Comments on U.S. food production and distribution

Prepared for The Union of Concerned Scientists

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Introduction

Alarmed by the Covid-19 outbreak, I was inspired to write a book promoting a revival of the WWII victory gardens. That, in turn, led me to compare home gardens to the industrial food system point by point, from taste and nutrition to cost, safety, and yield. To my utter surprise, and contrary to what I had routinely taught in my environmental science courses, I found that pound for pound of food production, home gardens are vastly more efficient than the industrial food system while delivering far superior health, social, economic, and environmental outcomes. I expanded on this finding my recently published book, *Just Grow It Yourself – Home Gardens Outshine Industrial Food*. I wrote it for both gardeners and policymakers, as each needs to understand the other's perspective in order to generate a much-needed gardening boom.

Industrial food has prohibitive external costs, unlike home gardens

The industrial food system's extraordinary inefficiency is mostly due to the enormous external costs it generates but doesn't pay for. Various estimates put these costs in multiples of $trillions:

- $12 trillion per year – Food and Land Use Coalition
- $3 trillion per year in environmental costs alone – TruCost study for the UN
- $5 trillion in externalities for U.S. industrial agriculture – Iowa State University
- External costs = 224% of industrial food's $1 trillion in revenues – KPMG Global
- $2.6 trillion: annual cost of wasted food to U.S. economy – *Food Fix*, Mark Hyman
- At least $3.2 trillion: the true cost of U.S. food – Rockefeller Foundation

By contrast, home gardens generate no such externalities, and few internal costs. And even at average yield rates they can deliver more food per unit area of land than the industrial system, in which 40% of food production is wasted, as is 50% of fresh fruits and vegetables. Home

gardens' enormous efficiency advantage over industrial food has everything to do with thinking through innovative solutions to come up with new evidence-based policymaking. For the last sixty years the government, industry, and most food scientists have advanced the false narratives that the industrial food system is a marvel of efficiency, safety, and precision, and that home food production has little or no potential to meet significant, let alone much or even most of our current food needs.

Contrary to what might be expected, lawns—conveniently already the largest irrigated crop in America—have more than enough area when converted to home gardens to feed the country. They could provide a healthy diet complete in everything except Vitamin B12, which could be derived from a couple egg-laying hens per household. Densely populated areas with few lawns per capita would need to depend more on local food systems (see below), but even the largest cities have many unused lawns, empty lots, and rooftops that could be converted to food gardens.

Obviously, home gardens will not duplicate the meats, grains, dairy products, sweeteners, and soy that make up 85% of the American diet, largely in the form of ultra-processed, low-nutrition commodities. But those are precisely the foods largely responsible for the now 70% of the population being overweight and 43% obese, with nearly 50% either diabetic or prediabetic. Something new and more effective than current policies is needed to address a truly drastic public health challenge.

Despite industry promises to become sustainable or regenerative, it is unlikely to transition to a form that will truly serve the public good. The reason is that the current food system depends on an ecologically extractive and socially exploitative business model deeply geared to deliver the cheapest food in the world (in proportion to income), with the lion's share of profits going to a small group of multinational corporations with inordinate amounts of control over the economy.

That said, attempting to switch overnight to home gardens as the principal source of food is also unrealistic. Rather, a well thought-out, evidence-based policy would favor transitioning to a three-tiered system in which home gardens are the anchor, supplemented by local foods such as farmers markets, CSAs, and urban food hubs. These, in turn, would be backed up by a third tier – a much reduced (and thus more easily sustainably reconfigured) distant form of industrial food. The relative sizes of these tiers would gradually shift as the populace begins to understand how much it has to gain. As an aside, the first and second tiers would not replace purely industrial uses of food crops such as corn and soy for fuel.

Home gardens also have much lower internal costs

Food system experts are generally aware of the many problems with industrial externalities, yet they've evidently missed the also substantial internal efficiencies of home gardens, whose per pound production of food incurs far less:

- Use of fossil fuels (because the energy expended is mostly human-generated)

- Carbon emissions (since very little in the way of fossil fuels is needed)
- Land use (as little as 1-2% of the 3 acres/American that industrial food requires)
- Soil erosion and organic matter loss (home gardens typically increase healthy topsoil)
- Synthetic chemicals (home gardeners usually avoid chemical pesticides and fertilizers)

With both external and internal costs vastly lower than those of the industrial food system (per pound of production), the far greater efficiency of home gardens is not surprising.

Home gardens have extraordinary leverage

To date, the principal strategies for achieving sustainable, healthy, and affordable food involve attempts to: 1) "sustainabilize" the industrial system while retaining its largely centralized control by a few corporate players; or 2) transition to an alternative system composed of decentralized, small local farms / community food webs. Both would continue to rely on farms to produce food and middlemen to distribute it (farmers markets notwithstanding), and proponents of both contend that with enough engineering, their favored model would be sustainable.

