

Supply Side Deficiency and Policy Direction for Enhancing Food and Nutrition Security in the United States

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ABSTRACT

The U.S. government has put enormous resources into improving food and nutrition security. In the past twenty years, Federal spending on food and nutrition programs increased steadily and it reached a historical level of \$166.4 billion in 2023. However, the outcomes of those efforts fell far short of the public's expectation [1]. About 13.8% of American households were troubled by food and nutrition insecurity and adults and adolescent obesity has emerged as a serious public health concern. The US healthcare costs totaled \$4.5 trillion in 2023, an average of \$13,493 per capita, which, if not all, were largely tied to diet-related diseases. Drawing on the rich literature, government reports, and various data sources, this investigation identified some crucial issues less addressed in the discussion of food and nutrition security. Focused on the supply side, the study found that an array of deficiencies associated with imbalanced healthy food production, small farms, marketing channels, the Federal farming subsidies programs, and the provision of nutrient-dense food at the U.S. restaurant. Strategic solutions and policy directions were suggested for reinvigorating the supply of nutrient-dense and healthy food products through the lens of tailoring to the needs and benefits of small fruit and vegetable producers.

Keywords: Food and nutrition security, Small farms, Healthy food, Crop insurance, Agricultural Programs, Agricultural subsidies.

INTRODUCTION

Food and nutrition security mean consistent availability, access, and affordability of healthy, safe, and affordable foods essential to optimal health and well-being [2]. The US government opted for combining food security and nutrition security together, that is food and nutrition security. A concurrently held argument by many countries and professionals in the field is to separate food security from nutrition security [3,4 5,6,7,8]. This investigation keeps using the terminology of "food and nutrition security" within the context of the manuscript, but we are leaning toward perceiving it as a process that are morphing from food security to nutrition security in the United States.

For years, the US government has spent billions of dollars to increase food and nutrition security through putting in place many programs to advance the equity on food consumptions. Millions of American households have benefited from the programs. Nevertheless, food and nutrition insecurity remain a problem plaguing the U.S. government and the omnipresent threat of the insecurity can be seen in various anomalies. In 2023, about 13.4% of American household still had trouble in providing sufficient food for their members. At the same time, the

incidence of obesity in the United States has stayed high. The data from the National Health and Nutrition Examination Survey (NHANES) 2017-2018 showed more than 2 in 5 adults (42.4%) have obesity and 1 in 5 children and adolescents ages 2 to 19 (19.3%) have obesity [8]. Obesity, of course, is driven by many factors, but an unsecured nutrition intake is certainly one of the crucial contributors. In addition, coming with improper diet are the high incidence of coronary heart disease, cancer, stroke, osteoarthritis and osteoporosis, and diabetes. The phenomenon become self-evident given the data have persistently shown that most Americans' diets fall short of national recommendations [9,10,11,12]. Being one of the richest countries, the United States remains challenged by both hunger and healthcare from food and nutrition insecurity.

Why did food and nutrition security fall short of the expectation of the public despite enormous resources having been diverted into many federal programs? What are the major deficiencies in the path of transition from food security to nutrition security? What actions should be taken to expedite accomplishing the objective of nutrition security in the foreseeable future? Those are the questions that need to be fully addressed and certainly are of interest to this study. A brief review of the status quo of food and nutrition security practices helps untangle the impacts of diverse drivers, a novel perspective on the provision of healthy food highlights the pragmatic food policy direction, and the discussion and suggestions for facilitate the transition from nutrition precarity to security will flesh out more specific action details tailoring to the needs of major stakeholders along the food supply chain in the United States.

