs such as the Older Americans Act Nutrition Program provide congregate and home-delivered meals to support both nutritional needs and social well-being. Together, the 16 federal nutrition assistance programs are reported to serve one in four Americans and represent important investments in nutrition security throughout the life course (Food and Nutrition Administration, 2026).

Charitable organizations—including food banks, food pantries, and community meal programs—provide an essential safety net for individuals experiencing food insecurity who may not qualify for federal nutrition assistance programs or whose needs exceed available benefits. Collectively known as the emergency food system, these organizations operate through networks of nonprofit organizations, community partners, volunteers, and food donors to acquire, store, and distribute food to individuals and families experiencing need (Hales et al., 2026). Although the charitable food system plays a critical role in addressing immediate food needs, it was historically designed as an emergency response rather than a long-term strategy for ensuring nutrition security. Nevertheless, many households rely on charitable food assistance over extended periods (Kaiser & Cafer, 2017). Furthermore, food banks and pantries face inherent challenges related to the availability, consistency, and nutritional quality of donated foods, which may limit their ability to provide foods aligned with individual dietary needs and chronic disease management goals (Simmet et al., 2017).

Although these programs differ in their purpose, eligibility criteria, and target populations, they represent complementary approaches and an essential foundation for improving food and nutrition security in the United States.

Persistent Gaps & Conceptual Evolution to Food is Medicine

The existing nutrition assistance program infrastructure is an essential life-saving safety net for millions of Americans. These programs have demonstrated success in improving access to food, supporting dietary intake, and reducing the consequences of food insecurity among

vulnerable populations. However, persistent disparities in food insecurity, diet quality, and the continued rise of diet-related chronic disease highlight the need for complementary strategies that address the complex relationship between food access, nutrition, and health outcomes (Mozaffarian et al., 2021).

In 2023, 76% of U.S. adults (approximately 194 million people) reported having at least one chronic disease, while 51% reported living with multiple chronic conditions (Watson et al., 2025). The prevalence of chronic disease has continued to increase over the past two decades, placing substantial physical, emotional, and financial burdens on individuals while increasing financial and capacity demands on the healthcare system (The US Burden of Disease Collaborators et al., 2018).

Advocates have therefore suggested that existing nutrition assistance programs could be further strengthened to emphasize nutritious foods and improve health outcomes (Leung & Wolfson, 2025; Mozaffarian et al., 2021). Proposed strategies include healthy food incentive programs, which provide additional resources for SNAP participants to purchase fruits and vegetables (Mozaffarian et al., 2021). This evolution reflects a broader conceptual progression in public health nutrition, from preventing hunger to promoting health through dietary quality. FIM extends this progression further by integrating food directly into healthcare delivery as a tool for preventing, managing, and treating disease.

What is FIM, Anyway? Prevailing Definitions

The phrases “Food Is Medicine” and “Food As Medicine” are both used to describe the use of the power of food to improve health, though both phrases lack a standardized definition (Defraeye et al., 2025). An insightful landscape analysis of the terms captured the nuances in how they are being used: Food *Is* Medicine is often “describing evidence-based, clinically integrated nutrition interventions eligible for healthcare funding or reimbursement”, while Food *As* Medicine more often refers to “a broader, more holistic approach to food and health” (Hanson & Conklin, 2025, section *The Language Landscape: Who’s Using What*). Google Trends search data from the past five years indicate that “food is medicine” consistently generated more interest than “food as medicine,” suggesting broader public recognition and use (Google Trends, n.d.)

The term Food Is Medicine was selected for this project because of its more specific meaning, providing a clearly defined, evidence-based framework for examining clinically integrated nutrition interventions. This narrower conceptual scope aligns with this project's objective of evaluating how existing FIM programs incorporate environmental sustainability into their design, implementation, and evaluation. This project will utilize the definition of FIM offered by Volpp et al. (2023) on behalf of the American Heart Association: "the provision of healthy food resources to prevent, manage, or treat specific clinical conditions in coordination with the health care sector". This anchor in the healthcare sector and focus on individual patients distinguishes FIM from other population-level nutrition programs and interventions (Schwartz et al., 2025). Common FIM interventions include produce prescriptions, medically tailored meals (MTM), and medically tailored groceries (MTG), which are described in further detail in the subsequent section. FIM interventions are intended to promote health by addressing barriers to healthy eating, utilizing different strategies than existing nutrition security programs (Berkowitz, 2024). In this sense, FIM represents the next step in an evolving continuum of food-related health interventions. It builds upon, rather than replaces, existing population-level food security and nutrition security efforts by explicitly linking dietary intake to clinical outcomes within individuals.

Common Types of FIM Interventions

Like the definition of FIM itself, FIM interventions are not uniform across the field. FIM program models vary across communities and may differ in their funding sources, partnerships and implementing agencies, food procurement practices, participant eligibility criteria, distribution method (pickup vs home delivery), dosage (how much is provided and how frequently) or duration (how long they are provided). These interventions are generally funded by philanthropic, government, or healthcare funds and are provided at low or no cost to the recipient (Downer et al., 2020). FIM interventions are generally time-limited, though some are thought to provide enduring benefits by modeling recommended portion sizes and meal options (Berkowitz et al., 2020).

Each of the FIM intervention types described below may additionally include nutrition education or basic culinary training, or be augmented by digital health technologies like meal

tracking or nutrient analysis applications, or wearable devices (Defraeye et al., 2025; Food Is Medicine Coalition, n.d.). Perhaps in part due to this program diversity, scientific evidence on the efficacy of FIM interventions for improving human health is promising, but still emerging (Downer et al., 2020; Hager et al., 2024; Seligman et al., 2025; Volpp et al., 2023). An in-depth discussion of the FIM efficacy research is outside the scope of this project.

The American Heart Association categorizes FIM interventions as either “cash-like” or “in-kind” (Volpp et al., 2023). Cash-like interventions provide subsidies, vouchers, or cash equivalents to purchase foods up to their cash value. These cash-like interventions can maximize participants' freedom of choice in the specific foods purchased, though they may be redeemable only for particular foods at particular retailers (Berkowitz, 2024). Produce prescription (PRx) programs are a common type of cash-like program in which participants are provided with vouchers or subsidies to purchase fruits and vegetables. The National Produce Prescription Collaborative (2021) utilizes the following definition:

A Produce Prescription (PRx) is a medical treatment or preventative service for eligible patients due to diet-related health risks or conditions, food insecurity, or other documented challenges in access to nutritious foods, and are referred by a healthcare provider or health insurance plan. These prescriptions are fulfilled through food retail and enable patients to access healthy produce [according to USDA WIC-eligible fruits and vegetables] with no added fats, sugars, or salt, at low or no cost to the patient. When appropriately dosed, Produce Prescriptions are designed to improve healthcare outcomes, optimize medical spending, and increase patient engagement and satisfaction (*What is a PRx?* section).

As the name suggests, PRx programs are accessed from within the healthcare environment. PRx programs may be appropriate for both disease management and prevention (Downer et al., 2020). PRx are intended to provide supplemental nutrition, rather than complete nutrition (Hager et al., 2024).

In contrast to cash-like interventions, in-kind FIM interventions provide food to participants. Two common types of in-kind interventions include unprepared food packages (“food

boxes”) or prepared meals. In-kind food package programs may provide perishable foods such as fruit, vegetables, meats or plant-based proteins, or non-perishable staples such as grains, beans, nuts or seeds. Example programs might include a food pantry or “farmacy” (food pharmacy) located within a healthcare facility, or healthy food boxes prepared by a local food bank and delivered to eligible home-bound community members. Participants may be deemed eligible based on income level, food security status, health condition, or other criteria. Food may be sourced from local farms or a facility garden, or rely on donations from the emergency food system or retail partners.

Some in-kind interventions are customized according to the particular health needs of their participants, and may be intended to manage disease rather than prevent it. Medically tailored groceries (MTG) are a type of food package specially assembled to serve participants with diet-responsive conditions such as diabetes, heart disease, or dysphagia (difficulty swallowing). MTG may consist of whole foods, or may also be “lightly processed” and pre-portioned into a meal kit format (Food Is Medicine Coalition, n.d.). MTG are ideal for individuals with complex medical needs who may experience difficulty with completing food shopping activities, but who are able to cook at home. In contrast, medically tailored meals (MTM) are generally fully prepared ready-to-eat foods optimized for participants with multiple complex medical conditions who cannot shop for or prepare food for themselves (Downer et al., 2020; Hager et al., 2024). MTM can be modified by a registered dietitian nutritionist or other qualified professional to accommodate a participant’s food allergies and intolerances, medications, culture or dietary preferences, such as vegan or vegetarian. While other FIM interventions are intended to supplement a participant’s own pantry, MTM may be designed to meet the participants’ complete nutritional needs (Hager et al., 2024). As with PRx programs, both MTM and MTG are generally accessed by a referral from a healthcare professional. Some programs offer medically *supportive* meals and medically supportive groceries, which are not individualized to the degree of MTM & MTG but are intended to be nutritious and beneficial for a broader patient population (Office of Disease Prevention and Health Promotion [ODPHP], 2026).

Boundaries of FIM and Complementary Practices

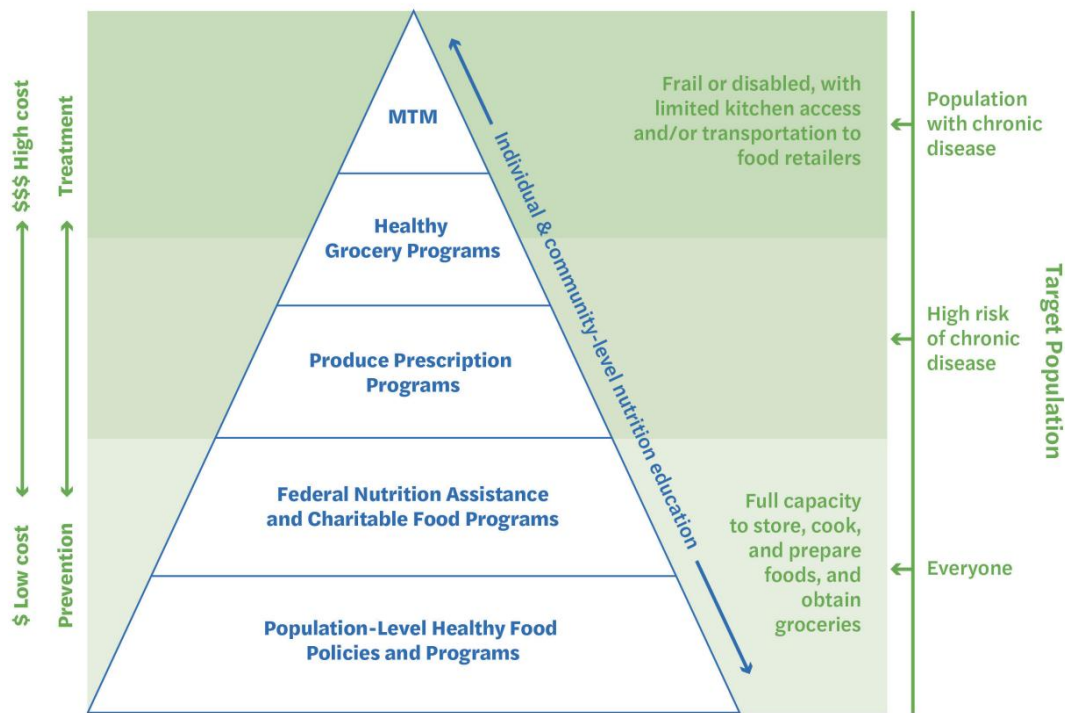
As the definition of FIM has not yet been standardized, a wide range of interventions are ascribed to the name and the full scope of FIM can be difficult to define. However, FIM should not be considered synonymous with all nutrition-based healthcare practices. Medical nutrition therapy (MNT), for example, is a distinct, evidence-based therapeutic approach in which a registered dietitian nutritionist provides individualized nutrition assessment and intervention to prevent or manage disease (Academy of Nutrition and Dietetics [AND], n.d.). Nutrition is a pillar of lifestyle medicine, but the practice of lifestyle medicine also encompasses a broader range of health behaviors including physical activity, sleep, stress management, avoidance of substance use, and social connection (American College of Lifestyle Medicine, 2026). Within the functional medicine model, trained practitioners holistically assess a patient for “nutritional imbalances and possible root causes, triggers, and perpetuators of chronic diseases”, and may utilize functional nutrition for “nutrient-dense dietary treatments and prevention strategies” (IFM Medical and Editorial Content Team, 2026, para. 1). The growing practice of culinary medicine takes a different approach which “blends the art of food and cooking with the science of medicine” (La Puma, 2016), and is offered as an additional training and certification for physicians, physicians’ associates, nurse practitioners, nurses, pharmacists, and registered dietitians (American College of Culinary Medicine, n.d.). Culinary medicine can refer to providing experiential cooking activities in the training of healthcare professionals, but also to the provision of nutrition education to culinary and foodservice professionals or healthy cooking classes to the general public (Hildebrand et al., 2025).

