

COVID-19 and the Case for a National Food Emergency Stockpile

Maggie Davis,¹ Netta Squires,² Chris Webster³

¹ Corresponding Author: University of Maryland Center for Health and Homeland Security, mddavis@law.umaryland.edu

² University of Maryland Center for Health and Homeland Security

³ University of Maryland Center for Health and Homeland Security

ABSTRACT

Food insecurity in the United States is not a new challenge, but the coronavirus pandemic has revealed that the current system to support Food Assistance Providers (FAPs) is incredibly brittle and vulnerable to supply chain disruptions. Many FAPs use just-in-time models to support their operations, relying heavily on donations from restaurants and grocers. However, COVID-19 has demonstrated that when a disaster causes increased food demand and widespread destabilization of food supply chains, jurisdictions are severely constrained from obtaining and delivering food to populations in need. Recent events have further amplified a potential danger to current food security strategies in terms of regions experiencing multiple events, such as a pandemic coupled with hurricanes, wildfires, or other catastrophes.

After exploring the current governmental food security measures, their long-term deficiencies, and other lessons learned through the COVID-19 response, we call for a major policy shift in how the country addresses food insecurity following a disaster. Rather than relying on after-the-fact spending and hastily created infrastructure, the nation should proactively stockpile shelf-stable food. To this end, we propose establishing a national stockpile of shelf-stable foods to help protect against future food supply destabilization.

Keywords: critical infrastructure, food security, disaster resilience, shelf-stable foods, stockpiles, supply chains, emergency management

Introduction

The COVID-19 pandemic has revealed weaknesses in the food supply chain in general and, more specifically, in supply chains that end with Food Assistance Providers (FAPs). FAPs are typically charitable organizations, such as nonprofit food banks, food pantries, sectarian and other community-based groups. They broadly serve individuals experiencing food insecurity.

The weakness is revealed by the dramatic surge in the number of individuals seeking help from FAPs during the COVID pandemic. In 2018, more than 37 million people in the United States struggled with hunger (Coleman-Jensen et al. 2019, 9), but it is estimated that in 2020 that number increased to more than 54 million people (including about 18 million children) (Feeding America, 2020, 1). This is directly related to the pandemic effects of massive loss of jobs and income that pushed many families to seek emergency food assistance. Some regions have been more affected than others. A food bank operator in Missouri has estimated, for example, that in 2020, the number of food insecure individuals in his area of 19 counties could, “increase by 40 percent to an estimated 18.3 percent of the population—and 26.5 percent of the children ...” (Higdon 2020).

The disruptions of COVID-19 have revealed some important lessons about the FAP food supply chain, and highlighted the need to implement policies that bolster the resilience of these critical community safety net providers. Early lessons from the COVID-19 response have shown the fragility of the supply chain and the limited capacity of FAPs, the United States Critical Infrastructure Protection Plan, and the Food and Agriculture Sector-Specific Plan. We recommend that decentralized, easily-deployable stockpiles of shelf-stable food be established to address these issues. That is, establishing a national food emergency stockpile plan.

Background

Surging Demand, Unstable Supply

Although FAPs have worked hard to meet increasing demand, they have rarely run out of food because of FAP ingenuity and emergency measures put in place at the federal, state, and local levels. FAPs often operate on a just-in-time model, relying on continued operations of food supply chains rather than on storing or stockpiling food for months or years. This means that even a significant but short disruption can leave shelves empty. FAPs rely heavily on donations from grocers and restaurants, often receiving more than half of their food supply from businesses, with the FAP purchasing the other portion of food in the commercial market. This puts FAPs at the end of a long supply chain over which they have little to no control. As seen during the first weeks of the COVID-19 pandemic, early Stay-at-Home orders triggered a run on retail groceries that left many stores with empty shelves and caused a significant drop in donations from retail sources.

Claire Babineaux-Fontenot, CEO of Feeding America, told National Public Radio's (NPR) *Morning Edition* in April 2020 that food banks were "seeing as much as a 35% reduction in that donation stream from retail."

The challenge of restocking shelves during COVID-19 is not that the nation is out of food. Instead, the challenge is one of a "misalignment of production and supply," in part due to the rapid shuttering of restaurants (U.S. Department of Agriculture (USDA), 2020b). Before COVID-19, food consumed away from home constituted 33% of the average American's daily calorie consumption (Saksena, et al. 2018). Food supplied to restaurants and caterers is packaged in larger, commercial-sized packages, rather than packaged for household distribution. During the early response to COVID-19, there was abundant food in the U.S. food supply chain, but what was available was largely packaged for wholesale consumption and could not be easily distributed by local FAPs without costly repackaging.

