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EMERGING TECH RESEARCH

# Food as Medicine: An Overhyped Concept or the Next Frontier?

## Momentum on the rise for nutrition-based treatment modalities

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### Key takeaways

- Nutrition programs delivered through digital therapeutics, medical foods, and medically tailored meals are an emerging treatment modality. Given the range of chronic conditions that can be prevented through diet or managed with nutrition, food as medicine can provide dual benefits of reducing costs for payers and improving health outcomes for patients.
- Food-as-medicine point solutions are more apt to get lost in the crowd and less likely to gain meaningful scale. We expect integrated food-as-medicine companies—such as those with delivery programs, coaching, and nutrition—to have the greatest potential for success in an increasingly crowded market.
- While indefinite coverage of medically tailored meals and subsidies could be too expensive to scale for very large populations, we hold the view that meal plan programs could be a good initial entry point, and members could later transition to lower-cost models focused on nutrition and dietary guidance.
- Access to food as medicine remains a roadblock because of limited rollouts beyond pilot initiatives. In the longer term, we expect food as medicine to expand through consumer-oriented food delivery platforms. In a noteworthy test case, Instacart is currently accepting electronic benefits transfer (EBT)—the payment system used for the Supplemental Nutrition Assistance Program (SNAP)—as a payment method for qualified online grocery orders.
- Key challenges to widespread food-as-medicine adoption include resistance to diet restrictions, food quality concerns, uncertainty around attribution, and difficulties with compliance and engagement. Despite these challenges, we are bullish on the long-term opportunity given a growing roster of high-quality startups, with several announcing funding rounds in 2023 despite a tough fundraising environment.

## Introduction

Proper nutrition is a crucial yet often underappreciated aspect of the prevention and management of chronic health conditions, and the concept of food as medicine has been gaining momentum due to a confluence of factors: the success of pilot food prescription programs, explicit government support, early adoption by payviders, and the rise of personalized nutrition. A food-as-medicine approach is especially relevant for those with a chronic health condition—nearly half of the US population—and could provide an avenue for underserved populations to access healthy, medically tailored foods.<sup>1</sup> Although food as medicine as an investment category faces some challenges in reaching its full potential, we are bullish on the long-term opportunity given an expanding roster of high-quality startups, a growing body of supporting research, and strong support from government and nonprofit entities.

Recently, there has been robust media coverage of food as medicine; however, few sources have attempted to provide a comprehensive, consistent definition, creating questions about what programs qualify. To provide a framework for market participants to analyze the space, we define food as medicine as nutrition programs that aim to prevent, manage, or reverse specific health conditions. We have identified three primary categories of food-as-medicine programs that we explore further in this note:

- **Medical & functional foods:** Condition-specific perishable and nonperishable foods that generally require further meal preparation.
- **Medically tailored meals & groceries:** Ready-to-eat meals and foods that can provide more than 50% of caloric needs.
- **Produce prescriptions & subsidies:** Supplemental nutrition programs that provide produce vouchers or other methods of accessing healthy groceries.

While nutrition programs are commonly associated with weight loss and diabetes, there are a range of health conditions and diseases that can be prevented through diet or be managed and treated with nutrition programs. As part of a primary prevention approach, food as medicine can help avoid the development of Type 2 diabetes; cardiovascular conditions, such as heart disease, hypertension, and stroke; kidney disease; liver diseases; and arthritis, among other conditions. We are also seeing the emergence of food as a treatment modality, particularly for conditions that currently lack accessible treatment options or where the current standard of care is inconvenient or expensive. For example, nonalcoholic steatohepatitis and prostate cancer could provide opportunities for market entrants, as these conditions have well-established correlations with food and nutrition.<sup>2, 3</sup>

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1: "Health for Life," American Hospital Association, Fall 2007.

2: "NASH Diet Tips to Help Reverse Fatty Liver Disease," NASH Facts, October 5, 2022.

3: "Nutrition and Prostate Cancer," UCSF Health, n.d., accessed July 17, 2023.