Other nutrition-related therapies, including food-based vitamin or mineral supplements, or “medical foods” like oral nutrition supplements (such as Boost® and Ensure®), may complement FIM interventions, but they are not generally considered core FIM interventions within themselves (Defraeye et al., 2025; Downer et al., 2020; Li et al., 2021). FIM is generally characterized by the provision of food-based interventions integrated with healthcare delivery rather than by nutrient supplementation alone (Defraeye et al., 2025). Overall, PRx, MTG, and MTM are the core interventions recognized as FIM.

As discussed previously, FIM is distinct from and complementary to established population level nutrition assistance programs such as SNAP, WIC, and the National School Lunch Program (NSLP). While these programs at times overlap in the populations they serve, they differ in their purpose, target population, and funding mechanisms. Mozaffarian et al. offer the following visualization of FIM's place within the overall nutrition system, sometimes called the FIM pyramid.

Figure 1

The FIM pyramid



Note. Reproduced from *Supporting Food & Nutrition Security through Healthcare: A Resource for Healthcare Systems and Their Public Health and Community Partners* (p. 17), by Nutrition and Obesity Policy Research and Evaluation Network, 2023, University of California, San Francisco (https://nopren.ucsf.edu/sites/g/files/tkssra17721/files/Supporting%20F%26N%20Security_FINAL_0.pdf). Copyright 2023 by Nutrition and Obesity Policy Research and Evaluation Network.

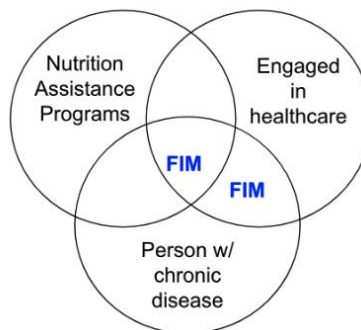
Each ascending layer of the pyramid is more individualized and serves fewer people than the layer before. While government nutrition security programs are reported to serve one in four Americans, an estimated 10.4 million US adults (approximately 1 in 33 people) may qualify for

medically tailored meal programs nationally (the highest tier) (Deng et al., 2025; Food and Nutrition Administration, 2026).

The FIM pyramid shows that FIM is built upon a foundation of other nutrition programs, but the figure does not fully capture the overlap which may occur between programs. As Figure 2 demonstrates below, FIM may concurrently serve individuals who receive support from federal nutrition programs such as SNAP and WIC, but may not be appropriate for or accessible to all individuals engaged in these programs. FIM alone cannot meet the food and nutrition needs of all Americans, or even all those with chronic disease. As a healthcare intervention, FIM by definition excludes those who do not have access to healthcare. In turn, federal nutrition assistance programs may reach individuals who are not engaged with healthcare, but exclude other individuals due to unmet work requirements, immigration status, or carceral history. FIM may improve food security as a secondary benefit alongside other nutrition programs, while SNAP, WIC, and the NSLP inevitably serve many individuals with chronic disease, as FIM is intended to do.

Figure 2

FIM's interaction with federal nutrition assistance programs & intended populations.



FIM should therefore not be viewed as a replacement for existing nutrition assistance programs, or as a complete solution for food and nutrition insecurity. While scholars differ on whether population-level nutrition programs should be considered FIM, most agree that FIM is one tool among many to improve health and well-being in the United States (Defraeye et al., 2025; Downer et al., 2020; Hager et al., 2024; Schwartz et al., 2025). Because the factors

influencing dietary behaviors and health outcomes are multifaceted, improving nutrition and reducing diet-related disease requires coordinated approaches across policy, community, and healthcare.

A Systems Perspective of Food Is Medicine

Although FIM is typically discussed as a healthcare intervention, its implementation necessarily extends beyond the clinical setting. FIM programs vary widely in their structure and delivery models, but every FIM program depends upon a broader network of food production, processing, distribution, procurement, and consumption. In this way, FIM operates simultaneously within the healthcare system, the food system, and the communities they serve. Understanding these interconnected systems provides important context for evaluating both the intended and unintended consequences of FIM programs. This systems perspective is particularly important when considering environmental sustainability. Because FIM connects healthcare delivery with food production and consumption, its implementation is influenced by two sectors with substantial environmental footprints (Bernstein & Hunnes, 2025). While food production and health care are essential activities, their significant environmental impact begs examination of the causes and opportunities for reduced emissions.

Globally, the food system is responsible for 30% of greenhouse gas emissions (Crippa et al., 2021). These estimates account for how food is grown, processed, packaged, transported, consumed, and wasted. The U.S. food systems activities make up approximately 8% of the global emissions. Healthcare is also a major contributor to the climate crisis: if healthcare were a country, it would be the fifth largest emitter of greenhouse gasses (Karliner et al., 2019). Healthcare produces approximately 4.5% of worldwide greenhouse gas emissions, and U.S. healthcare alone is responsible for a disproportionate 25% of those emissions—the most of any industrialized nation (Eckelman et al., 2020). These emissions were not found to be correlated with healthcare quality, which suggests that these emissions could be reduced without sacrificing patient well-being. This creates an opportunity for emerging interventions such as FIM to consider not only whether they improve human health outcomes, but also how their implementation can affect the health of the environment.

Climate change is directly relevant to the FIM mission of improving human health. The World Health Organization (WHO) has called climate change “the greatest threat to global health in the 21st century”, projecting that it will cause approximately 250,000 additional deaths each year between 2030 and 2050 (WHO, 2015). In the United States, climate change impacts include droughts, excessive heat, and worsening air quality driven by wildfire smoke and other pollutants, changes to water quality and quantity, and changes to infection and transmission patterns for disease carried by mosquitoes, ticks, and fleas (Crimmins et al., 2016; Romanello et al., 2025). These environmental changes can have many health implications, especially for members of vulnerable groups such as children, pregnant people, older adults, and economically disadvantaged people (Crimmins et al., 2016). (See Figure 3 below for examples of physical health impacts.) Climate change can seriously impact mental health too, causing stress, anxiety, depression, feelings of despair and helplessness, and more (Crimmins et al., 2016; Hough & Counts, 2023). Community health impacts may include increased aggression, violence, and crime, strains on social relationships and decreased community cohesion. These impacts have led prominent US health organizations to declare climate change a “public health crisis” (American Medical Association, 2024) and a “health emergency” (American Lung Association, 2019). Research shows a clear link between climate change and human health. After all, as Bernstein and Hunnes (2025) remind us, “the ultimate determinant of human health is planetary health”.

Despite these connections, climate change, healthcare delivery, and food systems have historically been addressed through largely separate disciplines and policy structures. FIM offers a unique opportunity to bridge these traditionally siloed sectors by creating interventions that simultaneously address human health, food access, and environmental sustainability. Failing to consider the environmental consequences of food-based healthcare risks addressing the late-stage symptoms of poor health while overlooking one of its most significant upstream drivers. Integrating sustainability into FIM could link patient outcomes with the long-term conditions that support population health. Given these intersecting impacts, understanding how FIM programs

currently address environmental sustainability—and where opportunities remain—has become an increasingly important area of inquiry.

Figure 3

Examples of climate impacts on human health

	Climate Driver	Exposure	Health Outcome	Impact
 Extreme Heat	More frequent, severe, prolonged heat events	Elevated temperatures	Heat-related death and illness	Rising temperatures will lead to an increase in heat-related deaths and illnesses.
 Outdoor Air Quality	Increasing temperatures and changing precipitation patterns	Worsened air quality (ozone, particulate matter, and higher pollen counts)	Premature death, acute and chronic cardiovascular and respiratory illnesses	Rising temperatures and wildfires will lead to increases in ozone and particulate matter, elevating the risks of cardiovascular and respiratory illnesses and death.
 Flooding	Rising sea level and more frequent or intense extreme precipitation, hurricanes, and storm surge events	Contaminated water, debris, and disruptions to essential infrastructure	Drowning, injuries, mental health consequences, gastrointestinal and other illness	Increased coastal and inland flooding exposes populations to a range of negative health impacts before, during, and after events.
 Vector-Borne Infection (Lyme Disease)	Changes in temperature extremes and seasonal weather patterns	Earlier and geographically expanded tick activity	Lyme disease	Ticks will show earlier seasonal activity and a generally northward range expansion, increasing risk of human exposure to Lyme disease-causing bacteria.
 Water-Related Infection (<i>Vibrio vulnificus</i>)	Rising sea surface temperature, changes in precipitation and runoff affecting coastal salinity	Recreational water or shellfish contaminated with <i>Vibrio vulnificus</i>	<i>Vibrio vulnificus</i> induced diarrhea & intestinal illness, wound and blood-stream infections, death	Increases in water temperatures will alter timing and location of <i>Vibrio vulnificus</i> growth, increasing exposure and risk of water-borne illness.
 Food-Related Infection (<i>Salmonella</i>)	Increases in temperature, humidity, and season length	Increased growth of pathogens, seasonal shifts in incidence of <i>Salmonella</i> exposure	<i>Salmonella</i> infection, gastrointestinal outbreaks	Rising temperatures increase <i>Salmonella</i> prevalence in food; longer seasons and warming winters increase risk of exposure and infection.
 Mental Health and Well-Being	Climate change impacts, especially extreme weather	Level of exposure to traumatic events, like disasters	Distress, grief, behavioral health disorders, social impacts, resilience	Changes in exposure to climate- or weather-related disasters cause or exacerbate stress and mental health consequences, with greater risk for certain populations.

Note. Image reproduced from *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. U.S. Global Change Research Program (page 23) by Crimmins et al., 2016
<https://www.healthandenvironment.org/docs/ImpactsClimateChangeHumanHealthUSGlobalChangeResearchProgramSmall2016.pdf>

FIM within the Healthcare System: Contexts and Constraints

Although FIM extends beyond the clinical setting, healthcare remains a central entry point for identifying patients and connecting them with FIM interventions. Examining the healthcare context therefore provides important insight into both the opportunities and limitations of implementing FIM as a clinical intervention, and how environmental impact may factor into that implementation.

The primary care environment could be a natural entryway for FIM. Primary Care Providers (PCPs)—including physicians (MD, DO), nurse practitioners (NP), and physician associates (PA)—are often a patient's first contact with the healthcare system. PCPs are charged with coordinating a patient's health, from encouraging prevention strategies to treating chronic disease (Centers for Medicare & Medicaid Services [CMS], 2023; Health Resources and Services Administration, 2025). Surveys suggest patients look to PCPs for nutrition advice, and evidence-based nutrition counseling has been shown to reduce morbidity and mortality when delivered in a primary care setting (Johnson et al., 2026; Zhang et al., 2019). However, the realities of contemporary primary care limit providers' ability to independently address nutrition-related barriers. Nutrition education is limited in medical and advanced care practitioner (NP, PA) training programs, and many physicians report low confidence in providing nutrition counseling (Chao et al., 2022; Devries et al., 2014; Sullivan, 2000; Vetter et al., 2008). There is a movement to require additional nutrition education in medical school curriculum (HHS, 2026; Association of American Medical Colleges, n.d.). This change could empower providers but would be an incomplete solution to address other structural issues (Albin et al., 2024, Ockene et al., 1999). One such issue is provider time: the average U.S. primary care visit lasts approximately 18 minutes, with a substantial portion of that time devoted to electronic health record documentation rather than direct patient interaction (Deeds et al., 2025; Neprash et al., 2021). Access to physician time is also not equitably distributed; Gaffney et al. (2022) estimated that Black and Hispanic individuals receive approximately 52 minutes of outpatient physician face time annually compared with 70 minutes among White individuals. These constraints may allow for brief nutrition education but leave little opportunity to identify and address the other numerous factors influencing an

individual's dietary behavior. These same barriers which led, in part, to FIM's emergence, will also impact its implementation. Efficient screening tools and streamlined referral pathways can support PCPs in connecting patients with appropriate nutrition resources, including FIM interventions (Hildebrand et al., 2022).