Finally—and perhaps most critically—the COVID-19 pandemic has revealed that large-scale national disasters may drive more individuals into food insecurity, while at the same time disrupting food production and supply chains. Moreover, the mere threat of supply chain disruption can trigger panic buying and consumer stockpiling that, in turn, limit the availability of post-consumer food products to FAPs. In April 2020, one Pennsylvania-based distributor who supplies FAPs noted that, "the wholesale cost of rice has almost tripled and won't be delivered until June. Canned fruit and vegetables are very hard to get, rice and pasta is challenging, and costs have gone crazy as manufacturers pay more for labor, food and transport" (Lakhani 2020). All of this adds up to higher costs and less food availability for FAPs at a time when demand is higher than ever.

Compound Disasters and Additional Supply Chain Disruptions

COVID-19 has made food insecurity front page news in America. The country may be unable to tolerate additional disasters on top of the existing, ongoing mass-care feeding operations. The United States is currently in the middle of the 2020 hurricane season and a western states fire season. In August, as the U.S. was responding to the COVID-19 pandemic, wildfires broke out in California and Hurricane Laura hit Louisiana. The California LNU Lightning Complex fire charred more than 350,000 acres, destroyed more than 900 structures, and forced thousands of people to flee their homes (Sottile 2020). Hurricane Laura, which made landfall in Cameron, Louisiana, as a Category 4 storm, left about 600,000 people without power and over 200,000 people without water (BBC 2020b).

The hurricane exacerbated already-existing food insecurity in the region because of food storage vulnerabilities. The Centers for Disease Control and Prevention (CDC) recommends that after only four hours without power, refrigerated foods (meat, fish, cut fruits and vegetables, milk, eggs) be either discarded or placed in another cooling source such as an insulated container with dry ice

(CDC, n.d.b). Food in a freezer will only remain safe to eat for up to 48 hours in a full freezer and 24 hours in a half-full freezer. The USDA recommends on its Food Safety and Inspection Service website that individuals should be prepared for an emergency by having items on hand that don't require refrigeration, such as shelf-stable food, boxed or canned milk, water, and canned goods. Additional stockpile items should include ready-to-use baby formula and pet food, as needed.

While the impacts of the fires in the California and Hurricane Laura in Louisiana were devastating on their own, they occurred when the COVID-19 pandemic had already strained those regions' scarce food resources. In an analysis by Feeding America on how food insecurity may increase in 2020 due to COVID-19, Louisiana was ranked number one in having the highest projected food insecurity rate in children, at 34%, and fourth overall highest at 22% (Feeding America, 2020, 3). On August 30th, after the recent hurricane, a Southwest Louisiana FAP described the situation to local news outlet *4WWL-TV* as, "... literally one crisis on top of another." Communities there faced the painful reality that there was no way to meet the need for emergency food assistance.

The same study showed that California had the highest-projected increase in the number of food insecure people, with an additional 2.1 million people needing food, which included 852,730 children (also the highest rate of increase to food insecure children due to the pandemic). California also had the highest projected rate of total number of food insecure people, with an estimated 6.4 million people (Feeding America, 2020, 4). The continuing wildfires compound problems for California's FAPs, forcing temporary closures, disrupting delivery schedules, and increasing the need for food weeks and months after fires were extinguished as individuals are uprooted, many having lost homes (Sparling 2020).

A large percentage of the population is already on the Supplemental Nutrition Assistance Program (SNAP) (previously called Food Stamps), and many require additional supplies obtained by frequent visits to food pantries. Concurrently facing multiple disasters (power outage, fire, tornado), an already overstrained and under-resourced food network may not be able to meet all families' needs. Another option to provide a backup source of food is investing in a stockpile of canned and dried foods. This is a safe alternative to perishable food that needs to be refrigerated.

The fragility of the international food supply network is a further compounding factor. Ports such as Santos in Brazil or Rosario in Argentina, for example, are considered vital ports for the export of key staple commodities. Argentina is the largest exporter of soymeal livestock feed in the world (FAO, 2020). Maximo Cullen, Chief Economist and Assistant Director-General, Food and Agriculture Organization of the United Nations, predicts that "Internationally, if a major port like Santos in Brazil or Rosario in Argentina shuts down, it would spell disaster for global trade."