## Current landscape

Though there is clear evidence that proper diet and nutrition can prevent and reverse health conditions, it is another matter for food-as-medicine programs to have scientific, clinical backing and become part of the standard of care. There is a necessity for additional randomized, controlled studies of food-as-medicine programs; academic and scientific research to date has identified meaningful health and cost benefits. A national study by Tufts University found that a 30% Medicare and Medicaid subsidy for fresh fruits and vegetables could prevent more than 300,000 premature deaths from cardiovascular events and save \$40 billion in total lifetime healthcare costs for program members.<sup>4,5</sup> A separate study published in the Journal of the American Medical Association in October 2022 explored the benefits of medically tailored meals and concluded that offering a nationwide medically tailored meal benefit to individuals with heart disease, cancer, or diabetes could save more than \$180 billion in medical costs.<sup>6</sup> More recently, on March 15, 2023, Blue Cross and Blue Shield of North Carolina published data in the New England Journal of Medicine about its pilot food delivery program for members with Type 2 diabetes in Affordable Care Act plans, which resulted in a \$139 reduction in total medical costs per member per month.<sup>7</sup>

One state leading the way in food as medicine is California, and as of 2022, food is now a covered medical benefit under California's Medicaid (Medi-Cal) program. This initiative provides a model for future statewide and nationwide food-as-medicine programs, and preliminary results have been promising. According to Richard Ayoub, chair of the California Food is Medicine Coalition, hospital re-admission rates for first-year participants were consistent with reduced re-admission rates of similar intervention programs, and patients who completed the full program reported statistically significant improved health outcomes.<sup>8</sup> Recognizing that providing healthy food choices is not sufficient to deliver full outcomes, California takes a holistic approach. Vendors in California are required to also offer nutrition and lifestyle coaching, as combining food assistance with education has been shown to be more effective at promoting healthy eating.

Though there are limited food-as-medicine programs with an established national footprint, the Department of Veterans Affairs recently established a program that offers a \$100 monthly debit card for veterans to purchase healthy foods. An initial pilot in Salt Lake City and Houston is being funded by the Rockefeller Foundation and is available through nonprofit startup About Fresh's platform. Another option is the implementation of a produce prescription program, which offers providers the ability to prescribe fruits and vegetables, or other foods, that are covered by government or commercial health plans. In North Carolina, the state has a \$2.5 million pilot produce Rx program underway, and there is a pending bill in Virginia's legislature to launch a similar pilot program.<sup>9</sup>

4: "Cost-Effectiveness of Financial Incentives for Improving Diet and Health Through Medicare and Medicaid: A Microsimulation Study," PLOS Medicine, Yujin Lee, et al., March 19, 2019.

5: "Statement by Dr. Rajiv J. Shah, President of the Rockefeller Foundation, and Nancy Brown, CEO of the American Heart Association, on New Food Is Medicine Research Initiative," The Rockefeller Foundation, September 28, 2022.

6: "Association of National Expansion of Insurance Coverage of Medically Tailored Meals With Estimated Hospitalizations and Health Care Expenditures in the US," Journal of the American Medical Association, Kurt Hager, et al., October 17, 2022.

7: "North Carolina Blues Plan Says Food-as-Medicine Program Resulted in Better Outcomes for Diabetes Patients," Fierce Healthcare, Frank Diamond, March 20, 2023.

8: "California's 'Food Is Medicine' Pilot Project Delivers Encouraging First-Year Observations," Health Trust, June 20, 2019.

9: "Virginia HB2430," TrackBill, January 18, 2023.

We expect to see a combination of public-private partnerships, nonprofit initiatives, and greater investment dollars flowing into food-as-medicine-focused and nutrition-focused startups. In September 2022, the Biden administration announced a package of private sector spending totaling over \$8 billion to fuel food-as-medicine programs, with \$2.5 billion allocated to startups, a positive development for early-stage startups seeking capital in a challenging fundraising environment.<sup>10</sup> In the longer term, commercial payers could expand their coverage of food-as-medicine programs, but before this occurs, there likely needs to be further research exploring cost savings potential. There are strong incentives for functional food startups to fund clinical studies as they seek out commercial partnerships. If their products can equal or exceed outcomes delivered by the current standard of care, they could take advantage of existing reimbursement pathways—with potentially high product pricing. In contrast, the clinical effect of broad-based programs such as grocery reimbursements, medically tailored meals, and produce prescriptions may be difficult to isolate due to issues with tracking, compliance, and other factors, such as dietary changes and the impact of exercise.