Registered dietitian nutritionists (RDNs) provide specialized nutrition expertise within the primary care team, supporting both primary care providers (PCPs) and patients. Through medical nutrition therapy (MNT), RDNs assess a patient's nutritional status, develop personalized interventions, monitor outcomes, and help patients navigate the practical realities of dietary change (AND, n.d.). Rather than simply reinforcing general healthy eating recommendations, dietitians tailor nutrition care to each individual's food preferences, cultural practices, cooking skills, grocery budget, physical access to food, medical conditions, lifestyle factors, and personal goals. In outpatient settings, RDNs have more time to use counseling approaches such as motivational interviewing to overcome barriers and develop sustainable strategies for behavior change. Despite their expertise, however, RDNs remain underutilized within many healthcare systems because of role ambiguity, limited or confusing insurance coverage, referral requirements, and limited geographic availability (Abruzzino & Ventura Marra, 2015; AND, 2024; CMS, 2022; Gaare et al., 1990; Trujillo et al., 2019). Expanding access to RDNs may therefore represent a critical opportunity for strengthening FIM implementation and effectiveness by ensuring that medically tailored food interventions are paired with evidence-based nutrition assessment, counseling, and ongoing clinical support (Short et al., 2025).

While healthcare providers routinely encourage healthy dietary behaviors, patients may simultaneously experience social, economic, and environmental conditions which make implementing those recommendations difficult or impossible. Other healthcare team members, such as social workers, behavioral health providers, case managers, and community health workers, can offer essential support in overcoming these barriers to healthy eating—yet access to these professionals may be hindered by insurance reimbursement. Many of the activities required to coordinate these services, including screening, referral, care coordination, communication with community partners, and follow-up, have historically fallen outside traditional fee-for-service

reimbursement, making it difficult for healthcare organizations to sustainably integrate multidisciplinary teams capable of addressing patients' complex needs (Docherty et al., 2020). The traditionally siloed healthcare team structure may need to be revised to ensure the enduring success of FIM interventions and the participants they serve.

These challenges are not isolated operational barriers; they reflect broader characteristics of the U.S. healthcare system, including financing structures that have historically prioritized disease treatment over prevention and upstream intervention. As the National Academies point out, “the U.S. health care system is focused, and paid, on the notion of treating illness rather than on maintaining health” (2021, Chapter 9, *How Much Payment Is Rendered* section). In 2024, the United States spent \$5.3 trillion on healthcare—more per capita than any other nation (CMS, 2026; World Bank, 2025). Ninety percent of these expenditures are for management and treatment of chronic disease, while only 3% are estimated to fund public health and prevention (CDC, 2026; Himmelstein & Woolhandler, 2016). Primary care teams, “the backbone of healthcare” (Gao et al., 2022b), provide about 50% of ambulatory care services but receive only 5% of the funding (Martin et al., 2020; Santo & Kang, 2023). A healthcare system oriented toward disease treatment is not just expensive, it is resource-intensive. Healthcare delivery itself contributes to environmental pressures through energy consumption, supply chains, transportation, and waste generation (Eckelman et al., 2020). As a result, efforts to shift healthcare upstream through prevention-oriented interventions such as FIM may have implications not only for population health outcomes but also for the environmental and fiscal sustainability of healthcare systems themselves (Bernstein & Hunnes, 2025; Hager et al. 2022). FIM therefore challenges multiple facets of healthcare: clinical practice, the financial architecture, and its environmental impact.

Integrating FIM into healthcare does not automatically guarantee equitable access. Indeed, implementing FIM through existing healthcare structures may reproduce some of the same inequities that have historically limited access to preventive care. In a 2024 survey, 44% of Americans reported they were uninsured, had a gap in insurance coverage, or were underinsured with coverage that did not enable affordable access to health care (Collins & Gupta, 2024). In the

same survey, 29% of respondents reported medical debt, 38% of whom delayed or avoided needed health care or prescription drugs due to cost concerns. Another survey highlighted consumer experiences of difficulty navigating the healthcare system, with adults who identify as Black, Indigenous, or People Of Color (BIPOC) spending more time coordinating care on average than White adults (American Academy of Physician Associates [AAPA], 2023). Many of the social and structural factors associated with chronic disease—including poverty, food insecurity, inadequate transportation, unstable housing, and limited access to healthcare—also create barriers to accessing FIM interventions (Benavidez et al., 2024). Consequently, the populations most likely to benefit from FIM are often those who face the greatest obstacles to receiving healthcare-based services.

FIM represents not only a clinical intervention but also an opportunity to shift toward investing healthcare resources upstream to address the social drivers of chronic disease before costly complications develop. While FIM interventions may originate in healthcare, they are often delivered in communities. The limitations of healthcare-based approaches to nutrition also highlight a fundamental challenge for FIM: improving health outcomes requires coordination among sectors that have historically operated independently. Healthcare, public health, agriculture, and community support organizations often use different funding streams, priorities, outcome measures, and operational structures, which may create barriers to collaboration (Calloway et al., 2026). Designing FIM solely around existing healthcare delivery structures risks excluding precisely the populations it seeks to serve unless programs intentionally address these barriers through flexible referral pathways and communicative partnerships with safety-net organizations. These partnerships are particularly important because many of the resources necessary to address food insecurity exist outside healthcare altogether. Each community may offer different assets and service gaps: one community may be lacking primary care providers but have strong support for farmers, for example, while another might offer an especially health-focused emergency food organization or a FIM champion at a local hospital. FIM interventions can be designed to link these assets through partnerships so the program best serves the intended patients and community.

Overall, these realities suggest that FIM should not be viewed simply as another clinical service. Rather, FIM represents an attempt to address longstanding limitations of the healthcare system by connecting clinical care with nutrition assistance, public health, and community food resources. FIM represents an opportunity to shift toward investing healthcare resources upstream to address the social drivers of chronic disease before costly complications develop. Successful FIM programs must be designed not only to effectively deliver food but also to empower individuals to navigate these systems.

Food System Conceptual Overview

Whether a FIM program involves a produce prescription, medically tailored groceries, or medically tailored meals, it all starts with food. An introduction to the food systems concept will demonstrate the myriad of ways in which the simple act of providing food to patients could have impacts beyond individual health.

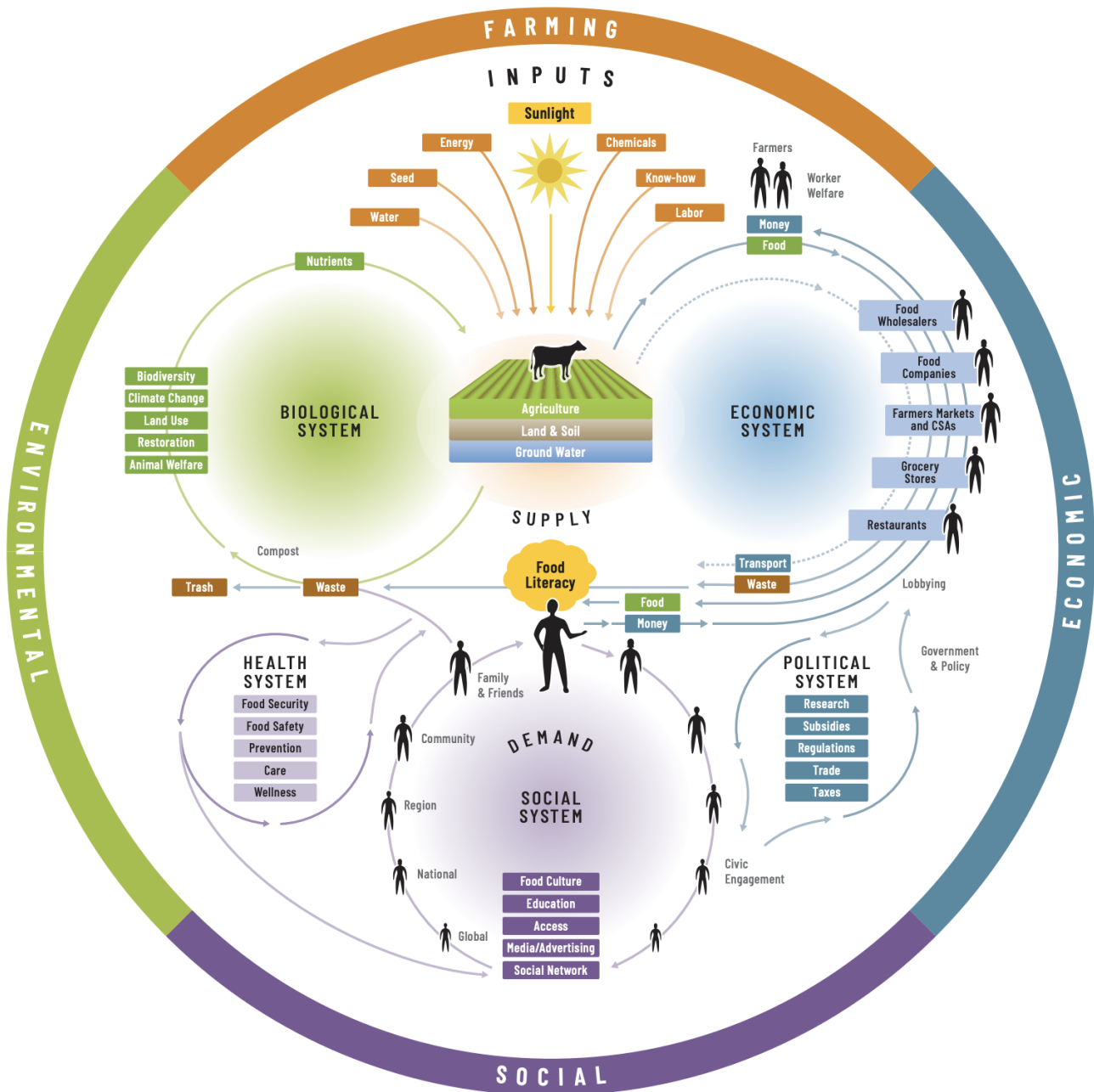
While descriptions of the food system vary, the U.S. Agency for International Development (2016) offered the following comprehensive definition:

The intact or whole unit made up of interrelated components of people, behaviors, relationships, and material goods that interact in the production, processing, packaging, transporting, trade, marketing, consumption, and use of food, feed, and fiber through aquaculture, farming, wild fisheries, forestry, and pastoralism.

The food systems concept provides a framework to assess the many social, economic, and environmental influences and impacts of how food is grown and used (USDA, n.d.). Sustainable food systems, in particular, strive to provide food and nutrition for current and future eaters in ways that balance economic profit, social benefits, and environmental impact (Food and Agriculture Organization of the United Nations [FAO], 2018). Nourish Initiative offers the following visual representation of the food system:

Figure 4

The Food System



Note. Used with permission from Nourish Initiative, www.nourishlife.org. Copyright WorldLink, all rights reserved.

The food system can be considered in six stages: pre-production, production, processing, distribution, consumption, and waste. The boundaries of these conceptual stages are not finite, as they frequently overlap and constantly interact. Each stage has a bidirectional relationship with climate change: both producing emissions and being affected by the resulting climate effects (Brown et al., 2015). Each of these stages is governed by a complex web of policies which shape their operations.

Pre-Production. Before food production can begin, aspiring producers must obtain the capital, land, water, seeds, labor, equipment, and other resources necessary for growing food. Policies relevant to this stage might include pesticide safety standards, zoning and land use laws, and water access and usage laws.

As of 2017, just over half (53%) of the land in the United States is used for agriculture, including crop production and pasture land (Callahan, 2026). Many beginning farmers and those from socially and economically disadvantaged groups experience difficulties accessing the necessary financing to lease or purchase farmland (Callahan & Hellerstein, 2022).

Land use and land use changes are important considerations for environmental and planetary health. Plants, soils, and other organic matter sequester carbon from the atmosphere, and that carbon can be released when land use changes, such as from transitioning grassland or forest to crop production (Crippa et al., 2021; U.S. Environmental Protection Agency [EPA], 2025). While the EPA reports that land use/land use changes in the United States result in more carbon sequestration than emissions, this may not account for global land use changes driven by the dietary choices of U.S. consumers (EPA, 2025).

Greenhouse gas emissions are also generated in the manufacture of fertilizers or animal feed, energy production for on-farm use, and other pre-production activities.

Production. This stage involves the transformation of inputs such as sunlight, water, land, seeds, human expertise and labor into the plants and animals intended for human consumption (WorldLink, n.d.). This includes farming, fishing, and the raising of livestock. Policies

relevant to this stage might include agricultural subsidies, tax exemptions or other incentives for agricultural producers, or organic certification standards (Healthy Food Policy Project, 2023).

Greenhouse gas emissions are produced in each stage of the food system, but “on farm” food production is estimated to contribute the largest proportion (48%) of global food system emissions (FAO, 2024). Among other factors, these estimates include the fuel used to plant and harvest foods, as well as the methane produced by ruminant animals such as cows, and activities described in the pre-production stage above.

Agriculture is also a significant user and polluter of water, especially in the production stage. Crop irrigation is the single greatest user of freshwater, and agriculture is the leading contributor to water quality impacts in rivers and streams (Medalie et al., 2025). Agricultural inputs and byproducts like disturbed soil, pesticides, herbicides, antibiotics, manure and its bacteria can all run off farmland and into waterways, impairing water quality and affecting the health of humans and other animals and plants in an ecosystem (EPA, 2026; CDC, 2024).