The major explosion in a warehouse in Beirut on August 4, 2020, was a startling example of the effect of such an event. The disaster began with a large fire at the Port of Beirut, which is in close proximity to the country's grain silos, which store most of the country's wheat supplies (Osseiran 2020). A subsequent explosion in the building resulted in a blast that caused widespread damage in a nearly 2000-foot radius, obliterating the grain silos and destroying the port, where 85% of the country's imported foods arrive (BBC 2020a). Initial reports by Beirut's governor, Marwan Abboud, estimated that nearly 300,000 people had been made temporarily homeless as a result. Prior to the explosion, Lebanon was supplying aid to 75% of its population (Devi 2020). The preexisting socioeconomic conditions, compounded by COVID-19 and further exacerbated by the devastating explosion, have left the country in a grave state of food insecurity. While Lebanon is not a food exporting country and the circumstances of the explosion were unique to that port, this event exemplifies the world's reliance on port facilities to both export and import food.

The U.S. must be prepared for the possibility of existing food insecurity conditions deteriorating further. Countries such as the U.S., which are heavily dependent on imported foods, are at greater risk from border closings and supply chain failures (Naja & Hamadeh 2020). The Homeland Security Council has called for preparedness measures to be taken at the local, state, and federal levels to support critical infrastructure food services, with adequate transportation and distribution policies and planning (Homeland Security Council, 2006, 153). COVID-19 has demonstrated that any infrastructure protection plan must be able to withstand compounded disasters. As the lead agency designated to oversee the Agriculture and Food Sector of the National Infrastructure Protection Plan (NIPP) (Homeland Security, n.d.), it is incumbent on the USDA to invest in a sufficiently scaled, long-term plan. A preexisting stockpile of shelf-stable key commodities that is readily deployable is critical to preventing or reducing food insecurity following a compounding catastrophic disaster to a network that is already stretched.

Results: Local, State, and Federal Level Stopgaps

All levels of government have responded to the food crisis related to the COVID-19 pandemic. This section provides a brief overview of some programs, but it is not a comprehensive catalog of COVID-19 food security responses.

Local Government Efforts

Local Home Meal Delivery

Disaster response always relies heavily on local governments, with local emergency management officials accustomed to requesting state and federal resources after their resources have been overwhelmed. The same is true in the COVID-19 re-

sponse, which has resulted in local government and networks of FAPs bearing the burden of addressing food insecurity in their communities. Faced with an unstable food supply chain and an enormous increase in food insecurity, local governments, communities, and FAPs have gotten creative in devising ways of maintaining food distribution. Two actions that local jurisdictions have deployed are the pop-up distribution of prepared meals and enhancing the network's supply of shelf-stable food.

A challenge created by COVID-19 has been the need to distribute meals to individuals quarantined in their homes who are physically unable to go to a location to pick up food or are financially unable to order food to their homes. To address this challenge, several jurisdictions have created entirely new food provision services and systems. One example is New York City's new GetFoodNYC Emergency Home Food Delivery program. The program helps residents who are unable to go outside on their own because they are homebound or at increased medical risk, have no one who can help them get food such as neighbors or nearby family, do not receive assistance with meals from other providers, or are not able to afford the cost of delivery from local restaurants or grocery stores as a result of the pandemic (NYC311, n.d.). Eligible residents can get prepared meals delivered to their house. A delivery contains nine meals per person, but no more than 18 meals per delivery per household (City of New York, n.d.).

Washington, D.C. currently runs a similar program called GetHelpDC (Government of the District of Columbia, n.d.). In addition to food, the program offers eligible recipients other necessary supplies, such as hygiene products. In Montgomery County, Maryland, the COVID-19 Food Security Task Force has supplied prepared meals to eight senior buildings in the county, so that individuals in those buildings do not have to risk venturing out for groceries or meals. This is a very limited sample of the feeding programs and disaster partnerships that have sprung up across the country to meet the increased local need.¹

To respond quickly, to source food from a ready supply, and to support local businesses, these programs in New York City, Washington, D.C., and Montgomery County, Maryland, purchase prepared meals from local restaurants and caterers. There are challenges associated with serving prepared meals. Prepared meals often do not account for peoples' palates, cultural sensitivities, or health restrictions such as allergies. Giving a set menu deprives them of making their own choices in food consumption, or worse, leaves them hungry if they are unable or unwilling to eat the meals provided. Additionally, while prepared-meal delivery provides immediate relief to a food-insecure individual or family, many food-insecure individuals not experiencing immediate illness prefer preparing meals at home rather

¹ The authors of this article have been supporting the COVID-19 food security efforts of Montgomery County, Maryland, since March 2020. References to Montgomery County, Maryland's efforts are drawn, in part, from first-hand experience and information obtained through that work.

than having prepared meals delivered for reasons that include health, variety, and the desire to consume culturally appropriate foods.