FOOD PROGRAMS AND RESOURCES ALLOCATED

USDA has wrestled for decades with building a safety net for millions of Americans who were food-insecure via providing children and low-income people access to food, a healthful diet, and nutrition education. Massive Food and Nutrition Service (FNS) programs encompasses child nutrition programs, the Supplemental Nutrition Assistance Program (SNAP), and emergency food assistance programs. Child Nutrition Programs are composed of National School Lunch Program, School Breakfast Program, Child and Adult Care Food Program, Summer Food Service Program and Fresh Fruit. The Supplemental Nutrition Assistance Program (SNAP) is a major avenue of nutrition assistance for millions of low-income households. The program enhanced purchasing power of low-income households and made it possible for them to buy healthy and nutrient dense foods at various markets across the country they otherwise may not be able to buy.

In addition, an array of FNS Food Distribution Programs distribute USDA-purchased food to school children and low-income families, emergency feeding, Indian reservations, and the elderly, provides another layer of pretention for the nutrition need of underserved demographic groups.

Apart from the Federal programs administered by FNS, the Center for Nutrition Policy and Promotion (CNPP) has been working on a dynamic dietary guidance that exposed the nutrition needs to best evidence-based scientific research. The guidance is aimed to provide all consumers with advice and information on what they should have in their dietary intake.

The commitment to the programs above is tied to a large federal funding. The figure 1 below displayed that, billions of dollars were spent in the past 50 years on subsidizing the nutrient intake of American households and there was an uptrend of spending with a significant increase in recent years.

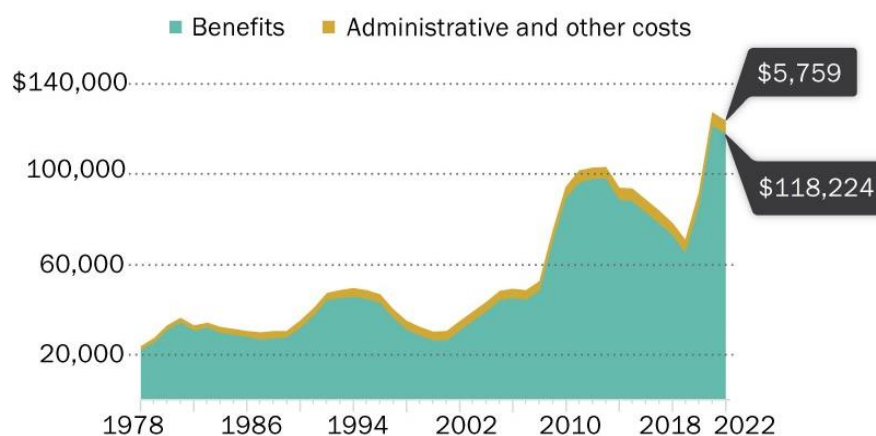


Figure 1: Federal SNAP spending, in millions 2023 dollars

Sources: Pew Research Center analysis of data from USDA food and nutrition service

The informative details of federal spending on nutrition were unfolded in the outlay of the 2018 Farm Bill in Table1[9]. The twelve titles in Farm Bill ushered in a wide spectrum of policies related to food and agricultural production. Nutrition program's budget share tops all others with a percentage as high as 76.1% and the projected outlay reaches more than \$326 billion in the five years from 2019 to 2023. While there is no automatic reconsideration during the span of the Farm Act, Congress can alter mandatory-funding levels at any time if needed, which means the real costs could be higher than the funds appropriated in the Farm Bill.

Table 1: Outlays under the 2018 Farm Act, 2019-2023

Farm Bill Titles	Projected Outlays (millions of dollars)	% of Total
Nutrition	326,020	76.1%
Crop Insurance	38,010	8.9%
Commodities	31,440	7.3%
Conservation	29,270	6.8%
Other	3,543	0.8%
Total	428,283	100.0%

UNPROMISING OUTCOMES ACHIEVED

In the wake of years' effort, the U.S. remains a country of the highest healthcare costs in the world. In 2022, U.S. healthcare spending reached \$4.5 trillion, an average of \$13,493 per capita, which doubled the average costs of healthcare in all other wealthy countries.