Overall, food production decisions help determine the environmental footprint of food before it ever reaches consumers.

Processing. During the processing stage, raw food products are harvested and changed into the items we see on our plates. The steps of this stage can vary widely depending on the food type and desired end product. For example, soy beans can be processed in a number of ways after harvest:

- sorted, washed and flash frozen for home cooking or packaged foods
- dried, soaked, boiled and pressed into tofu, or strained and fortified with vitamins to make soymilk
- dried, hulled, milled into flour for protein powder
- ground into meal for animal feed
- pressed into oil for cooking, then transesterified and mixed into biodiesel, cosmetics or pharmaceuticals (U.S. Department of Energy, n.d.)

The processing stage also includes transport of foods from where they are grown and harvested to where they will be processed. Sources of greenhouse gas emissions in this stage could include factory operations or manufacturing of packaging materials.

Policies relevant to this stage might include food safety standards, cottage food laws, consumer protection laws such as prohibition of trans fats (Healthy Food Policy Project, 2023).

Distribution. During the distribution phase, food is transported from its processing location to the consumer. Emissions are produced in this stage by the planes, trains, and automobiles used to transport food. Year-round availability of products like berries, summer squash and tropical fruits has raised interest in “food miles”, or the distance food travels to the consumer. However, research suggests that food transportation across the whole food system accounts for 11% of total food systems emissions, while only 4% of food system emissions are related to “final delivery” to the retailer (Weber & Matthews, 2008). Consumer efforts to eat locally produced food can aim to reduce those final delivery miles.

Policies relevant to this stage might include permitting a farmers’ market or mobile market, setting SNAP retailer enrollment standards, or regulating where fast food restaurants can operate (Healthy Food Policy Project, 2023).

Consumption. In this stage, consumers purchase, cook, and eat food. Consumers face a dizzying number of food decisions—should it be low fat, gluten-free, locally grown, on sale, organic, quick-cooking, jumbo-size, fair trade, from a familiar brand or a new one? As discussed previously, consumer choice is shaped by many factors such as habit, taste and personal preference, food price and income, cultural background, perceived health effects, marketing, and more (Fernqvist et al., 2024). Food choices are closely linked with human health, but they also play an important role in environmental health. As different foods are grown, processed, and transported, they require different quantities of land, water, agricultural inputs, and packaging, leading to a different environmental footprint. The charts below display greenhouse gas emissions by food type, both by kilogram of food (Figure 5) and by 1000 kilocalories (Figure 6).

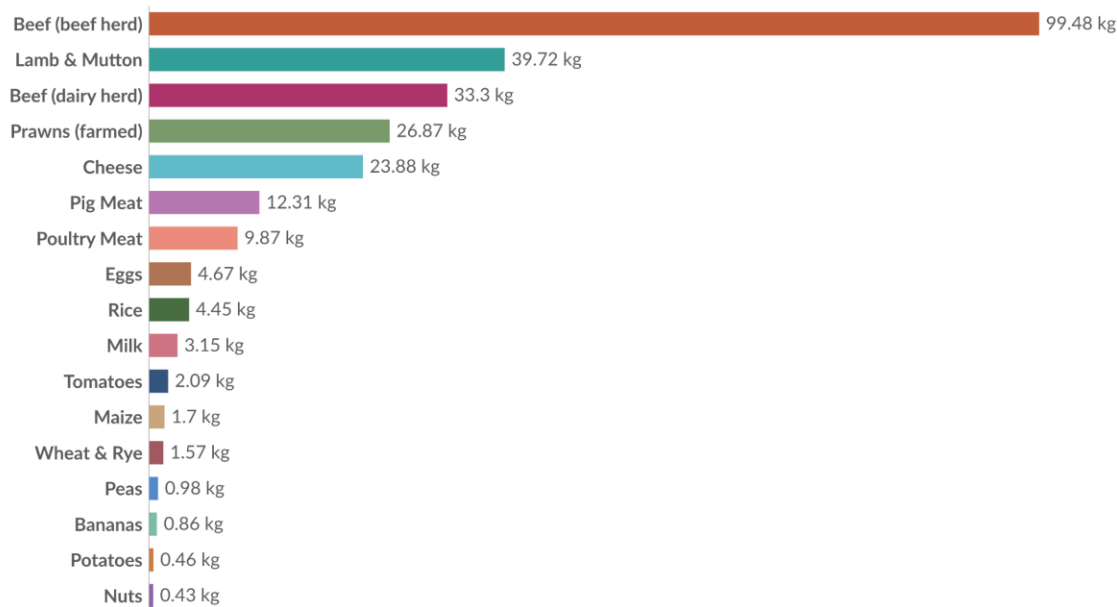
Figure 5

Greenhouse gas emissions per kilogram of food product

Greenhouse gas emissions per kilogram of food product

Our World
in Data

Greenhouse gas emissions¹ are measured in kilograms of carbon dioxide-equivalents². This means non-CO₂ gases are weighted by the amount of warming they cause over a 100-year timescale.



Data source: Poore and Nemecek (2018)

OurWorldinData.org/environmental-impacts-of-food | CC BY

1. Greenhouse gas emissions A greenhouse gas (GHG) is a gas that causes the atmosphere to warm by absorbing and emitting radiant energy. Greenhouse gases absorb radiation that is radiated by Earth, preventing this heat from escaping to space.

Carbon dioxide (CO₂) is the most well-known greenhouse gas, but there are others including methane, nitrous oxide, and in fact, water vapor. Human-made emissions of greenhouse gases from fossil fuels, industry, and agriculture are the leading cause of global climate change.

Greenhouse gas emissions measure the total amount of all greenhouse gases that are emitted. These are often quantified in carbon dioxide equivalents (CO₂eq) which take account of the amount of warming that each molecule of different gases creates.

2. Carbon dioxide equivalents (CO₂eq) Carbon dioxide is the most important greenhouse gas, but not the only one. To capture all greenhouse gas emissions, researchers express them in "carbon dioxide equivalents" (CO₂eq). This takes all greenhouse gases into account, not just CO₂.

To express all greenhouse gases in carbon dioxide equivalents (CO₂eq), each one is weighted by its global warming potential (GWP) value. GWP measures the amount of warming a gas creates compared to CO₂. CO₂ is given a GWP value of one. If a gas had a GWP of 10 then one kilogram of that gas would generate ten times the warming effect as one kilogram of CO₂.

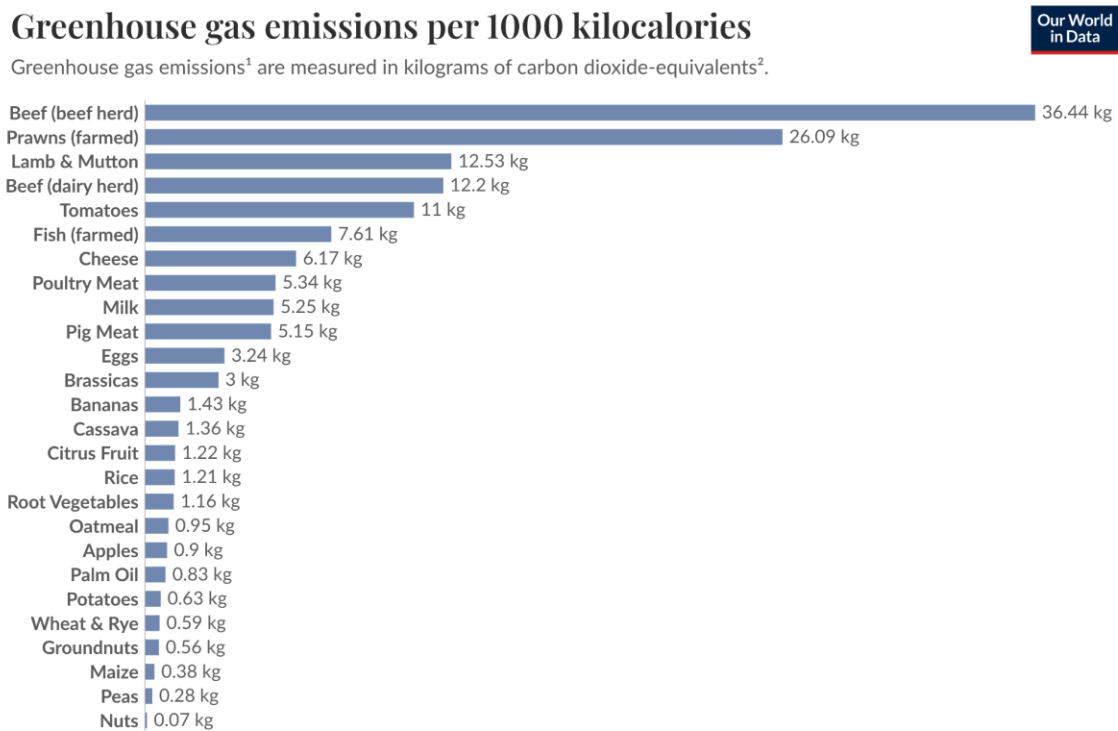
Carbon dioxide equivalents are calculated for each gas by multiplying the mass of emissions of a specific greenhouse gas by its GWP factor. This warming can be stated over different timescales. To calculate CO₂eq over 100 years, we'd multiply each gas by its GWP over a 100-year timescale (GWP100).

Total greenhouse gas emissions – measured in CO₂eq – are then calculated by summing each gas' CO₂eq value.

Note. Reproduced from Environmental Impacts of Food Production, by H. Ritchie, P. Rosado, and M. Roser, 2022, Our World in Data (<https://ourworldindata.org/environmental-impacts-of-food>). Based on data from Poore and Nemecek (2018). License CC BY.

Figure 6

Greenhouse gas emissions per 1000 kilocalories



Data source: Poore and Nemecek (2018)

OurWorldinData.org/environmental-impacts-of-food | CC BY

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Note. Reproduced from *Greenhouse gas emissions per 1000 kilocalories*, by Our World in Data (2019), <https://ourworldindata.org/grapher/ghg-kcal-poore>. Data adapted from Poore and Nemecek (2018). Licensed under CC BY.

Overall, animal-based foods have a greater environmental impact than plant-based foods. Beef is often cited as the most environmentally impactful food, as cows not only require large amounts of plant food, water, and grazing land, but they also produce methane (a greenhouse gas) as a part of their digestive process (Poore, 2018). For similar reasons, sheep

production and dairy foods are therefore also quite resource-intensive. Compared to growing plant foods for direct human consumption, growing plants for animal food generates additional emissions in part because of transportation requirements (e.g. bringing food to herds), and deforestation associated with pasture and corn and maize intended for animals (Poore, 2018). Animal production also results in emissions from wastes such as manure and slaughterhouse effluent.

Large-scale consumer choice of plant-based diets (diets low in or free of animal-derived foods) therefore has the potential for significant positive environmental effects (Gibbs & Cappuccino, 2022). Because the consumption stage ultimately determines which foods are demanded and therefore produced, consumer dietary patterns represent an important leverage point for reducing the environmental impacts of the food system.

Policies relevant to this stage might include setting nutrition standards in the National School Lunch Program, municipal code allowing gleanings in city parks, procurement standards for a state food purchasing program, limiting food advertisements in children's media, or mandatory nutrition labeling in restaurants (Healthy Food Policy Project, 2023).

Waste. This stage accounts for the disposal of uneaten food that was intended for human consumption. These food losses have a social, economic, and environmental cost. Though sources differ on how food waste is defined and quantified (surplus food vs food losses vs food waste, inclusion or exclusion of inedible parts), estimates suggest about 30% of food in the United States is wasted (Buzby et al., 2014; ReFED, 2026; FAO, 2019). Food waste or loss can occur at any stage of the food system: crops may be left in the field if unsold or blemished, peels or scraps may be disposed of during food processing, a break in the cold chain during transportation may lead to food spoilage, a retailer may be unable to sell perishable foods in time, or a consumer may throw away remnants of an overlarge restaurant meal. Of all these potential losses, consumer food waste is estimated to be the largest contributor in the United States (ReFED, 2026). The U.S. Environmental Protection Agency (2025) has calculated that on average, a U.S. consumer wastes \$14 of food per week, around 11% of their total food expenditures (Kenny, 2025). These estimates include both prepared and unprepared food at

home, restaurants, cafeterias, and other settings. Consumer food waste has been linked to limited planning before purchases, overlarge packaging sizes, label confusion (“best by” vs “use by”), food preferences (such as to not eat leftovers), sub-optimal cooking skills (such as inability to cook leftovers into new meals), or not composting or recycling kitchen waste (Principato et al., 2021). While some edible yet uneaten food can be diverted to the charitable food system or for livestock feed, most consumer food waste goes to the landfill (ReFED, 2026). Food waste reduction has been highlighted as a key opportunity for reducing food insecurity, mitigating climate change, and providing economic benefit to industry and consumers alike (FAO, 2019; ReFED, 2026).