Further, the cost and complexity of delivering prepared meals is significantly higher than the cost of providing household grocery items to be prepared at home. In Montgomery County, Maryland, market research has shown the average cost of a prepared meal to be between \$6.50- \$8.50 per meal when buying in large quantities. This is far more expensive than providing fresh-food boxes or shelf-stable items. The logistics of preparing, chilling, and delivering large quantities of prepared meals are also considerable. In fact, in New York City and Washington, D.C., special software has been developed and deployed to help manage this complexity (Unqork, n.d.).

Local Shelf-stable Procurement and Repackaging

With severe challenges to the FAP supply chain, some state and local governments have stepped in to directly purchase shelf-stable food from food distributors for FAPs to provide to residents in need. Montgomery County, Maryland, for example, contracted with local food distributors to purchase shelf-stable food. This approach was necessary, and it helped many providers fill the food shortages they were experiencing. But it was costly. Of the 110 food-assistance providers in Montgomery County, only a few were eligible for federal programs that provided more supplies. Even organizations that were eligible for federal assistance found limited shelf-stable staple items on the food bank's shelves. Early in the COVID-19 response, a run on local grocery stores prompted grocers like Aldi and Costco to begin rationing quantities that were being sold, leaving many FAPs who relied on bulk purchasing unable to purchase more than a couple of single-unit rice or flour bags at time.

To address this issue, jurisdictions like Montgomery County, Maryland, used federal COVID-19 relief funding to partner with local non-profit organizations and food wholesalers to purchase bulk supplies of rice, beans, and other items that would have been sold to local businesses, and they then repackaged those items in household quantities. An entirely new packaging operation had to be established to buy, move, repackage, and store these bulk items. The repackaged products were in sizes suitable for families, ranging from one to three pounds of rice, lentils, or beans. To meet the food safety standards of the FAPs, the operation had to be situated in a commercial kitchen, limiting the number of volunteer organizations that could help facilitate the project. Over the summer of 2020, the operation repackaged an average of 40,000 pounds of rice, lentils, and beans a week. Even this high volume, though, was still insufficient to fulfill the local need.

This type of ad hoc repackaging operation is not uncommon in the COVID-19 response and helped to inject much-needed food into the food bank system. However, this type of operation takes significant time, money, and effort to establish and operate.

Similar to prepared-meal programs, bulk shelf-stable food purchases take time. More importantly, they rely on there being a steady supply of food to purchase. Even when that food is available, it is often expensive, and it requires near-heroic logistics on the part of local governments, who are not in the business of large-scale food wholesaling.

State Government Efforts

State governments are also experimenting with novel partnerships to address food insecurity in the wake of the pandemic. Some states, such as Massachusetts, have created statewide food security task forces to coordinate the efforts of various food-assistance programs and FAPs in order to best respond to a growing level of need (Commonwealth of Massachusetts, 2020). Beyond the traditional role of facilitating funding between the federal and local governments, some states have created novel private-public partnerships to address hunger. For example, New York recently announced a partnership with the meal kit service Hello Fresh to provide over 200,000 meals through the end of 2020 as part of its Nourish New York initiative (New York State, 2020).

Washington State has experienced an increase of almost 50% in state residents seeking food assistance compared to November 2019 (Patrick 2020). An estimated 30% of the population, or 2.2 million people, were identified as food insecure, with 59% having children in the household (University of Washington Center for Public Health Nutrition, 2020). Similar to other areas in the country, local food banks and FAPs have recorded six to 12-week delays in the arrival of bulk shipments of food. In a proactive effort, the Washington State Department of Agriculture (WSDA) established a high-commodity food stockpile containing items such as peanut butter, pasta boxes, applesauce, canned vegetables, and pancake mix (Patrick 2020). Although this stockpile represents the kind of solution this paper proposes, in establishing the state's food commodity stockpile as an emergency, rapid-response measure and not as a long-term strategy, regional and national supply chain gaps were exacerbated for these commodities.