By contrast, home and community gardens do without farms and middlemen. As a result, they enjoy an extraordinary degree of efficiency-derived leverage—and thus the power to produce timely, "massified" results—that is lacking in the industrial, and to a lesser degree, local systems. The same could be said when comparing home gardens to hybrid strategies that adopt varying degrees of both industrial and local systems. Thus of all the proposed routes to food sustainability, home gardens are the:

Quickest

Eliminating industrial food's externalities is such a formidable goal it would require a "generational" time scale to accomplish, even if the prohibitive transition costs and drastic changes to its business model could somehow be managed. Local food systems are better positioned, as they have already largely internalized their costs, but so far they've only been able to reach 0.4% of the food supply. New farms, equipment, buildings, and supplies would still have to be financed, and an army of new farmers would have to be trained on a far larger scale and at a much faster rate than has happened to date.

By contrast, it has already been demonstrated that home gardens have the capacity to ramp up quickly, even with amateur gardeners. In World War II, 20 million victory gardens were started virtually overnight, providing 40% of the nation's vegetable supply. Moreover, the ratio of home gardens to population today is 0.13, very near the ratio of 0.15 during the era of victory gardens in 1944. However, today's home gardens produce only 6-8% of the country's vegetables, which together with industrial produce supply only about 15% our calorie intake. So what would be needed is an evidence-based national campaign, similar to the quickly-rolled-out effort by the USDA in WWII, to inspire substantially increased home food production.

Gentlest

Home gardens are the least threatening alternative to the existing food system primarily because the industry will not at first perceive a threat to its near-total domination. That will allow home gardeners to accelerate production gently enough (though still relatively quickly compared to the other strategies) to avoid unduly disruptive shock waves. Then, once industry does recognize their broad public appeal, it will be more inclined to accommodate than fight it, which will paradoxically further ease its way.

Most powerful

The principal reason home gardens, pound for pound of food production, are so powerful is that they have so much unused potential. The amazing productivity of the WWII victory gardens provide one line of evidence, and Nigeria's production of 50% of its vegetables in home gardens on only 2% of its cropland is another. Why continue to waste all that unused potential? Especially when it brings so many additional benefits along with it (e.g., much needed exercise, exposure to nature, increased freshness and nutrition, greater food safety).

Easiest to implement

Compared to what it would take to transform the industrial system into a truly sustainable one (i.e., to fully internalize its costs by drastically redesigning its business model, then to educate the public about why resulting prices are so much higher), or to increase the capacity of local food well beyond its current tiny proportion of food production, home gardens require by far the least amount of social and physical infrastructure upgrades required to produce much to most of the nation's food. This is because 33% of all households already have a food garden, 67% of all adults either have a food garden or are planning to start one, and a national infrastructure to deliver seeds, gardening, and canning supplies already exists. It's just a matter stepping up the already substantial participation of gardeners and production of supplies, which has been done before in a timely manner (again, the example of victory gardens).

Most economical

As indicated above, if industrial food were serious about becoming fully sustainable, it would simply internalize all its external costs. Except it isn't simple, as it would require a highly complex, gargantuan effort and hundreds of billions of dollars, which would drive up the cost of food well beyond what people have been conditioned to believe is reasonable. Internalizing any remaining external costs for local foods would be less challenging, but so far they have resulted in higher average food prices than what most people are willing to pay (cf. the stigma attached to higher prices for organic). By contrast, home gardens bypass virtually all the internal and external costs of producing industrial food, as well as most of the costs of local food production. The result is lower real costs for food.

Most enticing

Approached in the right way (with self-sufficient empowerment), home gardens are easily the most enticing way to inspire people to implement large-scale production of healthy food. This is because gardens are 1) driven by enjoyable activity with 2) relatively quick, satisfying results that 3) benefit gardeners and their families in a number of tangible ways. And given that sales of seeds, gardening, and canning supplies have gone through the roof in the spring of both 2020 and 2021, a gardening boom is already underway. Evidently the challenges of the pandemic, unemployment, and social disruption have made more people open to the advantages of self-producing a ready supply of healthy food.

Least likely to be undercut by predatory business practices

The reason industrial food has slipped into the habit of offloading far more than half of its production expenses onto other segments of society comes back to a fundamental failure of capitalism as we know it: the so-called "invisible hand" of modern economics. An unfettered marketplace and buyer short-term, financial self interest were supposed to automatically work for the good of all, but they never have, even with the addition of some regulation. Although not all commerce players are unethical, enough are to set the operating tone of the entire economic system. That allows predatory practices to subvert fair and equitable competition, resulting in short-term benefits for some at the longer-term expense of many, or even all. That is what generates the $trillions of industrial food's external costs, with its massive, out-of-control exploitation, damage, and waste.

Local food systems, to their great credit, avoid the most destructive hegemonies of industrial food. However, even the locals are strongly impacted by it, as they must compete with conventional food in a culture that's been conditioned to see artificially low prices as a good thing. That puts local food sources at a distinct disadvantage, which is likely a leading reason why they've never been able to get more than a tiny foothold in the food market.

Home gardens, by contrast, avoid predatory business practices, as they don't engage in business in the usual sense at all, other than minimally depending on industrially produced seed, gardening, and canning supplies. That gives them an edge that even local systems can't match.