Policies relevant to this stage might include “best by” food date labels, setting home composting standards, tax deductions for food donation, or “good Samaritan” laws exempting food donors from liability (Healthy Food Policy Project, 2023).

Tying it all Together

While each stage of the food system presents distinct logistical and environmental considerations, the stages are highly interconnected. Decisions made during production influence processing and distribution, while consumer demand helps shape what is ultimately produced. Understanding the food system as an interconnected whole provides a useful framework for evaluating interventions that seek to improve health, sustainability, or both. Rather than considering food solely as a source of nutrients, a food systems perspective recognizes that decisions about what food is produced, purchased, consumed, and discarded have implications for environmental, economic, and social outcomes. This perspective is inherently relevant to FIM, as a food-based intervention.

Although FIM programs represent an important bridge between healthcare and the food system, the primary emphasis to date has been on improving individual health outcomes, without discussion of the larger systemic context. This focus is understandable given the urgent burden of diet-related chronic disease and the healthcare system’s need for evidence-based interventions. However, as FIM continues to evolve, there is an opportunity to consider how these programs might simultaneously address the interconnected challenges of human health and planetary

health. Understanding whether this broader perspective is already reflected in current FIM practice is an important step toward identifying opportunities for future program development. The following sections describe the results of a stakeholder survey examining how existing FIM programs incorporate food system objectives, with particular attention to environmental sustainability considerations in program design, implementation, and evaluation.

Methods

IRB

This study protocol was entered into the IRB Exempt Wizard with the following result: “This activity is not human subjects so 45 CFR part 46 does not apply.”

Literature Review

A foundational literature review was conducted by searching Google Scholar and ASU Library, which includes the ASU catalog and EBSCO. The following search terms were used:

- "food as medicine" OR "food is medicine" AND sustainability
- "food as medicine" OR "food is medicine" AND planet
- "food as medicine" OR "food is medicine" AND planetary health
- "food as medicine" OR "food is medicine" AND “climate change” OR “global warming”
- "food as medicine" OR "food is medicine" AND climate
- "food as medicine" OR "food is medicine" AND agriculture

Due to the rapidly evolving nature of FIM, the search was limited to literature published in the year 2000 and later. The author reviewed additional relevant literature on topics such as healthcare and food systems to inform the Background section of this paper.

Surveys

Potential survey respondents were identified by searching “food is medicine” OR “food as medicine” and names of individual states. Survey invitees were self-identified as FIM (or food as medicine) programs or practitioners based on explicit use of those terms on their webpages. FIM programs that claimed to be part of a time-limited pilot project were excluded. Additional survey invitees were identified by utilizing the Find a FIM Agency function on the Food Is Medicine Coalition (FIMC) website (<https://fimcoalition.org/find-agency/>). The author contacted the FIMC to

discuss sharing the survey with their membership, though ultimately the time constraints of this project prevented such a partnership. The author also contacted other national and state-level FIM coalitions without response. The Food As Medicine Collaborative shared the survey with their members. The author also posted about this project on LinkedIn.

Potential survey respondents were contacted by email, website contact form, or LinkedIn message and were invited to complete surveys electronically via Google Forms. Survey respondents were provided the option to submit confidential responses. The survey questions and informed consent statements are provided in Appendix A of this report.

Key Informant Interviews

Survey results were supplemented by three key informant interviews. While surveys aimed to capture current practices in existing FIM programs, these key informant interviews focused on the future opportunities of FIM and how environmental sustainability may factor into those opportunities. The interview questions were provided to interviewees in advance, and are provided in the Appendix of this report along with the accompanying consent form.

Representative quotations from key informant interviews and open-ended survey responses are included in this report to illustrate themes. Quotes are presented verbatim with minor edits for spelling or punctuation where indicated, and identifying information was removed to preserve participant anonymity when requested.

Limitations

Small sample size and strict time constraints limited the exploration of this topic. Participants are not a representative sample of the many diverse FIM programs in the United States. Survey invitees were self-identified as FIM (or food as medicine) programs or practitioners based on explicit use of those terms on their webpages, and therefore this survey may have unintentionally excluded programs that are offering FIM interventions under other names or without a web presence. Survey invites were primarily sent through email, and therefore did not reach FIM programs or practitioners without a publicly available email. Though the author attempted to invite respondents from across the country, FIM programs were not easily identified in each state using the methods described above. Because the author posted about this project

on LinkedIn, respondents were more likely to be associated with the author's own professional network, which is certainly biased towards nutrition and sustainable food systems professionals based in the western United States. Because the project title and survey descriptions explicitly mentioned environmental sustainability, respondents whose programs prioritize sustainability practices may have been more inclined to complete the survey and interview for this project, unintentionally excluding FIM programs that do not presently implement explicit environmental sustainability measures.

Each survey reflected the perspective of a single respondent within an organization. While respondents provided valuable insights into organizational practices, individual perspectives may not fully represent the breadth of activities, priorities, or decision-making occurring across the organization. Because participants were not asked to report their job title or organizational role, it was not possible to determine the extent to which their responses reflected organization-wide practices. Accordingly, findings should be interpreted as reflecting informed organizational perspectives rather than definitive descriptions of each organization's complete FIM programming.

Another limitation of this study is the potential for self-selection bias among survey respondents. Individuals with academic, research, or evidence-informed professional backgrounds may have been more likely to participate because they are more familiar with research processes and more accustomed to completing surveys. Consequently, the findings may overrepresent the perspectives of stakeholders who are already engaged with research or who have greater familiarity with evaluating and discussing FIM programs. Though survey invites were sent to commercial/private sector FIM programs (such as MTM vendors), very few received responses.

By design, this study surveyed professionals involved in Food Is Medicine (FIM) rather than seeking to capture the perspectives of program participants or community members in their capacity as recipients of FIM services. Accordingly, the findings primarily reflect respondents' professional perspectives and should not be interpreted as representing the full range of patient or community perspectives. Incorporating the voices of program participants and communities

into future research will be essential to ensure that efforts to integrate sustainability into FIM remain responsive to the needs, priorities, and lived experiences of those the programs are intended to serve.

Results

Approximately 100 personalized survey invitations were distributed, resulting in 30 responses and three key informant interviews.

Organizational Characteristics

The organizational characteristics of respondents are summarized in Table 1 below. Of these respondents, most identified as a nonprofit organization (53%), followed by a food bank or food access organization (23%). Some respondents identified as multiple organization types, (non-profit & food access organization, food pantry inside an academic research hospital, free and charitable clinic & food access organization), which they entered in the “other” free response field. Two respondents identified themselves as food hubs and agricultural organizations or farmers’ co-operatives.

Respondents were funded by a variety of means. All but one respondent included grants in their list of primary funding sources. Respondents also shared that they were funded by general operating funds, agricultural extension funds, or revenue generated from retail sales. Two respondents mentioned they were previously funded by healthcare payers but were not presently receiving those funds.

Produce prescriptions were the most common type of FIM intervention offered by respondents’ organizations (73%), followed closely by nutrition education (63%) and cooking classes/culinary education (47%). MTG and MTM were the least common interventions, which perhaps reflects their high level of individualization and resource requirements. Two-thirds of respondents offered multiple intervention types at their organization.

Table 1*Organizational Profiles, Funding Streams, and FIM Intervention Types of Respondents*

Organization Characteristic	<i>n</i>	%
Organization Type ^a		
Nonprofit organization	16	53
Food bank or food access organization	7	23
Healthcare system or clinic	5	17
Academic institution	2	7
Agricultural organization (food hub and/or farmer's co-operative) ^b	2	7
Health philanthropy ^b	1	3
Primary Funding Sources ^a		
Foundation or philanthropic grants	25	83
Government grants or contracts	14	47
Individual donations	13	43
Healthcare payer reimbursement (Medicaid, Medicare, Commercial insurance)	7	23
Research funding	4	13
Corporate funding or sponsorships	3	10
FIM Intervention Type ^a		
Produce prescriptions (PRx)	22	73
Nutrition education	19	63
Cooking classes/culinary education	14	47
Medically tailored groceries (MTG)	9	30
Medically tailored meals (MTM)	7	23

Note. N=30.

^a As these questions allowed respondents to select all applicable answers, percentages sum to greater than 100.

^b These options were listed under "other". Please see the Results section for a summary of responses listed under "other".

One respondent organization offered a “referral program for patients who screen as food insecure”, rather than PRx or the other FIM interventions listed. Another respondent clarified that their organization (a health philanthropy organization) did not operate FIM interventions, rather they fund Federally Qualified Health Centers to do so.

Respondents also shared about a number of additional interventions offered by their organizations, as shown in Table 2:

Table 2

List of other programs and services offered by respondent organizations, as volunteered by respondents

Intervention Type	
Food Provision (In-kind or cash equivalent)	Customizable CSA shares based on food preferences and dietary restrictions -- In addition to produce, we offer meats, eggs, dairy, value added/shelf stable products, whole grains.
	Shelf-stable food boxes
	Medically supportive groceries, medically supportive meals
	Produce drops at public and private partner sites
	Farmers market produce vouchers
	Medicare FSA / OTC Cards for Healthy Groceries at Retail Location
Incentive Program	SNAP incentives
Non-food Offerings & Services	Cooking supplies/tools
	Garden based health interventions
	Stocking HRSA [health related social needs] pantry
	Referral programs
	Leadership and advocacy for FIM

Note. Interventions are described in respondents' own words whenever possible.

Importance of Environmental Sustainability Considerations

All respondents reported their organizations considered environmental sustainability when designing or operating FIM programs, albeit with varying frequency (see Figure 7). When asked their own opinion about how important it was to consider environmental sustainability in FIM programs, all respondents reported it was either “moderately important” or “very important” (see Figure 8)

Figure 7

Frequency of environmental sustainability consideration in FIM programs

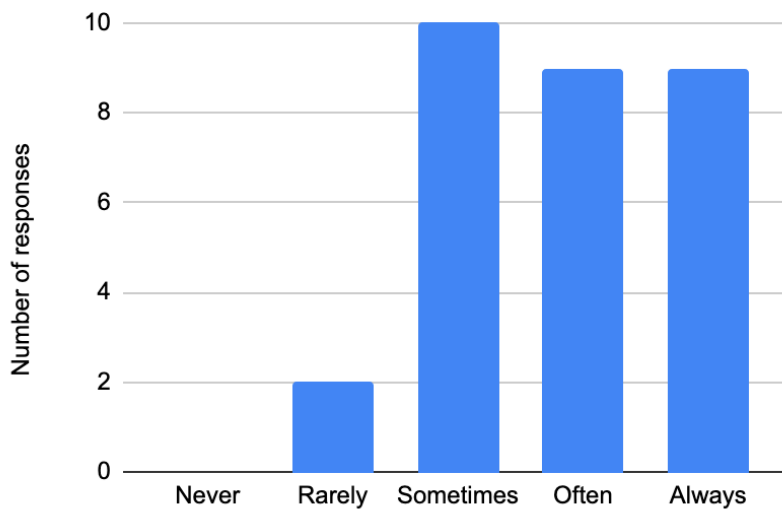
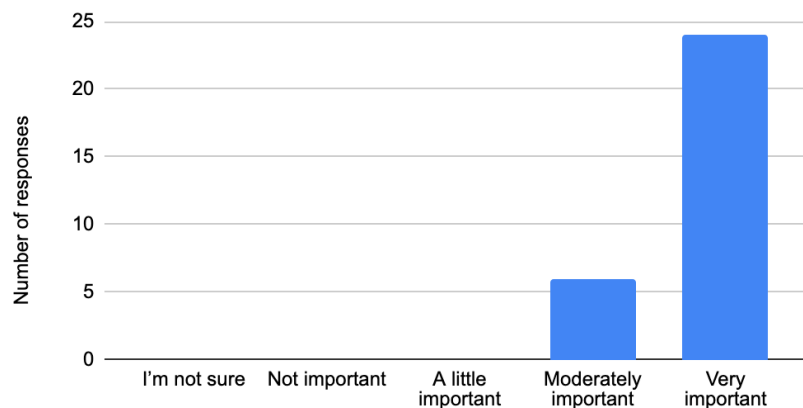


Figure 8

Perceived importance of environmental sustainability considerations in FIM programs

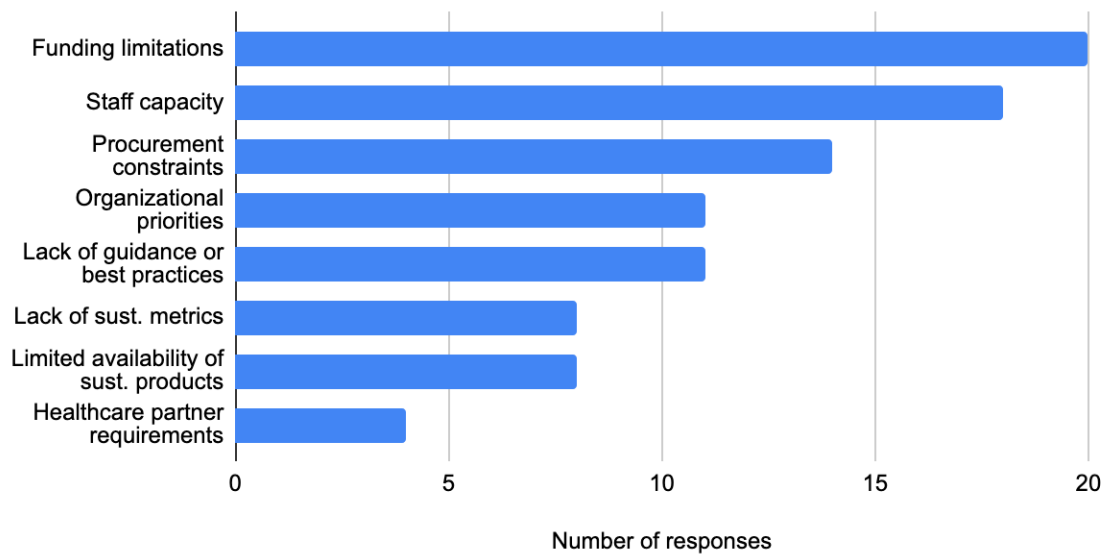


Barriers to Incorporating Environmental Sustainability Considerations

Respondents identified a number of barriers to incorporating environmental sustainability considerations, as shown in Figure 9.