Federal Efforts

CARES Act Funding

Resources to address food insecurity were included in the 2020 omnibus Coronavirus Aid, Relief, and Economic Security (CARES) Act (15 U.S.C. § 116), which was a \$2 trillion economic relief package that provided emergency assistance and health care response for individuals, families, and businesses affected by the COVID-19 pandemic. Approximately \$49 billion was directly allocated to food and agriculture provisions: \$24 billion toward domestic food programs; \$15.8 billion increased funding to existing supplemental nutrition programs; and \$8.8 billion to fund additional child nutrition programs (Farm Bureau, 2020). The emer-

gency expansion of federally-funded food insecurity programs was a critical step in helping food insecure individuals because it enabled expansion of the existing government food assistance infrastructure, as well as lessening the shock to the FAP network from the great increase in demand. Although the legislation was quickly enacted, the process to enroll a large number of new beneficiaries in these programs took time, resulting in long lines at FAPs and severely strained resources. Additionally, many of these programs excluded individuals due to economic, employment, or citizenship status, a gap that is often filled by FAPs.

USDA TEFAP Program

The Emergency Food Assistance Program (TEFAP) is a federal program that helps supplement the diets of low-income Americans by providing them emergency food assistance at no cost (Food and Nutrition Service, USDA, 2020). The USDA buys the food from domestic producers and then gives the food to each state's distributing agency. Each state is allocated a specific amount of food based on residents below poverty level and the state's unemployment numbers. The state distribution agency then allocates food to local organizations, such as food banks, to distribute to the local FAP network of food pantries, soup kitchens, faith-based, and other organizations serving the public.

USDA CFAP Program

An unprecedented and enormously successful effort by the federal government has been the USDA Coronavirus Food Assistance Program (CFAP). This \$19 billion program provided \$16 billion in direct payments to agriculture producers impacted by the pandemic and \$3 billion to a USDA Farmers to Families Food Box program. The USDA partnered with distributors at the national, regional, and local levels that had been negatively impacted by closures of restaurants, hotels, and other food service businesses to purchase up to \$3 billion in fresh fruit and vegetables, dairy, and meat products from domestic producers. The produce, dairy, and meat were then packaged by distributors into family-sized boxes and sent to local food banks, nonprofit partners, and government entities such as schools that were trying to meet their community's increased demand for food. According to the USDA, receiving organizations had to demonstrate that they had the "operational and financial capability to receive, store and distribute requested food items" (USDA, 2020a).

While the CFAP program demonstrates a creative emergency initiative to feed individuals who are food insecure, it is not a long-term solution. The program was designed to both support mass feeding operations nationwide and to help producers and distributors remain financially stable as the pandemic disrupted their supply chains as spring and summer harvest seasons began. Although this one-off program initiative helped avoid a catastrophic shortage of food in the short-term,

without a stable source of funding, the agricultural industry will adjust their future harvests to meet market needs.

The CFAP program has provided perishable items that are an excellent source of nutritious food, but this has required more complex cold storage and transportation than are needed for shelf-stable foods. Many medium- to small-sized FAPs do not have adequate cold spaces for storage, transportation, or distribution. Even larger FAPs struggle with cold storage space due to the increased demand that has filled their limited shelf space. Larger providers are also seeing their capacity stretched. Not only are they supplying for their own increased demand, but they are housing food for smaller providers, further diminishing available space.

Discussion

A National Food Stockpile

After six months of COVID-19 response and working closely with FAPs to address critical gaps in the food supply chains, several elements of a successful plan to address food insecurity in the context of an emergency incident are apparent. First, it is impractical to rely on brittle supply chains to provide just-in-time food resources for a community. As demonstrated by the pandemic, external events can disrupt these brittle supply chains and leave people without access to food. To minimize the risk posed by supply chain disruptions, there should be a stable source of food in place prior to the emergency incident. Second, because emergencies are often unpredictable, the food stored prior to the emergency should be non-perishable food that is suitable for storage in large quantities for an extended period of time. Third, shelf-stable food stored in preparation for an emergency must be easily deployable within hours of the need being identified. Fourth, that deployment should be pre-planned and practiced to the greatest extent possible.

Learning from these lessons, the United States should consider a major policy shift in how it addresses food security following a disaster. Rather than relying on after-the-fact spending and hastily created infrastructures, the nation should proactively stockpile shelf-stable food. These stockpiles should be regional, allowing local FAPs to access required food from stockpiles within hours of the need being identified. Fortunately, there are other stockpile models currently used in the United States that can serve as general blueprints for creating a National Food Stockpile.

Modern methods of food preservation have created the ability to safely stockpile food to mitigate against future scarcity. If implemented correctly, a stockpile of shelf-stable food can provide a long-term, durable solution for food droughts, disruptions in the food supply chain, or other food insecurity impacts stemming from disasters.