## Market opportunity

From a market opportunity perspective, food as medicine offers the potential to deliver meaningfully better health outcomes to a large population. More than 48 million US households have a member with a health condition that can be managed by a nutrition-focused diet, and according to Nielsen, this represents \$270 billion of annual grocery sales.<sup>11</sup> Food-as-medicine programs with a home delivery component could enable providers and health plans to reach the 17 million Americans who live in food deserts, which are defined as geographic areas with highly limited options for purchasing affordable and healthy foods.

We see two distinct paths for food as medicine to receive nationwide benefit coverage. Currently, government-sponsored programs for Medicare and Medicaid populations have strong momentum, with Medicaid-sponsored food initiatives on track to expand to a total of at least nine states by 2024. Additionally, commercial payers could begin to cover food as medicine and food benefit programs, and in the long term, nutrition could develop into a core health plan benefit. We see the commercial payer pathway for food as medicine as a blue-sky opportunity given limited adoption to date. Beyond the low-hanging fruit of providing nutrition programs to sporting organizations and the tech and banking industries, which already have significant food and meal budgets, more legwork is needed to expand the value proposition for employers without existing meal benefits in place. While a minority of the overall commercial population would materially benefit from food-as-medicine coverage, programs would be more relevant for specific populations, such as workers with diabetes, and employers that primarily operate in rural areas. Still, even a minority of the commercial market would generate a market opportunity for, at minimum, tens of millions of commercial plan members.

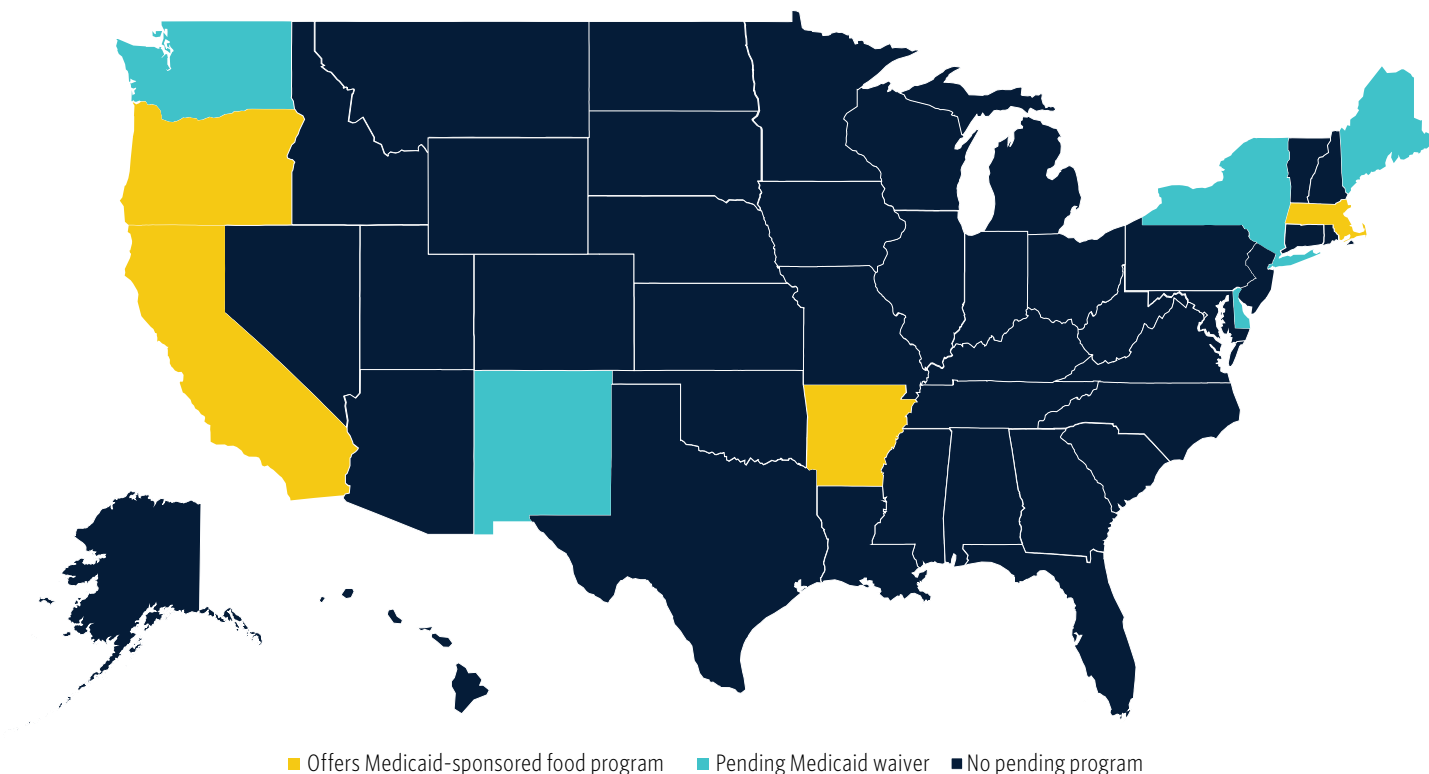
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10: "White House Reveals \$8B in Private Sector Spending to Fight Hunger With Focus on Nutrition and Chronic Illness," Fierce Healthcare, Annie Burky, September 28, 2022.