Figure 9

Perceived barriers to environmental sustainability considerations in FIM programs



Reported barriers clustered into four broad categories:

1. Capacity constraints: funding and staffing
2. Supply chain: procurement and product availability
3. Institutional or healthcare system constraints: organizational priorities and healthcare partner requirements.
4. Knowledge and implementation gaps: lack of guidance/best practices and metrics

Capacity-related barriers appeared most frequently among responses, suggesting that organizations perceive resource limitations as a greater challenge than a lack of interest in sustainability.

Environmental Sustainability Practices

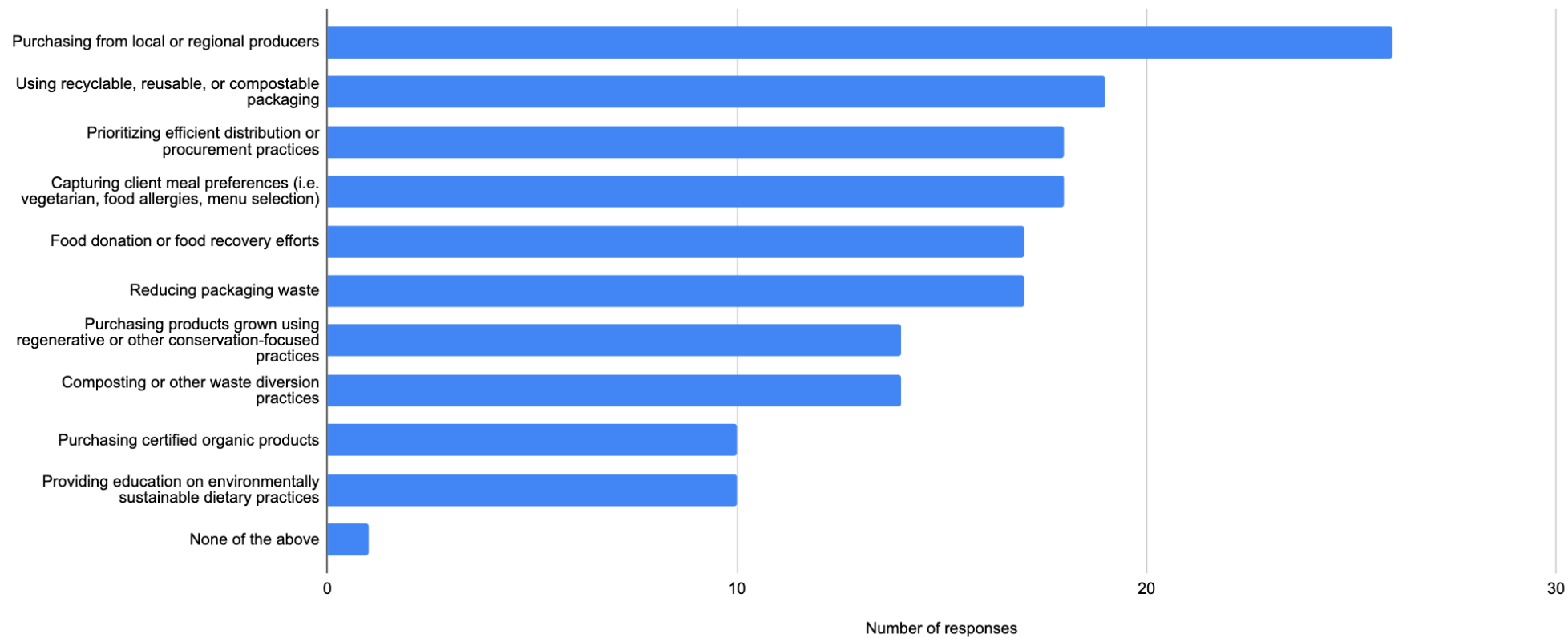
Despite the many barriers, all but one respondent had implemented environmental sustainability considerations into their FIM program design and operations. (The remaining program focused on referral services for patients with food insecurity and did not report providing any in-kind food programs). Practices spanned food production, procurement, processing, packaging, distribution, consumption/waste prevention. Purchasing from local or regional producers was by far the most commonly cited practice at 87%. Some practices might have been double-counted; for example, “purchasing from local or regional producers” might also have been categorized as “prioritizing efficient distribution or procurement practices”.

Notably, this survey did not ask about what types of food would be provided (e.g., plant-based meals), as this practice would likely only have been applicable to MTM or MTG programs rather than the spectrum of program types surveyed.

Importantly, respondents also reported other practices including community gardening, building community, increasing native pollinators, and engaging traditional ecological knowledge from elders. Two respondents highlighted the use of 100% client choice in their programs (SNAP match, and PRx, MTM, MTG, cooking classes, nutrition education). One respondent who identified as a non-profit organization mentioned that their program did not “dictate growing practices to our farmer/producer network, but the majority are using regenerative practices. [...] We offer farmers services such as technical assistance and cost-share incentives for “Climate-Smart” practices”.

Figure 10

Reported environmental sustainability practices



Note. N=30

Evaluation Practices

Twenty-two respondents (73%) noted that their organizations did not formally measure or evaluate any environmental sustainability outcomes in their FIM programs, or that these outcomes were not applicable to their program. One of these respondents reported their program was in the process of defining such outcomes. Additional respondents mentioned that they were not sure, or that partners or other areas of the organization's operations measured relevant outcomes.

Those respondents measuring environmental sustainability most frequently mentioned metrics focused on procurement practices: value or percentage of food budget spent on local food, amount/value of food grown by the program, number of organic farms, ranches and dairies supported, and share of food coming from 250 miles. Other metrics highlighted distribution (vehicle miles traveled) and food waste and waste avoidance.

Reported evaluation practices also expanded beyond this author's provided list of options. Respondents mentioned measuring environmental impact with "reduction in carbon impact from being 100% electric, reduced energy use from solar/battery system" (C. Couch, personal communication, July 2, 2026), while another tracked social value with food shared through free programs, value of pay-as-you-can sales, and a third collected economic surveys from local farmers and producers. A respondent based in a tribal health clinic shared, "we incorporate food sovereignty principles into programming which synergizes well with environmental sustainability (but this is from a cultural importance perspective)". The diversity of FIM intervention models are reflected in their varied evaluation practices, though these findings suggest programs may struggle to capture the full value of these interventions.

Discussion

Key informant interviews and surveys provided important insights into the current practices and priorities of existing FIM programs, as well as essential opportunities for linking FIM and environmental sustainability in the future. Respondents identified opportunities spanning healthcare and multiple stages of the food system, including agricultural production, procurement,

distribution, consumer education, and food waste reduction. Collectively, these findings suggest that the opportunity for environmentally sustainable FIM is not simply to encourage new practices, but to recognize, measure, connect, and strengthen work that is already underway.

Several key themes emerged:

FIM Implementers See the Systems

Key informant interviews and surveys revealed that existing FIM programs are already engaging with questions that extend beyond individual health outcomes. While this project focused specifically on environmental sustainability, respondents consistently connected planetary health with the social and economic conditions necessary for communities, producers, healthcare systems, and the individuals served by FIM programs to thrive. Respondents saw it as a “triple win”, repeatedly noting the potential “synergy” or “symbiosis” of linking human health and planetary health through partnerships with agriculture, healthcare, and public health.

As one key informant noted, “[t]his is a very...unique opportunity for us to potentially improve on attributes of the food system, and [...] get people thinking about the environmental impacts and [...] how the food is produced, too” (K. Battaglia, personal communication, June 16, 2026). The opportunity is not convincing FIM practitioners that environmental sustainability matters—they already believe it. The opportunity is helping translate existing systems thinking into measurable, scalable action, and allowing that action to make systems thinkers of us all.

Barriers Exist, but Programs Persist

Although respondents overwhelmingly valued environmental sustainability, implementation was constrained by funding, infrastructure, and competing priorities.

Funding and Competing Priorities. One anonymous respondent noted, “[w]e definitely need to understand more about environmental sustainability in all food access (not just FIM), but I think the question also is - how do you balance meeting the need for food (volume and cost) with sustainable practices?”

For many organizations, environmental sustainability represents an expansion of their mission rather than their foundational purpose. Programs first must ensure they can reliably provide nutritious food to participants, meet funder requirements, and maintain operational

capacity. These immediate pressures may explain why environmental considerations, although valued, are not always prioritized during program design or evaluation. From her perspective in a food access organization, one respondent suggested, “[t]he core issue is awareness and an understanding of the potential negative impacts of sourcing poor quality food that is grown in unsustainable ways and how this links to your own mission as an organization” (C. Couch, personal communication, July 2, 2026).

Supply Chain Realities. Though most (87%) respondents reported purchasing from local or regional producers, they were not always able to attain the desired products: “[w]e have talked to farmers about local produce for our meal/grocery production but they can't consistently get us produce. We also need farmers to grow more to fulfill our procurement needs.” This is not an isolated problem: unfortunately, current agricultural production is not aligned with human nutritional needs. Kc et al. (2018) found that the current agricultural system does not produce adequate fruit, vegetables, and protein to meet global nutrition needs, while simultaneously producing excess grains, fats, and sugars. Scholars have argued that a growth in FIM could drive demand for fruits and vegetables, which paired with federal-level policy changes, could shift what crops are grown and what production methods are used (Adams et al., 2024; Defraeye et al., 2025). These shifts are especially important, as climate change is expected to threaten future food security both locally and around the globe (Brown et al., 2015).

However, farmers are already experiencing the urgency of climate pressures. During a key informant interview, an organic farmer and sustainable food systems practitioner was asked how environmental sustainability factors into the ideal future with FIM. She answered, “it's critical. I mean, we have to know the soil and we have to know water. Those are the two critical components. And those are the most at-risk components that we are facing today. And we have to solve those problems. Immediately.” Climate pressure is a current reality for farmers, but respondents suggested this urgency may not be reaching conversations yet with implementers, funders, and policymakers. And these conversations need to reach a critical mass: “if a majority of the people are not thinking about Food Is Medicine, and the potential for the environment, then

that might not be [...] enough people to actually make progress in that department” (K. Battaglia, personal communication, June 16, 2026).

From Invisible Work to Impact Stories

One survey respondent implored, “[p]lease find a way to highlight the work that is already being done by organizations and not just looking for new programs. We are doing the work now” (J. Skipton, personal communication, June 26, 2026). Unfortunately, this powerful work may be difficult for outsiders to see. Though nearly all (97%) survey respondents reported implementing environmental sustainability considerations in the program design and operations, only 27% were explicitly measuring related outcomes.

Quantifying impacts is essential for enlisting support from participants, partners, communities, and funders. Most FIM evaluations, understandably, focus on the health outcomes of individual patients (weight, hemoglobin A1c, cholesterol or blood pressure levels)--after all, improving health is the primary intended action of FIM interventions. Some programs and researchers are also focusing on the potential cost savings or changes in utilization for healthcare organizations and the health system overall (Downer et al., 2020; Hager et al., 2022).