The USDA defines shelf-stable food as “Foods that can be safely stored at room temperature, or on the shelf” (U.S. Department of Agriculture, n.d.). Examples of non-perishable, shelf-stable products include “jerky, country hams, canned and bottled foods, rice, pasta, flour, sugar, spices, oils, and foods processed in aseptic or retort packages and other products that do not require refrigeration until after opening.” Marianne Gravely, Technical Information Specialist for the Food Safety and Inspection Service notes on the USDA blog that, “Most shelf-stable foods are safe indefinitely.” She adds that, “In fact, canned goods will last for years, as long as the can itself is in good condition (no rust, dents, or swelling).” The chart below displays the average time that different self-stable foods may remain safely edible.

Table 1. Shelf Stable Food Storage Chart (Source: U.S. Department of Agriculture, Food Inspection Service)

FOOD	STORAGE ON SHELF	STORAGE AFTER OPENING
Canned ham (shelf-stable)	2 to 5 years	3 to 4 days in the refrigerator
Low-acid canned goods (e.g., canned meat and poultry, stews, soups (except tomato), spaghetti (noodle and pasta) products, potatoes, corn, carrots, spinach, beans, beets, peas, and pumpkin)	2 to 5 years	3 to 4 days in the refrigerator
High-acid canned goods (e.g., juices (tomato, orange, lemon, lime, and grapefruit), tomatoes, grapefruit, pineapple, apples and apple products, mixed fruit, peaches, pears, plums, all berries, pickles, sauerkraut, and foods treated with vinegar-based sauces or dressings like German potato salad and sauerbraten)	12 to 18 months	5 to 7 days in the refrigerator
Home canned foods	12 months. Before using, boil 10 minutes for high-acid foods; 20 minutes for low-acid foods.	3 to 4 days in the refrigerator
Jerky, commercially packaged	12 months	N/A
Jerky, home-dried	1 to 2 months	N/A
Hard/dry sausage	6 weeks in pantry	3 weeks refrigerated, or until it no longer smells or tastes good.
USDA dried egg mix	Store below 50 °F, preferably refrigerated, for 12 to 15 months.	Refrigerate after opening. Use within 7 to 10 days. Use reconstituted egg mix immediately or refrigerate and use within 1 hour.
Dried egg whites	Unopened dried egg products and egg white solids can be stored at room temperature as long as they are kept cool and dry. After opening, store in the refrigerator.	Refrigeration is not required unless reconstituted.
MRE's (Meal, Ready to Eat)	120 °F, 1 month 100 °F, 1 1/2 years 90 °F, 2 1/2 years 80 °F, 4 years 70 °F, 4 1/2 years 60 °F, 7 years	Refrigeration will increase the shelf-stable storage times.
Tuna and other seafood in retort pouches	18 months	3 to 4 days in the refrigerator
Meat or poultry products in retort pouches	Use manufacturer's recommendation on the package.	3 to 4 days in the refrigerator
Rice and dried pasta	2 years	After cooking, 3 to 4 days in the refrigerator

Considering Existing Stockpiles and Reserves

In the past, the United States maintained modest stockpiles of materials and resources necessary to its defense. For example, in 1917, it was recognized that “certain minerals of great importance, particularly in war time” were lacking and that a stockpile of those important minerals would enhance the nation’s defense ([National Research Council, 2008, 133-34](#)). During World War II, the United States created its first strategic stockpile through the 1939 Strategic Materials Act, “which authorized \$100 million for the Secretaries of War and the Navy acting jointly with the Secretary of the Interior and in conjunction with the Army and Navy Munitions Board to purchase strategic raw materials for a stockpile.” In the intervening years, the United States maintained a variety of stockpiles of critical materials, with the efforts reorganized as the threats facing the nation evolved. Currently, the two most well-known stockpiles maintained in the United States are the Strategic National Stockpile and the Strategic National Petroleum Reserve.

The Strategic National Stockpile

Initially created as the National Pharmaceutical Stockpile by Presidential Decision Directive 62 (Federation of American Scientists, n.d.), Congress appropriated funds to the CDC in 1998 (U.S. Department of Health and Human Services, n.d.) to prepare against bioterrorism events like anthrax and smallpox. It was renamed the Strategic National Stockpile (SNS) in 2003 following the terrorist attacks of September 11, 2001 (Public Health Emergency, n.d.). President Bill Clinton’s motivation for establishing the SNS has been attributed to a work of fiction—Richard Preston’s *The Cobra Event*, a novel centered around a novel virus called Cobra manufactured by a terrorist organization and deployed in New York City (Waxman 2020). At the time, the nation’s stockpiles were reserved for the military and there was not a comparable stockpile to provide aid to civilians should a bioterrorism event occur.