11: "Fresh Food as Medicine for the Heartburn of High Prices," Deloitte, Daniel Edsall, et al., September 26, 2022.

## Medicaid-sponsored food programs by state\*

Medicaid-sponsored food programs are currently available in four states (Arkansas, Massachusetts, Oregon, and California), while five others (Delaware, Maine, New Mexico, New York, and Washington) are in the process of obtaining federal waiver approval for their respective programs.



Source: PitchBook • Geography: US  
\*As of July 14, 2023

In the medical & functional foods category, companies with foods that target specific conditions could pursue robust clinical trial processes to show their products' efficiency compared with current standards of care. This approach has some additional risk from clinical trial costs and a longer go-to-market timeline, but if successful, medical and functional foods could be potentially reimbursable at rates commensurate with pharmaceuticals, enabling food-as-medicine vendors to sell medical and functional foods at relatively high price points.

## Addressing critiques and challenges

**Consumer resistance to diet restrictions:** Restrictions on food choices and food spending as part of formal food-as-medicine initiatives could receive pushback, especially in programs launched through government initiatives, as they could be seen as the government telling people what to eat. Still, several food-as-medicine vendors that we spoke with during our research efforts emphasized the food flexibility they offer to participants. And while some food-as-medicine programs can be restrictive, members may be willing to accept diet restrictions in lieu of prescriptions for expensive drugs, or perhaps to avoid the need for other, more aggressive surgical treatment options down the road.

**Food quality concerns:** There has been concern among food-as-medicine proponents such as Dennis Hsieh, Chief Medical Officer of the Contra Costa Health Plan, that certain vendors offer highly processed food in food prescription programs. Given that a high level of food processing and additives such as corn syrup and preservatives are directly linked to the development of chronic diseases, medical and functional foods that are highly processed may face a more challenging path in receiving recommendations from care providers. This raises the bar for medical & functional food vendors to show their food products not only accomplish medical objectives but also limit unnecessary additive ingredients (while remaining palatable to consumers).

**Attribution:** Food-as-medicine programs are not meant to be a sole remedy for major health conditions; rather, like the oft-cited cereal tagline of being “part of a balanced breakfast,” food as medicine is one lever of many that can enable better health outcomes. The development of chronic conditions is correlated with, but not solely attributed to, food and diet, and there are other relevant factors at play, such as genetic risk, environmental exposure, and autoimmune conditions. Given that food as medicine must be part of a balanced approach, it may also be difficult to attribute health improvements to a single prepared-meal vendor or a limited-dollar produce subsidy. Additional clinical data could support greater reimbursement of food as medicine, though considering these attribution challenges, there is an element of trust at play that food-as-medicine vendors must be careful not to lose.

**Compliance and engagement:** Medication and treatment compliance is a common issue across healthcare, especially for at-home programs, and particularly when there are limited methods to track engagement. For example, no wearables or devices exist to easily track adherence to a meal plan. A lack of certainty that program members are sticking to assigned meal plans can create challenges with accumulating supporting data and increase the difficulty of assigning proper attribution. During research interviews, we heard from several food-as-medicine startups about the importance of member engagement, and we hold the view that the most effective food-as-medicine program is one that a participant can complete, rather than one that aims to optimize nutrition but has low compliance.