The National Health and Nutrition Examination Survey (NHANES) 2017-2018 also showed a gloomy result of nutrition insecurity. Among population groups in the U.S., one in three adults

(30.7%) are overweight, more than two in five adults (42.4%) have obesity, and one in eleven adults (9.2%) have severe obesity; for children and adolescents, one in six children and adolescents ages 2 to 19 (16.1%) are overweight, almost 1 in 5 children and adolescents ages 2 to 19 (19.3%) have obesity, and one in sixteen children and adolescents ages 2 to 19 (6.1%) have severe obesity [8].

Poor diet of American households is a leading cause of high healthcare costs, obesity, and other diseases. An upsetting pattern in American dietary was revealed in a study of the National Cancer Institute: Three out of four Americans don't eat a single piece of fruit in a day, and nine out of ten don't reach the minimum recommended daily intake of vegetables. On a weekly basis, 96 percent of Americans don't reach the minimum for greens (three servings a week for adults), 98 percent don't reach the minimum for orange vegetables (two servings a week), and 99 percent don't reach the minimum for whole grains (about three to four ounces a day). Nearly the entire U.S. population consumes a diet that is not on par with recommendations of American dynamic dietary guidance published by the CNPP [10, 12]. A CDC fruit and vegetable intake survey found only 13.3% respondents in the U.S. meet recommendations for fruit consumption, 10.4% of respondents meet recommendations for vegetable consumption [13]

A similar adverse result was also reflected in the Dietary Quality Index, which measures the percentage of calories people derive from nutrient-rich, unprocessed plant foods on a scale of 0 to 100. The higher the score, the lower the risk of obesity and high blood pressure. The American diet got a rate around ten [12], which is deviated from being nutrition security.

The evidence above displayed a disturbing pattern of American diet, induced health problem, and the concurrent high social costs. The U.S. still fell short of food and nutrition security.

DEFICIENCIES ON THE SUPPLY CHAIN

The massive government programs and enormous federal supports did not bring about the expected results in improving dietary pattern and healthy status of Americans, which may partially attribute to insufficient effort on the supply side. While it is imperative to stimulate consumption, the production and supply of nutrient dense products is also worth more attention and resources. Currently, nutrient food production, availability, distribution, marketing channels, and the Federal subsidies programs have emerged on the top list of issues that need to be fully addressed in the United States.

Availability

The availability of nutrient dense and healthy foods in the United States remains a problem. On the one hand, the supply data from the Economic Research Service (ERS) of the U.S. Department of Agriculture (USDA) revealed substantial nutrient dense foods available in the marketplaces. The data in 2016 showed the American food supply chain offered a per capita annual total of 165 pounds of vegetables and 117 pounds of fruit. On the other hand, nutrition dense and healthy food production were produced in a quite unbalanced pattern across states. The top ten states produced 79 percent of U.S. vegetable in 2017, with California alone accounting for 42 percent. Four of the top U.S. counties in vegetables production are in California, with

Monterey County accounting for 14 percent of the U.S. total, which means more vegetable sales than any state except California [14].

Another pitfall of nutrient and healthy food supply comes with vegetable varieties. In 2017, of all major vegetables on the market, potatoes ranked first in terms of harvested acres, 1,133,128, topping all other vegetables for both the fresh market (535,792 acres) and the processing (597,336 acres) categories. If sweet corn and sweet potatoes were countered in, then the total acreages of the three add up to 1,802,207 acres, which is larger than the total of all other vegetables, 1,594,085 acres. It is hardly unnoticeable that the level of vegetable supply and consumption was inflated by potatoes, sweet potatoes, and sweet corn. The consensus on whether potato, sweet potato, and sweet corn are vegetable or fruit is not reached yet among experts and consumers. “A potato is not a vegetable from a nutrition point of view,” Lilian Cheung, lecturer of nutrition at the Harvard T.H. Chan School of Public Health, tells CNBC Make It. “Potatoes almost behave like a refined carbohydrate. It increases your blood sugar” [15].