While the SNS was envisioned as a response to bioterrorism events, the mission of the stockpile has expanded over the years to include natural disasters and emerging infectious disease threats like the Zika virus in 2015. Much of the stockpile contains materials necessary for a wide range of disasters, including gloves and antibiotics, as well as recently developed vaccines to potential bioterror agents like anthrax. The goals of the SNS have remained the same. It is designed to be deployed to disaster areas within 12 hours of the declaration of the disaster. As part of the Cities Readiness Initiative, 72 cities and metropolitan areas regularly practice distribution of standardized packages of supplies from the SNS (Centers for Disease Control and Prevention, n.d.a). During the COVID-19 response, the Trump Administration disputed this long-held premise of the stockpile’s design to support states, localities, and tribes during an emergency—claiming that the SNS was for federal purposes only (Blake 2020). This claim, and widespread reports of

the SNS having insufficient and defective supplies due to lack of maintenance, has demonstrated the need for a well-maintained stockpile and a clear understanding of its availability to support states, localities, and tribes.

Strategic National Petroleum Reserve

While the SNS was largely inspired by fiction, the Strategic National Petroleum Reserve was born out of economic necessity and lessons learned from the 1973 oil crisis (Office of the Historian, n.d.). In retaliation for the United States' support of the Israeli military during the 1973-74 Arab-Israeli War, the Organization of Petroleum Exporting Countries (OPEC) imposed an embargo against the United States that banned petroleum exports to targeted nations and cut oil production. At the time, the U.S. economy was largely dependent on oil produced in other countries. Following the end of the embargo, the United States legislatively established the Strategic Petroleum Reserve (SPR) in 1975.

The SPR contained 727 million barrels of oil at its peak in 2009, the largest supply in the world. With four sites along Gulf Coast, the oil is maintained in large underground storage caverns and can only be accessed by presidential directive. These directives typically occur when an external event creates a shock to oil markets that threaten to escalate fuel costs domestically. Most recently, the SPR was accessed following an attack on Saudi-American oil production facility (Defterios 2020).

National Emergency Food Stockpile Recommendations

To increase the resiliency of the FAP network, the United States Critical Infrastructure Protection Plan, and the Food and Agriculture Sector-Specific Plan (Cybersecurity and Infrastructure Security Agency, 2016), should be revised to create a shelf-stable food stockpile. The federal plan should support the development of regional food stockpile plans, which would be routinely reviewed and practiced. The stockpile should have the following characteristics.

1. **Pre-planned:** The just-in-time model for food should shift to an emergency preparedness model similar to that of the SNS. Federal, state, local, and tribal governments should work with the private sector to assess and address available food reserves and contingency plans. Accordingly, the plans should be periodically trained on and exercised in realistic conditions, leveraging leadership expertise from organizations like councils of governments or healthcare coalitions.
2. **All-Hazards Approach:** The plan should incorporate an all-hazards approach. The COVID-19 pandemic has revealed the fragility of the food supply chain on a global level, but it should be seen as a predictor of similarly impactful events. In addition to pandemics, weather changes leading to increased numbers of

severe hurricanes and wildfires, electric storms, and even sophisticated cybersecurity events, can cause major long-lasting disruptions to the food supply chain and food availability. In these events, non-perishable, shelf-stable food will be critical to stockpile.

3. **Deployable:** The stockpile should be readily deployable and contemplate storage and transportation requirements. Similar to the SNS, a shelf-stable food stockpile should include standardized pallets that can easily be transported, in this case to a FAP loading dock for distribution. A resilient deployment framework should be developed, and storage space and delivery mechanisms must be accounted for.
4. **Decentralized:** Stockpiles should be regional to ensure timely deployment and population data considerations. Each region should plan to stockpile based on geography and interjurisdictional relations. For example, existing councils of government in metropolitan regions like Washington, D.C.'s Metropolitan Washington Council of Governments or Seattle's Puget Sound Regional Council could be considered a region for both establishing the physical location of a stockpile, and also for planning, training, and exercise purposes.
5. **Safety:** Food safety should be a top priority of a stockpile plan. Consideration for the shelf-life of products and process for replenishing expired or used products in a timely manner should be developed and practiced on an ongoing basis. The shelf-stable stockpile should be continuously replenished and renewed.
6. **Culturally and Health Appropriate:** Stockpiles should have a standard set of staple items; however, the needs of the population in a particular region should also be incorporated in the plan for supplying the stockpile. Culturally appropriate, shelf-stable items, such as rice and beans, kosher, or halal items, should be stocked accordingly, as well as non-allergen foods. Food consumption models can be established based on local food bank purchasing and distribution patterns.