## Looking ahead: Our view

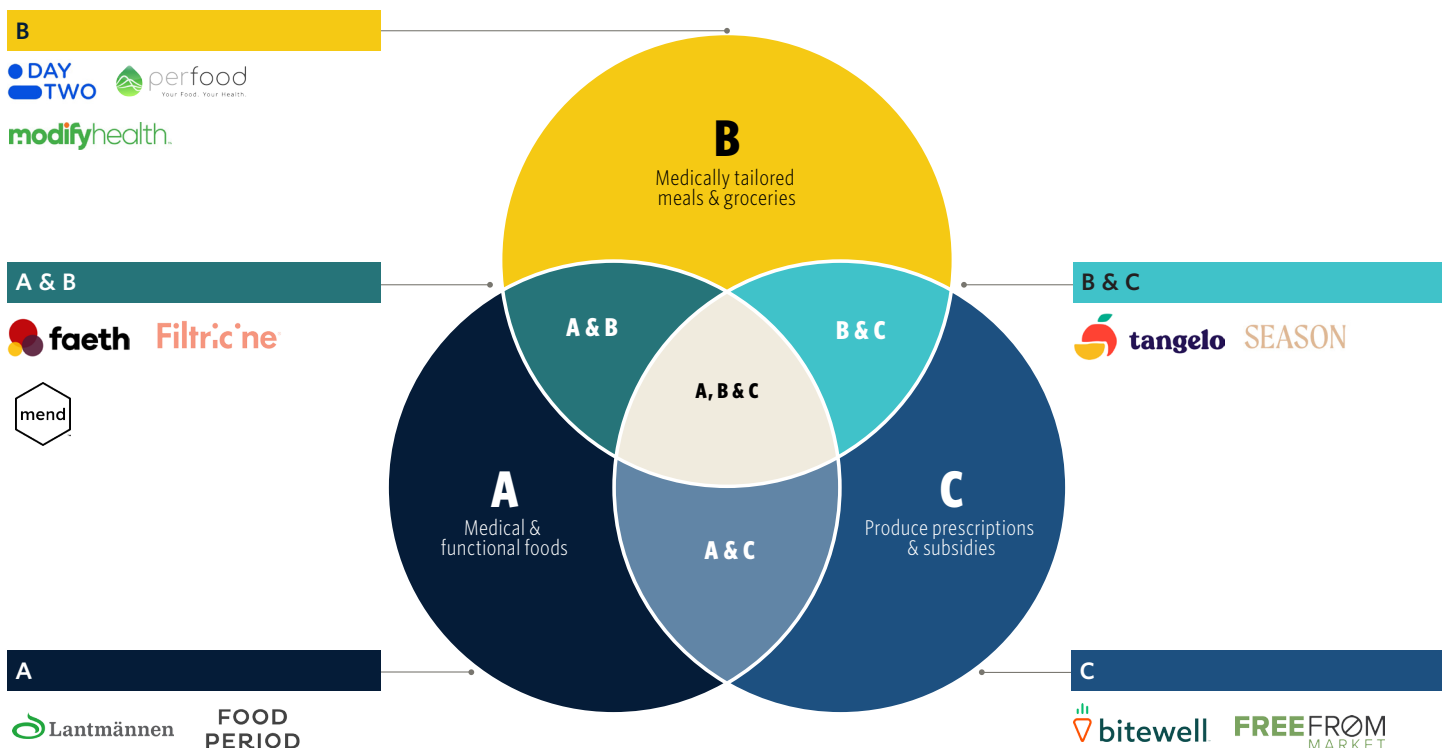
Moving the needle on food as medicine to meaningfully improve health outcomes will require pulling a combination of levers. On the demand side, providers are likely to offer produce prescriptions and nutrition-based digital therapeutics when they become more widely available in health plans. Provider education around supporting research for food as medicine and greater member awareness of food benefit programs are also needed to drive additional demand.