Table 2: The U.S. Vegetable Production

Varieties	Harvest Acres
Potatoes	1,133,128
Sweet corn	496,096
Lettuce	342,965
Tomatoes	335,348
Snap beans	219,373
Sweet potatoes	172,983
Onions, dry	163,982
Green peas	147,791
Broccoli	135,185
Watermelons	129,790
Cucumbers	119,655

Similar concerns were also raised about sweet corn. The contribution of sweet corn and potatoes to hydrocarbon intake should not be ignored even when we view them as vegetables rich in some nutrient contents like other vegetables.

Policy Deficiency in Supporting Nutrient Dense Food Production

The short supply of fruit vegetables is rooted deeply in the lack of Federal Program support. As revealed in table 1, the 2018 Farm Bill distributed about \$38,010 million dollars to crop insurance and \$31,440 million dollars to commodity programs. However, the lions' share of the funding mainly benefited a few staple crops in a few states. Farmers in just 10 states reaped almost two-thirds of all payments. Three-fourths of the payments went to four crops: corn, soybeans, wheat and cotton. And 34% of total crop insurance payouts were claimed by corn growers. Consequently, monocultures of inherently high-risk operation maximize efficiency in pursuit of yields at the explicit cost of necessary diversifications. In pursuit of efficiency, the farm safety net has consistently shifted towards large farms with less interest in producing nutrient dense and healthy products and less interest in organic production, which turns out to be the urgent need of American households for their healthier lives.

Lingering Farmers Markets

Farmers markets conventionally functioned as the major market channels for small farms to sell their products. Small farms normally feature small quantities of products, lack of temperature control transportation, and unfavorable supplier for large retailers, hence they intend to market their products in local farmers' markets. However, farmers markets normally are outdoors, typically consisting of booths, tables, and stands, where neither permanent building structure nor shelter for winds and rains are available, let alone air conditioners that contemporary consumers take for granted. Consequently, farmers markets will never be in a position to be a consistent supplier and provide consumers with a reliable purchasing venue. USDA did have a few policies to improve access to local farmers markets and the enrollment in the Supplemental Nutrition Assistance Program (SNAP) is one of supports. Nevertheless, its growth and development were imperiled due to the lack of long-term planning and effective implementation of the grant-supported research discoveries for years. Just believing in and relying on free market are less likely to build up farmers markets that could play an effective role in consistently providing American consumer with fresh and healthier local products.

Insufficient Support for Small Farms

Small farms proved themselves an efficient business form for local, fresh, and healthy produce production. In 2023, there were 1.9 million small farms in the United States, but the subsidies and other federal funds they claimed are very limited. As demonstrated in fig 2 Below, farmers below 50% of crop sale quantiles only got 2.9% of federal subsidies, and farms below 80% crop sales quantiles got 23.3% of federal subsidies, while those farms in the top quantile from 80-100% obtained 76.7% of federal subsidies. This extremely uneven distribution of federal subsidies partially explained why small farms are in a quite disadvantaged position in farming and market competition.

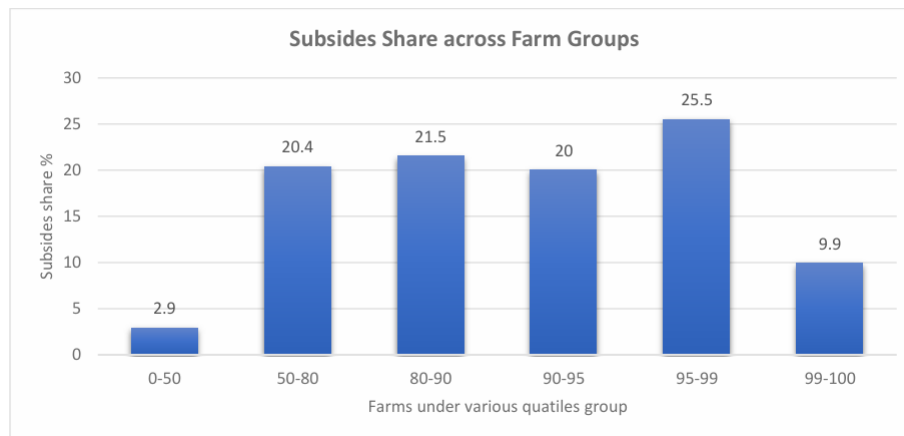


Figure 2: Percentage Share of Total Crop Insurance Subsidies by Crop Sale Quantiles, Average 2012-19