Environmental health metrics may be less familiar. As Bernstein & Hunnes (2025) point out, “measuring the ecological impact alongside clinical, utilization and financial measures of FIM requires a different analytical approach than used traditionally in health care”. However, guidance is limited. For example, neither environmental nor planetary health are mentioned in the HHS ODPHP Food Is Medicine Analytic Framework, the tool “developed to provide a research-based, community-centered guidepost to support diverse leaders implementing and measuring the effects of FIM interventions” (ODPHP, 2024, para. 1). The same is true in the American Heart Association (AHA)’s Healthcare by Food initiative overview of common FIM research measures (AHA, 2025). While both resources are important tools to create a shared language among FIM implementers, they miss the opportunity to examine climate impacts.

Fortunately, guidance can be found from other FIM programs. In a case study of the University of California, Davis Health Foodways to Health Program, Gupta et al. (2025) offer some relevant evaluation metrics which may be applicable to other programs:

1. Percentage of annual food purchased from plant-based foods (plant proteins and other plant-based foods vs animal-based foods vs beef and lamb specifically)
2. Percentage of annual food purchased from farms, ranches, pastures and fisheries “using environmentally friendly practices”
3. Food waste diversion (pounds of food donated)
4. Carbon emissions (“tons of carbon dioxide equivalent calculated by pounds of food purchased and pounds of food donated”, calculated using the CoolFood Calculator by the World Resources Institute)

Establishing shared outcomes metrics has been identified as a key strategy for successful FIM implementation (Houghtaling et al., 2024) and could be helpful for scaling FIM effectively. As the field matures, the next phase of FIM development may depend less on creating new models and more on documenting, evaluating, and strengthening existing programs. This documentation can make it easier to build a shared vision with funders. One key informant in the public health field pointed out: “so we've got to find the funding, and I think you do that by generating success stories, and by generating shared language.” Turning the conversation to climate can have surprising results. One respondent wrote,

Our sustainable procurement plan is really a pet project of mine since I have a background in climate justice, but I've been surprised at how well-received it has been when talking with donors. Our funding is raised by the community during an annual event [...] and it resonates with donors to know that the money they raise is invested directly back into community agriculture and food sovereignty for our region (J. Boger-Hawkins, personal communication July 2, 2026).

Environmental sustainability was personally important to survey respondents. Sharing that value openly can rally support, which translates into change. Capturing and elevating the important work of existing FIM programs can help keep environmental sustainability in the FIM conversation.

Actionable Strategies to Manage Impact Today

Nearly all (97%) respondents reported they were already implementing at least one environmental sustainability practice in their current work, and most closely associated procurement practices with their environmental impact. Procurement, whether it be sourcing locally or purchasing from producers using conservation-focused practices, can be an important lever (Rahman et al., 2024). In one example, the Center for Good Food Purchasing (n.d.) uplifts how value-based procurement for public institutions can build “grow local jobs and wages, reduce environmental impact, decrease health risks & healthcare costs, empower a valued workforce, improve animal welfare, advance equity, accountability and transparency” (*A Values-Based Framework for Food Purchasing* section). However, sustainable procurement is complicated by the still-emerging research on the environmental and human health impacts of particular agricultural production practices, which are highly context-specific and may function differently in different geographies (Battaglia et al., 2026; Rahman et al., 2024). But perhaps FIM programs need not stay frozen, awaiting that perfect agricultural production evidence. While procurement is an excellent entry point, it is not the only lever: existing research suggests additional opportunities may exist through shifting dietary patterns and food waste reduction.

While local purchasing is thought to strengthen the resilience of local food systems and communities, studies suggest that avoiding animal-based foods can have a larger environmental impact than reducing “food miles” (Poore et al., 2018). Choosing plant-based or primarily plant-based diets is suggested as an important climate change mitigation strategy (Moreno et al., 2022; Willett et al., 2019). Key informant Kyra Battaglia, a researcher examining the multifaceted societal health and environmental impacts of the FIM movement, opined that “the largest opportunity [of FIM] is to improve dietary intake in a way that addresses environmental concerns”. Perhaps this opportunity lies partly in encouraging plant-based diets in MTM and MTG programs (Bernstein & Hunnes, 2025).

Respondents highlighted the importance of consumer choice, and most (60%) reported capturing client preferences in their programs. This strategy could be helpful both for empowering plant-based diets and culturally relevant choices, but also for reducing consumer food waste,

which extracts a significant environmental cost (FAO, 2019). Food waste reduction has been identified as a key opportunity in FIM to mitigate climate impacts (Bernstein & Hunnes, 2025). Food donation, food recovery, and composting can all contribute to waste diversion, but these were the least reported strategies reported in surveys. Programs may consider adding information about plant-based recipes and food waste prevention as an actionable environmental intervention. Most respondents (63%) offer nutrition education with their programs, though only 33% reported providing education about sustainable dietary practices. Interventions such as cooking classes or culinary education, as offered by 47% of programs, can offer participants additional support in preparing unfamiliar foods or learning to re-use leftovers. These too may represent an actionable yet underutilized opportunity for FIM programs to mitigate environmental impact while broader supply-chain or research challenges are addressed. While any of these strategies may seem individually insufficient to overcome participants' barriers to healthy eating or to transform the entire food system, in synchrony they offer a powerful recipe for change. This is the true power of FIM.

A Call for Coordination & Collaborative Learning

Food Is Medicine programs are inherently transdisciplinary interventions, and their success depends on coordination across sectors that have historically operated separately. FIM implementers are feeling this tension. A state-level FIM facilitator shared, “there's a lot of momentum, but it doesn't feel coordinated just yet”, citing the loss of federal leadership in FIM and the splintering of the movement between “food *is* medicine” and “food *as* medicine” approaches. Echoes of this division are felt through the FIM movement, and practitioners have hope for better; one producer shared that the ideal future of FIM “would look like cohesiveness, because right now it's so fragmented.”

Part of this difficulty might lie in FIM's community roots. A key informant working to scale FIM noted, “what we're also seeing right now is, because programs are developed based on community need, community readiness, and whatever partners are at the table in a community. They are very hyper-localized. But that means their data sets are also hyper-localized. [...] that is the ultimate challenge, right? How do you scale something that is hyper-localized? [...] And we're

hearing that the hyperlocalization is really what makes the program successful.” This specificity may be the double-edged sword of FIM, both its greatest strength and potential weakness.

Scaling FIM cannot mean creating a universal model detached from local contexts. The very characteristics that make programs successful—their responsiveness to community needs, relationships with local partners, and ability to leverage existing assets—are also what make them difficult to compare and replicate. Future growth will require balancing shared outcomes and coordinated learning with flexibility for communities to design approaches that reflect their unique circumstances. After all, “[e]nvironmentally sustainable food as medicine programs will not be one-size-fits-all” (K. Battaglia, personal communication, June 16, 2026).

Collaborative learning may be part of the answer. These surveys show that FIM programs are out there doing the work now, but they want guidance on how to successfully and meaningfully incorporate environmental sustainability in their work. As one eloquent respondent shared,

I think there is significant opportunity for education and resource development to support organizations that design and implement Food Is Medicine programs in regard to environmental sustainability. For non-profits, program planning requires a constant balance between what is ideal for the target population and what is feasible given limited funding, staffing, etc. As a result, environmental sustainability is often deprioritized in favor of meeting funder requirements and addressing participants' immediate needs. Resources and practical tools that help organizations integrate sustainability into existing program planning, rather than treating it as a separate or competing priority, would be valuable. For example, guidance on small, achievable steps organizations can take to improve environmental sustainability without compromising program effectiveness may make sustainability feel more attainable. In addition, opportunities to learn from pilot programs or established Food Is Medicine initiatives that have successfully incorporated sustainability considerations could provide useful models and demonstrate that sustainability goals can be pursued in tandem with other programmatic goals. [emphasis added]

While this project did not include detailed case studies, Gupta et al. (2025), Rahman et al. (2024) and Sanabria et al. (2026) offer some relevant program profiles. Conveners such as the national and state FIM or food as medicine coalitions can also offer collaborative support and guidance. Philanthropic organizations such as the Rockefeller Foundation, or nonprofits like the American Heart Association are also coordinating national efforts in the FIM space.

Technical assistance is another important component for building the capacity of FIM programs. Agricultural extension programs contribute to the research gaps by helping producers collect on-farm data, and by elevating climate-smart agricultural practices. Food hubs and farmer's co-operatives can provide similar hands-on guidance, plus essential aggregation, marketing and vendor services linking producers and would-be buyers. By acting as conveners, local and state-level public health departments can act as essential links between agriculture, healthcare, and the communities they both serve. Public health can also offer support in program evaluation, helping to gather the data needed to tell the story of FIM's impacts to funders and policymakers. These partnerships represent the essential "synergy" which respondents repeatedly mentioned when discussing how FIM can support the health of individuals, communities, and the planet.

Conclusion

FIM represents an essential progression in public health nutrition, in which the importance of diet quality is recognized, and existing systems are redesigned to harness the power of food to prevent, manage, and treat disease. FIM has the potential to improve individual health with targeted healthcare-based interventions—but it could also be so much more. Positioned at the intersection of healthcare, agriculture, public health, and community development, it offers a unique opportunity to improve health while strengthening the food systems upon which that health ultimately depends. This study found that many FIM practitioners already recognize these connections and are incorporating environmental sustainability into their programs in meaningful, if often underrecognized, ways. Respondents demonstrated systems thinking that extended beyond patient outcomes to include farmers, local economies, community

resilience, and environmental stewardship, suggesting that the field is already moving toward a more holistic understanding of health.

At the same time, the findings indicate that translating these shared values into consistent practice requires greater support. Limited funding, competing priorities, fragmented coordination, and a lack of shared evaluation frameworks make it difficult for organizations to measure, communicate, and expand the environmental impacts of their work. Rather than calling for entirely new models of FIM, this study suggests that the next phase of the movement may depend on strengthening existing programs through practical guidance, collaborative learning, stronger partnerships, and shared outcome measures that capture both health and environmental benefits.

Importantly, environmentally sustainable FIM programs are unlikely to be one-size-fits-all. The local partnerships, community priorities, and regional food systems that make programs effective also make them inherently context-specific. Future progress will therefore require balancing shared goals with local flexibility, allowing communities to adapt evidence-informed practices to their unique needs and resources. As FIM continues to evolve, its greatest opportunity may lie not only in improving clinical outcomes, but also in helping bridge historically separate conversations between healthcare, agriculture, public health, community development, and environmental sustainability. In doing so, FIM could help cultivate the systems thinkers needed to close the gap between what we value and what we practice, strengthening both human and planetary health in the process.

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Declaration of Generative AI:

The author used ChatGPT to generate the title of this work utilizing the prompt “what title would you suggest for a capstone project examining how food is medicine programs integrate environmental sustainability practices?” (OpenAI, 2026). ChatGPT was also used to format citations without a digital object identifier (DOI) according to APA guidelines. This author reviewed all citations and links for accuracy.

APPENDIX A

FIM and Sustainability Survey

Title of Study: **Environmental Sustainability in Food Is Medicine Programs: Current Practices & Opportunities**

I invite you to complete a 10 question survey. Your participation is voluntary, and you are free to decline to answer any question or withdraw at any time without consequence. You must be 18 years of age or older to participate. There are no anticipated risks or discomforts associated with participating in this survey.

Use of Your Responses:

Your input is a vital part of this project. Your responses will be utilized to inform a graduate research project, culminating in a report published on the website of the Swette Center for Sustainable Food Systems. Insights from Food is Medicine (FIM) practitioners like you will help ensure that the final report reflects priorities of FIM practitioners and the breadth and diversity of FIM work being conducted today.

You will receive a copy of your survey responses to the email you provide. De-identified data collected as a part of current study will not be shared with others (e.g., investigators or industry partners) for future research purposes or other uses.

If you have questions about this research, you may contact the research team at the emails listed below. For concerns about your rights as a research participant, you may contact the ASU Office of Research Integrity and Assurance at (480) 965-6788.

Lani Miller, <email address>

Dr. Melissa Nelson, <email address>

Thank you for your time and support!

Email:

Confidentiality and Identification:

You may choose to remain anonymous or allow your name to be included in the report. If you choose anonymity, we will do our best to protect your identity.

- I agree to participate and would like to remain anonymous in the final report.
- I agree to participate and consent to be identified by name in the final report.

By entering your name below, you acknowledge your consent to participate in this study.

1. Would you like to be notified when the final capstone report is available online?
 - a. Yes
 - b. No
2. Which of the following best describes your organization?