On the supply side, managed care organizations (MCOs) have a key role to play in bringing food as medicine to the masses. Nutrition programs are often geared toward underserved and lower-income populations that experience more challenges with purchasing and preparing healthy meals for themselves and their families. For this reason, food as medicine can be considered part of a social determinants of health approach offered through managed care plans. MCOs are incentivized to offer additional nutrition programs like food as medicine for two reasons: 1) the

cost savings from health benefits could outweigh any additional expense, especially when long-term chronic conditions can be avoided or reduced, and 2) the programs can be used as a marketing effort to attract new members. We also see a core role for payviders, which are in the unique position of owning their own practices and are therefore highly incentivized to reduce the cost of chronic conditions that can be prevented through proper nutrition. Both Kaiser Permanente and Geisinger previously launched food-as-medicine pilot programs, and the tie-up of these two organizations could accelerate their efforts in the space.

Our review of the food-as-medicine landscape uncovered a range of models, from food score algorithms, to meal planning, to grocery subsidies. While these varying approaches can have different goals and target distinct populations, our view is that point solutions that offer only one service are more apt to get lost in the crowd and less likely to gain meaningful scale. We expect integrated food-as-medicine companies, such as those with delivery programs, coaching, and nutrition, to have the greatest potential for success in an increasingly crowded market. In the following graphic, we display a select number of food-as-medicine startups and show the overlap between various food-as-medicine categories. Three notable startups with consolidated platforms are Filtricine and Faeth, which offer functional food for oncology as well as medically tailored meals, and Tangelo, whose platform combines food subsidies with produce and meal boxes.

Food-as-medicine market map Venn diagram\*



Source: PitchBook • Geography: Global  
\*As of July 14, 2023

During research calls with market participants, we heard critiques of models traditionally associated with food as medicine, such as medically tailored meals and produce prescriptions, as these approaches may require long-term funding and be quite expensive to scale for large populations. We hold the view that medically tailored meals can be a good initial entry point for food as medicine, and members could later transition to lower-cost programs focused on nutrition and dietary guidance. For example, in a consolidated platform, users could have access to medically tailored meals that are fully covered for a period of time and then be offered regular appointments with a coach or dietitian on an ongoing basis. This approach serves a dual purpose of keeping users active on a food-as-medicine platform for a longer period and controlling costs to enable greater scale.

While food as medicine benefits from strong supporting research, and there are several promising initiatives in the works supported by the efforts of a growing wave of startups, access to food as medicine remains a roadblock because of limited rollouts beyond pilot initiatives. In a future state, members could place an order on delivery platforms such as Instacart or Uber Eats and have their order automatically covered by a food-as-medicine health plan offering. In a noteworthy test case for this model, Instacart currently accepts electronic benefits transfer (EBT)—the payment system used for the Supplemental Nutrition Assistance Program (SNAP)—as a payment method for qualified online grocery orders, and we could see this approach expanded to other consumer-oriented food delivery platforms.

## Startup spotlights

### *Season Health*

Austin-based food-as-medicine platform Season Health operates a comprehensive virtual program with meal planning as well as delivery and pickup options. The company currently offers programs for diabetes and pregnancy and is planning an expansion to other conditions and health needs.

Season has a national footprint and partners with many of the major health plans. It last raised a \$34.0 million Series A in March 2022 led by Andreessen Horowitz. In addition to personalized meal planning, the company offers appointments with a registered dietitian and communication access for users in between formal sessions. Most of Season's users access the platform through their insurance plans; the company also offers a direct-to-consumer option for \$75 per month. Through its partnership with home health marketplace healthAlign, Season provides access to a growing number of members in three of the largest Medicare Advantage plans.<sup>12</sup>

### *Perfood*

Digital therapeutics startup Perfood has a commercially available nutrition-based digital program for migraine treatment that is currently available in Germany, and the startup is ahead of its peers in bringing an approved nutrition digital therapeutic to market. Perfood recently reached 3,000 patients, and its migraine product is available by prescription through providers. Its successful market launch was driven

<sup>12</sup>: "Season Health, healthAlign Partner to Provide Nutrition Benefits to MA Beneficiaries," [MedCity News](#), Marissa Plescia, January 5, 2023.



by Germany's digital health legislation DiGA, which enabled digital health vendors to receive coverage through the country's single-payer health system. Beyond migraines, Perfood plans to target a range of other health conditions, including diabetes, psoriasis, food allergies, and colorectal cancer.