Conclusion

In sum, the COVID-19 pandemic forced governments at all levels to respond with quick, stop-gap solutions to feed an ever-growing number of individuals, families, and communities experiencing food insecurity caused by the health and economic effects of the COVID-19 pandemic. Policymakers should view the COVID-19 pandemic as a "near miss" that precipitated emergency measures and continued intervention. As governments plan for recovery and prepare for future hazards, they should include food stockpiles as mitigation strategies. As a first step, the

United States should revise the United States Critical Infrastructure Protection Plan (CIPP) and the Food and Agriculture Sector-Specific Plan to include a stockpile of shelf-stable food to supplement the existing FAP and other networks. The scope, scale, and complexity of any effective solution necessitates a cross-disciplinary approach that links policy makers at the federal, state, and local level with members of the academic, agricultural, industrial, and scientific community. It will also be critical to include members of the non-profit disaster relief and food security world, as their organizations have the best understanding of existing efforts, and practically serve as the critical last mile in food distribution and community support. A good first step would be convening a summit of a wide range of stakeholders to begin to vet potential food stockpiling strategies and to identify implementation strategies.

As a starting point in that discussion, the authors here propose that, to be effective, any stockpile must include a diversity shelf-stable food that is consistent with the cultural and nutritional needs of the residents. It cannot simply be a collection of meals ready to eat (MREs) or a purely fiscal solution (like a “disaster relief fund”) that does not account for supply chain fragility. Instead, this stockpile must be de-centralized, deployable, and consistent with cultural and nutritional needs. A crucial element to the planning efforts will be including FAPs operational efforts for local last-mile distribution of the food stockpile. Stockpile plans will need to be trained and exercised with the multi-agency governmental partners involved, drawing on lessons learned from the Cities Readiness Initiative exercises which practice SNS distribution. Making this policy shift will buffer against severe shocks to the FAP supply chain caused by natural or human-made disasters or economic collapse or dislocation.

Acronyms and Abbreviations

Acronym	Explanation
CARES	Coronavirus Aid, Relief, and Economic Security Act
CDC	Centers for Disease Control and Prevention
CFAP	Coronavirus Food Assistance Program
COVID-19	Coronavirus disease 2019
FAP	Food Assistance Providers
HHS	U.S. Department of Health and Human Services
NPR	National Public Radio
OPEC	Organization of Petroleum Exporting Countries
SNS	Strategic National Stockpile

SPR	Strategic Petroleum Reserve
TEFAP	The Emergency Food Assistance Program
USDA	U.S. Department of Agriculture
WSDA	Washington State Department of Agriculture

Author Capsule Bios

Maggie Davis, JD, MA, PMP is a Senior Law & Policy Analyst for the University of Maryland Center for Health and Homeland Security with over six years of emergency management law and policy experience. A lawyer and bioethicist by training, she has worked on issues ranging from emergency food security response to emergency mutual aid to terrorism prevention. She graduated from the University of Maryland Francis King Carey School of Law in 2013 with a certificate in Health Law, and received her M.A. in Bioethics and B.A. in Psychology from Case Western Reserve University in 2010 as part of the Integrated Graduate Studies program. She is licensed to practice law in New York State and the District of Columbia.

Netta Squires, JD, MSL, CEM is a Senior Law and Policy Analyst for the University of Maryland Center for Health and Homeland Security. Ms. Squires has been in the field of emergency management since 2004, most recently serving as a National Capital Region Emergency Preparedness Specialist for Montgomery County, MD, Office of Emergency Management and Homeland Security. In support of public health and mass care services during the pandemic, she leads the County's COVID 19 Food Security Task Force. Ms. Squires teaches Cybersecurity Technology at the University of Maryland University College, and Emergency Management at the Mid-Atlantic Center for Emergency Management at Frederick Community College. Ms. Squires received her Juris Doctor from the George Washington University Law School, and her Master of Science in Law from the University of Maryland at Baltimore.

Christopher Webster, JD is the Public Safety Technology Program Director at the University of Maryland Center for Health and Homeland Security, where he helps agencies, businesses, and nonprofits prepare for, respond to, and recover from disasters. Most recently, Mr. Webster has provided support to Montgomery County MD's COVID-19 Food Security Task Force, where he focuses on bulk food procurement, stockpiling, and strategic planning. Mr. Webster teaches Public Health Law in the Master of Science in Law program at the University of Maryland at Baltimore. Mr. Webster received his Juris Doctor from the University of Maryland Francis King Carey School of Law in 2010.

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* “n.d.” Indicates ‘No Date’ for the original reference.

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