Source: National Sustainable Agriculture Coalition

Owing to the limited access to major federal programs, most small producers were largely in a persistent mode of production. Most small farmers have off-farming jobs to generate nonfarming income and farming income is never their major revenue source. Consequently,

produce at farm level is not kept in a consistent and stabilized way. To empower small farms to increase their investment in producing nutrient dense fruit and vegetables, the effective support should go through new technology subsidies, such as organic production, high Tunnel, hydroponic farming, and climate smart operations and practices.

Limited Availability at Restaurants

A restaurant is never a place for ordinary consumers to obtain healthy and nutrient-intense food in the U.S. The most convenient place to have nutrient dense foods such as vegetables and fruits should be home [16, 17, 18]. However, dining out is an integral part of American culture. They are used to eating out and will continue to do so in the future [19, 20, 21] (13, 14, 31). About 74% say they don't feel like cooking, 51% find dining out convenient, 44% dine out to socialize. Americans spend a monthly average of \$166 per person going out to eat. The most popular restaurants consumers prefer to take out are fast food 60%. Those restaurants will be less likely to find more vegetables [22]. Vegetables and fruits are certainly not the dish of Chefs' favor due to their features as bulky materials, demand for restrictive storage conditions, the short shelf life, and susceptible to spoilage. At a normal restaurant, the 80:20 rule or Pareto Principle leads to their removal from the Menu list. For people of low income, the reality is that fat, salt and sugar taste great and their choice will be simple for junk foods, which takes the edge off hunger and is cheaper than eating a healthy, balanced meal. For middle class households, the habit of eating out place them in an eating environment, which provide limited choices even they prefer to have healthier dishes.

Between fast food restraint on every corner and grocery shelves stuffed with processed foods, making healthy food choices in America isn't easy. However, the regulation on providing healthy food is so limited and not the direction many policies makers and even food science professionals intend to go. Nevertheless, it is the time to seek out what and how to do ensure healthier food supply in the huge restaurant industry.

Whole Foods Fallacies

A well tested and widely accepted retail channel for nutrient dense, organic, and healthier foods in the U.S. is Whole Food. Nevertheless, it turns out to be a shop for the top layer of rich American. It has gotten the nickname of "Whole Paycheck." Shopping at Whole Foods could lead to a much bigger payment for the same food buck. Even for middle class household, what they normally do to steer clear of Whole Foods. For many households, especially lower income and subserved household groups, Whole Foods will just not be an option.

CONCLUSION AND RECOMMENDATIONS

Food and nutrient security are a long-term challenge for all countries. Many drivers on both the supply sides and demand sides contributed to the status quo and any changes, if they mean to advance food and nutrient security, will be very difficult and demanding. There is no easy solution if you just resort to the function of free market. In a rich country like the United States, the objective of get rid of absolute poverty has been largely accomplished at least not much are needed from the supply sides. However, to meet the expectation of nutrition security, more factors kick in and the process turns out to be more complex, there will be a long way to go, and both supply and demand sides have large room of improvement and service enrichment. This

investigation just highlighted the problems and possible paths to go through from the supply side of nutrient dense foods. The discussion above did insinuate the direction of policies, if not the solutions, to advance nutrition security in the United States.