While Perfood originally had ambitions to expand into the US market, given the slow momentum of payer coverage for digital therapeutics, the company is now looking to launch in other new markets, including France, Japan, and South Korea. While Perfood may not be available in the US in the near term, the startup's programs are a notable early market offering in nutrition digital therapeutics and are paving the way for other startups to enter the space. Perfood has raised more than €14 million to date and is currently raising an additional funding round to fuel its pipeline expansion and international ambitions.

### *Bitewell*

In June 2023, food health benefit startup Bitewell raised a \$4.0 million seed round in a deal led by Lake Nona Fund and Refinery Ventures. Bitewell's core product is an AI-driven food health score that helps users determine whether their food choices are beneficial or detrimental to their health goals. Bitewell primarily works with employers and organizations to offer food health benefit programs, such as food discounts, monthly food credits, and marketplace purchase options, with a per-member-per-month business model.

Bitewell boasts an 85% weekly active usage rate, and this high rate of engagement is a positive data point as the startup looks to expand its employer and member base. In the current environment, Bitewell is positioning its solution as a method for employers to consolidate or minimize food spending while also incentivizing users to make healthy food choices. Current demand is driven by organizations that already have an existing food budget, such as sports enterprises and large employers in tech and banking. Bitewell aims to expand its market to industries where nutrition plays a more indirect, but still important, role in maintaining a healthy and productive workforce: for example, in the transportation industry, where long-haul truck drivers face higher risks of developing chronic conditions.

## Appendix

### Select VC-backed food-as-medicine startups

| Company          | HQ location      | VC raised to date (\$M) | Food-as-medicine category                                       | Last financing round  | Last financing amount (\$M) | Lead investor(s) of last financing round             |
|------------------|------------------|-------------------------|---|-----------------------|-----------------------------|--|
| DayTwo           | Walnut Creek, US | \$102.0                 | Medically tailored meals & groceries—personalized nutrition     | Series C (2021)       | \$37.0                      | Micron Ventures, La Maison Partners, 10D             |
| Faeth            | Austin, US       | \$80.3                  | Medically tailored meals & groceries/medical & functional foods | Series A (2022)       | \$47.0                      | S2G Ventures   |
| Season Health    | Austin, US       | \$36.6                  | Medically tailored meals & groceries—meal planning              | Series A (2022)       | \$34.0                      | Andreessen Horowitz                                  |
| Mend             | New York, US     | \$20.1                  | Medical & functional foods                                      | Series A (2023)       | \$15.0                      | S2G Ventures   |
| Perfood          | Lübeck, Germany  | \$16.3                  | Medically tailored meals & groceries—personalized nutrition     | Early-stage VC (2022) | \$9.4                       | BonVenture   |
| Modify Health    | Alpharetta, US   | \$15.4                  | Medically tailored meals & groceries—meal planning              | Series B (2023)       | \$10.0                      | RC Capital   |
| NourishedRx      | Stamford, US     | \$10.0                  | Medically tailored meals & groceries—meal planning              | Seed (2021)           | \$6.0                       | S2G Ventures   |
| Filtricine       | Santa Clara, US  | \$8.4                   | Medically tailored meals & groceries/medical & functional foods | Seed (2022)           | \$0.6                       | SOSV, IndieBio                                       |
| Bitewell         | Denver, US       | \$4.2                   | Produce prescriptions & subsidies                               | Seed (2023)           | \$4.0                       | Lake Nona Fund, Refinery Ventures                    |
| Free From Market | Kansas City, US  | \$2.1                   | Produce prescriptions & subsidies                               | Seed (2023)           | \$2.1                       | Bluestein Ventures                                   |
| Swap Health      | Jersey City, US  | \$1.8                   | Medically tailored meals—personalized nutrition                 | Seed (2022)           | \$1.8                       | LifePoint Health, Apollo Global Ventures, 25m Health |
| RxDiet           | New York, US     | \$1.7                   | Medically tailored meals—groceries                              | Seed (2022)           | \$0.8                       | SOSV, Lakehouse Ventures, Plug and Play Tech Center  |

Source: PitchBook • Geography: Global  
\*As of July 14, 2023

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