Home Gardens: The most reliable way to ensure national food security

Precisely because home gardens have the greatest leverage to establish a new food system, they also have the greatest potential to ensure national food security in a timely manner. There are currently a number of threats to the U.S. food supply that have ultra-thin regional, national, or global safety margins, exacerbated by the increasing frequency of catastrophes. To wit:

The most immediate threats

- Continued or new pandemics (note the recent rise of the Delta variant)

- Extreme heat waves in the NW and NE, leading to mega-fires in the West
- Global supply chain disruptions such as the Ever Given blocking the Suez Canal
- Power losses like that in Texas this past winter •
- Ransomware attacks that can shut down large companies and public services
- "Just-in-time" restocking: supermarkets typically have only a three-day supply of food
- Destructive winds and floods caused by storm events like derechos (e.g., the Midwest in 2020), hurricanes, tropical depressions, and mega-storm systems like Sandy
- Severe water shortages caused by extreme heat, droughts, and over-draught of aquifers

Ongoing threats

- Increasing frequency of food recalls
- Livestock diseases such as those that recently wiped out millions of chickens and pigs
- Rapidly increasing incidence of overweight (now 70 percent of the population) obesity (43 percent), and people who are diabetic or prediabetic (almost 50 percent).

Larger, overarching threats

- Climate change exacerbating the threats above, and others such as sea level rise
- Continued loss of topsoil 10-17 faster than it's being replaced
- An overdue megaflood in the Central Valley of California

National policymakers generally know about these threats, but few are aware of the megaflood that is overdue for California's Central Valley. This breadbasket, home to 7 million people, 230 crops, and 5 million cattle, supplies over half of the fruits, vegetables, and nuts produced in the U.S., and 8% of the nation's total agricultural output. The last time it experienced a megaflood was in 1861-62, when it was inundated with 15-20 feet of water (immediately followed by a brutal drought). Geological records indicate that it also experienced megafloods at some point during the periods 1235-60, 1395-1410, 1555-1615, 1750-70, and 1810-20, about every 100-200 years. As 160 years have elapsed since 1861, it's definitely overdue for another one, especially in view of the increasing turbulence of extreme weather events because of climate change.

Given these kinds of threats to the food supply, it makes sense as a matter of national security for evidence-driven policymakers to step up and promote the expansion of existing home food gardens, the starting up of substantial numbers of new gardens, and the establishment of community gardens for those who lack appropriate garden space (see below). These gardens are literally our most reliable hedge against sudden widespread food shortage.

Home Gardens: Greater Potential for a Reliable Source of Food for the Hungry

No country can honestly call itself food secure when 18 percent of its citizens are chronically hungry; it's an even more immediately alarming threat to national security than those mentioned above. Even before Covid-19, the USDA estimated that 39 million Americans were food

insecure, a number that has ballooned by at least 20 million in the pandemic, and families with children are being hit the hardest. Altogether, that's 18% of the U.S. population. It is not a matter of insufficient production; we produce far more than enough to feed the country, although much of it is rendered into high-calorie, low-nutrition food, or wasted. The problem is that many millions do not have adequate access to it. The current system addresses food insecurity with assistance programs such as SNAP (whose recipients are often guided by heavy industry advertising toward junk food) and food warehouses and pantries. These band-aid programs are at best temporary and stigmatized sources of often unhealthy food, and tens of millions continue to go hungry in spite of them. How much better it would be if the food insecure were supplied with plots in community gardens, along with the support, know-how, tools, and the voluntary option to put them to use, with the goal of establishing permanent, healthy self-sufficiency. This would call for a well-thought-out national campaign to respectfully entice and empower people desperate for food to start growing their own – a great opportunity for a cadre of innovative, energized, evidence-driven policymakers. Given the enormous efficiencies of home gardening discussed above, it would likely cost far less than the $92 billion the USDA annually spends on food and nutrition assistance.

Walking my (and our) home gardens talk

It's one thing to talk about how efficient home gardens are; it's another to demonstrate their efficacy firsthand. So borrowing from Morgan Spurlock's 2004 documentary "Super Size Me," in which he ate only at McDonald's for 30 days, recording the effects on his body, last year I ate only vegetables grown in my garden for the same amount of time. Like him, I arranged a physical exam before and after, and kept a journal documenting my experiences. I also recorded every ounce of the eight different vegetables I consumed, and exactly how much area was required to grow them. Based on that, and the fact that I was able to stay healthy and well fed throughout the month, I calculated that with a 35' x 40' garden I could sustain myself for a year. This year's garden of that size is now well underway (see illustrations below). It remains to be seen if my calculations will pan out; the results will be described on my author and garden website https://justgrowityourself.com/ once the total harvest is in late this fall. An interim progress report is already there. That represents the first level of food self-sufficiency—an individual model garden. The next level model is being constructed by two groups of food entrepreneurs here in Fairfield, Iowa (population 10,000). We are applying for grants to begin a network of community gardens in the city, with special attention to serving the low income and to offer them the option to not only start growing their own food, but to become permanently self-sufficient, or as close to that as feasible. Coming up will be expansions to regional-, state-, and national-level demonstrations of the heretofore grossly underestimated efficacy of home gardens.