First, there is an urgent need to further stimulate the production of healthy food. Fruit and vegetable production should get more consideration in the federal stimulation policies. Current stimulation of commodity programs and insurance programs largely spent money on benefiting staple grain production, which relieved the calorie food supply and largely eliminated absolute poverty in the U.S. It is time to have a slow but steady support for vegetable and fruit production. Since fruit and vegetable production is largely produced by small farms, the value of consumption will normally spill over time in the future. To reduce the transaction cost of stimulating produce production, the process needs to be enhanced by incorporating farms coop, vertical integration, and community agricultural support etc. Doing so will engage more small farmers in fruit and vegetable production and take into consideration of future values of healthy food consumption. The process itself will counteract the longevity imbalance in vegetable production across states, so the imbalance in supply of healthy food across geographic locations will be solved.

Secondly, empower small farms in the transition from a persistent farming business to a vibrant and viable business. Small farms have considerable advantages in producing nutrient dense and healthy food. Any way of empowering small farms will lead to more fruit and vegetable produced. To get small farms engaged in producing healthier food, the following channels need to be imbedded in agriculture stimulating programs. The support for farmers coops, contract production, and vertical integration should grip considerable attention in policy making and funds appropriation. Doing so will engage more small farmers in fruit and vegetable production counteract the longevity imbalance in vegetable production across states, so a balanced supply of healthy food across geographic locations will be more likely to be achieved soon.

Thirdly, build up modern farmers markets and food catering to the need of local consumers.

Effective marketing channel is a critical component for the success of all business. Small farm business is not an exemption. Currently, most farmers markets failed to attract customers for poor environment, seasonality, and even irregular closure. To make farmers markets an effective channel for local producers and key purchase destination of local consumers, governments need to partner with local communities to build farmers market hub, which equipped with contemporary facility and become a reliable destination for local fresh products even out of season. It is vitally important to be aware that the investment in farm markets may not get a decent return in the short run. The spillovers and large social benefits may not be easily internalized and claimed by any specific agent. Given its role in activating small farms and in bolstering healthy food availability, the long run social benefits be worth the serious consideration and financial support.

Fourthly, regulate restaurant business to enhance access to healthier food, especially variety of fruits and vegetables. The Standard American Diet (SAD) is packed with processed foods, fast foods, added sugars, and sodium. Some common foods in the SAD diet: Packaged foods filled

with artificial flavors and colors, fried foods, red meat, processed meats (deli meat, cold cuts, bacon, etc.), sugar-laden baked goods (cakes, cookies, etc.), refined grains (white bread, white pasta, white rice, etc.), sugar-sweetened drinks (soda, sports drinks, fruit drinks, flavored coffee drinks, etc.), and dairy [23]. Restaurant business is one of major contributor to the current SAD diet.

USDA dietary guidelines suggested that half of your plate should consist of fruits and veggies, with a quarter of whole grains, and a quarter lean protein. Low-fat dairy is on the side. The reality is that the recommendation did not change much in Americans diet.

Fruits and veggies are nutritional powerhouses. But Americans don't eat enough of them. Given the significant discrepancy between SAD and USDA recommendations, something must be done to mitigate the avoidable nutrition insecure in American diet. Stimulating the supply of fruits and vegetables and levy tax on unhealthy foods (refined grains and sweets, potatoes, red meat, processed meat) and beverages (sugary drinks) are the possible policy practices to avoid the status quo that healthy foods such as fruits, veggies, whole grains, legumes, nuts, and seeds are largely forgotten in the most important daily food supplier, restaurants.

Further Evidence and Future Work

Food and nutrition security are a tough and long-term challenges for all countries in the world. Many factors kicked in and drove the complex process. There is not easy solution from all angles. This investigation kept the focus on the supply side of nutrient dense and healthy food. The real process or the effort to finding solution certainly need to include many factors on demand side, American consumption behavior, as well as many other social, cultural, and economic factors. Fortunately, there have been a large body of literatures in the area not covered in this investigation. The author will certainly expand the investigation and have demand side factors and consumer behavior included in our future research.

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