- a. Healthcare system or clinic
 - b. Nonprofit organization
 - c. Food bank or food access organization
 - d. Government agency
 - e. Academic institution
 - f. Other (please specify)
3. Which Food Is Medicine programs does your organization currently operate? (Select all that apply)
- a. Produce prescriptions
 - b. Medically tailored meals
 - c. Medically tailored groceries
 - d. Nutrition education
 - e. Cooking classes/culinary education
 - f. Other (please specify) _____
4. What are the **primary** funding sources for your Food Is Medicine program? (Select all that apply)
- a. Healthcare payer reimbursement (Medicaid, Medicare, commercial insurance)
 - b. Government grants or contracts
 - c. Foundation or philanthropic grants
 - d. Corporate funding or sponsorships
 - e. Individual donations
 - f. Research funding
 - g. Other (please specify) _____
5. How frequently does your organization currently consider environmental sustainability when designing or operating Food Is Medicine programs?
- a. Never
 - b. Rarely
 - c. Sometimes
 - d. Often
 - e. Always
6. In your opinion, how important is it for Food Is Medicine programs to consider environmental sustainability and/or planetary health alongside patient health outcomes?
- a. Not important
 - b. A little important
 - c. Moderately important
 - d. Very important
 - e. I'm not sure
7. Which of the following environmental sustainability practices are currently incorporated into your Food Is Medicine program(s)? (Select all that apply)
- a. Purchasing from local or regional producers
 - b. Purchasing certified organic products
 - c. Purchasing products grown using regenerative or other conservation-focused practices
 - d. Reducing packaging waste
 - e. Using recyclable, reusable, or compostable packaging
 - f. Prioritizing efficient distribution or procurement practices
 - g. Providing education on environmentally sustainable dietary practices
 - h. Capturing client meal preferences (i.e. vegetarian, food allergies, menu selection)
 - i. Food donation or food recovery efforts

- j. Composting or other waste diversion practices
 - k. None of the above
 - l. Other (please specify)
8. Does your organization formally measure or evaluate any environmental sustainability outcomes related to its Food Is Medicine programs? If so, please describe the metrics or outcomes below.
9. In your opinion, what are the biggest barriers to incorporating environmental sustainability into Food Is Medicine programs? (Select all that apply)
- a. Funding limitations
 - b. Staff capacity
 - c. Lack of sustainability metrics
 - d. Procurement constraints
 - e. Limited availability of sustainable products
 - f. Organizational priorities
 - g. Healthcare partner requirements
 - h. Lack of guidance or best practices
 - i. Other (please specify)
10. What opportunities do you see for Food Is Medicine programs to link human health and planetary health/environmental sustainability in Food is Medicine programs?
11. Is there anything else you would like to share? (optional)

APPENDIX B

Key Informant Consent Form

Title of Study: **Environmental Sustainability in Food Is Medicine Programs: Current Practices & Opportunities**

I invite you to complete a 30 minute key informant interview. Your participation is voluntary, and you are free to decline to answer any question or withdraw at any time without consequence. You must be 18 years of age or older to participate. There are no anticipated risks or discomforts associated with participating in this survey.

Use of Your Responses:

Your input is a vital part of this project. Your responses will be utilized to inform a graduate research project, culminating in a report published on the website of the Swette Center for Sustainable Food Systems. Insights from Food is Medicine practitioners like you will help ensure that the final report reflects priorities of FIM practitioners and the breadth and diversity of FIM work being conducted today.

You will receive a copy of your survey responses to the email you provide. De-identified data collected as a part of current study will not be shared with others (e.g., investigators or industry partners) for future research purposes or other uses.

If you have questions about this research, you may contact the research team at the emails listed below. For concerns about your rights as a research participant, you may contact the ASU Office of Research Integrity and Assurance at (480) 965-6788.

Lani Miller <email address>

Dr. Melissa Nelson <email address>

Thank you for your time and support.

Email:

Confidentiality and Identification:

You may choose to remain anonymous or allow your name to be included in the report. If you choose anonymity, we will do our best to protect your identity.

- I agree to participate and would like to remain anonymous in the final report.
- I agree to participate and consent to be identified by name in the final report.

Recording and Data Use:

With your permission, the audio of your interview will be recorded and transcribed using Zoom. The research team will review the transcription for accuracy using the recorded audio file. This recording will be kept in a password-protected drive on the secure ASU server. The interview will not be recorded without your permission. Please let us know if you do not want the interview to be recorded; you also can change your mind after the interview starts.

- I give permission to audio record and transcribe my interview.

- I do NOT give permission to audio record and transcribe my interview.

By entering your name below, you acknowledge your consent to participate in this study.

APPENDIX C

Key Informant Interview Questions

Thank you for participating in this capstone project exploring how Food Is Medicine (FIM) programs are incorporating environmental sustainability considerations in their work. I have shared a survey with people currently working in FIM programs about how sustainability factors into FIM interventions *today*: examining the day-to-day operational decisions, policies, and metrics at their organizations. In contrast, my discussion with you will focus on how FIM could look *tomorrow*.

1. Please briefly describe your area of expertise in relation to Food Is Medicine.
2. Looking ahead 10 years, what would an ideal Food Is Medicine system look like?
3. What do you see as the most important opportunities for the future of Food Is Medicine?
4. How does environmental sustainability/planetary health factor into that vision, if at all?
5. What would need to happen to move the field toward that ideal future?
6. Is there anything else you would like to share?

APPENDIX D

IRB Exempt Wizard Results

Response Summary:

Q1.1.



Welcome to the IRB Exempt Wizard

The ASU Institutional Review Board has implemented an IRB Wizard tool to streamline the IRB review process for studies that fall under one or more exempt categories. To determine if your study is eligible for a determination through the wizard, please review the criteria below.

Before you begin, please review our [IRB Exempt Wizard - FAQ](#) to facilitate the process.

Criteria:

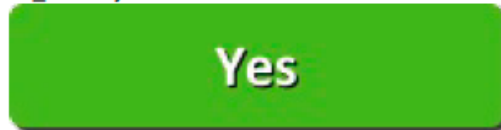
1. Unfunded research (i.e., studies that are NOT externally funded by federal agencies, industries, foundations, or local partners) – internally (ASU) funded research is eligible.
2. NOT a clinical trial.
3. Study does not involve development of an Artificial Intelligence (AI) tool or use of AI tool for data analysis.
4. Single-site study (IRB procedures conducted at ASU only and no external collaborators).
5. Study is only conducted in the U.S. (i.e., no international research).
6. Participants are adults (18 years or older) and NOT from a vulnerable population (i.e., non-military, non-Native American, and/or non-prisoner population).
7. Data collection methods:
 - A. For single component of data collection: surveys or interviews are acceptable.
 - B. For multiple components of data collection: surveys and interviews are acceptable.
 - C. Focus groups and interventions CANNOT go through the exempt wizard process.
8. Researchers do not have a dual role (i.e., conduct research on participants that they supervise/oversee).
9. Research does NOT involve sensitive topics related to drug/alcohol use, sexual behavior, mental health, criminal behavior, immigration status, or personal financial information.
10. Research does NOT involve other information that could put participants at risk of criminal/civil liability.
11. Research involves use of secondary human subjects data that are publicly available.
12. If you are unsure if your study meets the criteria above, you can reach out to ASUIRB@asu.edu for clarification.
However, if you feel that your study meets these criteria, please complete the Wizard

Once you have received a determination through the Wizard:

- The ASU Institutional Review Board (IRB) has updated the submission process for studies utilizing the IRB Wizard tool. Researchers are no longer required to log on to the Enterprise Research Administration (ERA) system to create a new study or upload the IRB Wizard determination and response ID. The additional ERA submission step has been eliminated to further streamline the process.
- Instead, please download a copy of Wizard's determination (e.g., *This activity is not human subjects research under 45 CFR part 46 does not apply.*) and the response ID (e.g., *R_3ewUzgEYL7bzLty*) for your own personal records.

I have reviewed the wizard **Criteria** above and confirm that my study meets these criteria.

- IM_6fJ27IXjr9uFkh0



Version 2.5

Q1.3. Contact Information

First Name	Lani
Last Name	Miller

Q1.4. Email address

lmille61@asu.edu

Q1.16. Study title

Where Does "Food Is Medicine" End? A Mixed-Methods Analysis of Definitions and Scope

Q1.17. What is the purpose of this study?

This study is conducted to meet the graduate capstone requirements. The study seeks to examine how U.S. government agencies, professional organizations, and implementing stakeholders define Food Is Medicine, and whether these definitions explicitly include or exclude sustainable food systems considerations such as planetary health and agricultural producer and worker equity.

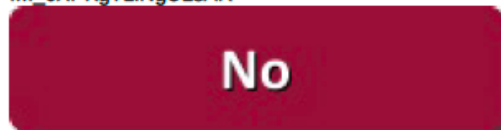
Q82. Principal Investigator (PI) name

Lani Miller

Q2.1.

Does the research involve using children (under 18) OR does the research involve using prisoners?

- IM_6XPKgT1iNgULsAR



Q2.2.

Is there more than one institution involved in the project (e.g., researchers from two universities)?

- IM_6XPKgT1iNgULsAR

No

Q2.3. Does the researcher have a non-research relationship with the subject e.g. professor to student or clinician to patient/client?

- IM_6XPKgT1iNgULsAR

No

Q2.4.

Is the study limited to following components - Surveys, interviews or both?

- IM_3a3xje1GW6tD98V

Yes

Q2.5. Does your research fall into any of the following categories?

- None of the above.

Q2.6. Are any of the following statements true? (Choose all that apply.)

- None of the above

Q3.1. Is the research minimal risk?

Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

- IM_3a3xje1GW6tD98V

Yes

Q3.2. Will you be collecting information that may be used to identify the participants (e.g., name, contact information, job title and employer name)?

Remember to consider the context of your study (e.g., demographic information for participants from one organization could be combined to identify individuals).

- IM_3a3xje1GW6tD98V

Yes

Q3.3. Will you be collecting information on any of the following topics? (Choose all that apply.)

- None of the above

Q3.4.

Are you using any of the following populations?

- None of the above

Q4.1. Is the activity a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge*? [45 CFR 46.102(l)]

*** Generalizable knowledge: If the results of the proposed study will be shared outside of ASU with peers at other institutions and with the general public then ASU IRB would consider this as contributing to generalizable knowledge. Generalizability means including the findings in the thesis, dissertation, publication, or presentation to be shared outside ASU.**

- IM_3a3xje1GW6tD98V

Yes

Q6.2. Will the project include [45 CFR 46.102(e)]:

- Obtaining information about or biospecimens from living individuals through intervention or interaction with the individual, and using, studying or analyzing the information or biospecimens.
- OR
- Obtaining, using, studying, analyzing, or generating identifiable private information about or identifiable biospecimens from living individuals?

Definitions:

- About individuals means that the information must be *about* a person. Questions may be asked from people that are not about people (e.g., asking transportation officials to describe local transportation policies or procedures).
- Intervention includes both physical procedures by which information or biospecimens are gathered (e.g., venipuncture) and manipulations of the subject or the subject's environment that are performed for research purposes.
- Interaction includes communications or interpersonal contact between investigator and subject for research purposes.
- Private information includes information about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place, and which the individual can reasonably expect will not be made public (e.g. a medical record).
- Identifiable private information is private information for which the identity of the subject is or may readily be ascertained by the investigator or associated with the information.
- Identifiable biospecimens is a biospecimens for which the identity of the subject is or may readily be ascertained by the investigator or associated with the biospecimens.

- IM_6XPKgT1iNgULsAR

No

Q6.3. Select all that apply, leave blank any that do not apply.

- Your project is limited to accessing one or more of the following legitimate public use datasets:

• Inter-University Consortium for Political and Social Research (ICPSR) • U.S Bureau of the Census • National Center for Health Statistics • National Center for Educational Statistics • U.S. Bureau of Labor Statistics • National Election Studies • National Crime Victimization Survey: School Crime Supplement, 2003	• National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) • National Survey of America's Families (NSAF) • National Sample Survey of Registered Nurses (NSSRN) • Federal Election Commission Website, and PRAMS
--	--
- Your project is limited to obtaining information that is not about living individuals (e.g., asking transportation officials to describe local transportation policies or procedures).

This activity is not human subjects so 45 CFR part 46 does not apply. To see the regulation [45 CFR 46.102(e)] [click here](#).

Other Federal, State, and local laws and /or regulations may apply to the activity.

BIOGRAPHY

Lani Miller is a candidate for a Master of Science degree in Sustainable Food Systems and a USDA NextGen Scholar. As a Registered Dietitian, Lani has supported the wellness of individuals and communities across the American West for over a decade. Lani is passionate about building systems that improve both human and planetary health. Find Lani online at [linkedin.com/in/lani-miller](https://www.linkedin.com/in/lani-miller).