



# Farm-To-School Programs in Southern Arizona: A Case Study on the Economics of Local Foods

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## Executive Summary

### ***What is the issue?***

Farm-to-school programs encourage local food purchasing by schools and school districts as part of their efforts to provide fresh, healthy school meal options for students and engage students in nutrition education. Farm-to-school programs are part of a broader local foods movement, which represents a burgeoning demand for foods that are source-identified and originate from within a certain proximity to consumers. One of the most commonly cited benefits of encouraging local foods is that it supports local farmers and businesses, strengthening local economies. Farm-to-school programs are an example of a program to promote local foods, and are used by schools to provide nutrition education, develop school gardens, and promote local food purchasing by school districts. This analysis focuses on the local food purchasing portion of farm-to-school programs in Southern Arizona, defined for this study as Cochise, Santa Cruz, Pima and Yuma counties. The analysis relies on data from the most recent Farm to School Census (2015), a national survey of farm-to-school programs including information on their characteristics and activities.

As the prevalence of farm-to-school programs increases and interest grows in promoting local foods, there is a need for improved information to fully understand the potential scope and scale of impacts and economic tradeoffs associated with increases in local foods activity, and to understand barriers to its future growth. As public funding goes towards programs to promote local foods with an eye towards economic development outcomes, we propose some key questions for program leaders and policy makers. The lessons learned from examining farm-to-school activities in Southern Arizona apply generally to local foods efforts in the region and can inform program planning and assessment to ensure that economic development goals tied to local foods efforts are producing their desired impacts in the community.

### ***What did the study find?***

#### **Southern Arizona Farm to School Census Results**

*Schools and school districts in Southern Arizona actively conduct farm-to-school activities, including local food purchasing.*

- Out of a total of 467 school districts in Arizona, 265 responded to the 2015 USDA Farm to School Census. Of these 265 districts, 22 percent (57 districts) reported being actively engaged in farm-to-school activities.
- In Southern Arizona specifically, 25 percent (11 of 44 districts) of Farm to School Census respondents reported actively conducting farm-to-school activities in the 2013-2014 school year.
- Nine of 11 respondents with active farm-to-school programs reported spending on local foods.
- For those schools with local food programs, spending on local foods (not including milk) averaged \$70,550 for the 2013-2014 school year. Including local milk, spending on local foods

averaged \$113,050. Local milk is tallied separately because, in general, milk typically travels a short distance to final consumers due to its perishable nature.

*Local Food Expenditures of Southern Arizona School Food Authorities (SFAs) Participating in Farm-to-School Programs*

Item	Average	Minimum	Maximum
Total food expenditures	\$365,330	\$12,000	\$1,300,000
Food expenditure (local foods) including fluid milk	\$113,050	\$0	\$550,000
Percent of food cost that was local, including fluid milk	26.6%	0	100%
Food expenditure (local foods) not including milk	\$70,550	\$0	\$450,000
Percent of food cost that was local, not including fluid milk	9.9%	0.00	53.6%

*Definitions of ‘local foods’ vary among respondents, though most respondents consider foods produced within Arizona as local.*

- 70 percent of Southern Arizona respondents with active farm-to-school programs consider food produced within the state of Arizona as local; 20 percent consider food produced within the same city or county as local.
- In Arizona, farm-to-school buyers more commonly consider in-state-produced food as local compared with U.S. consumers in general, where 70 percent of respondents consider local as within the same county or within a 50-mile radius of the school.
- The geographic definition of ‘local foods’ has important implications for assessing economic impacts of changes in school food spending. For states such as Arizona that produce a high share of certain vegetable commodities in major growing regions during times of the year when school is in session, schools may already be buying local without knowing it because there are few non-local options. Efforts to buy local in such cases may have negligible economic impacts.

*The most commonly purchased local foods by farm-to-school programs in the 2013-2014 school year were milk, vegetables, and fruit.*

- By category, local milk was the most frequently served local food item, with eight Southern Arizona school food authorities indicating serving local milk daily. Local fruit and vegetables were also commonly served on a daily or weekly basis. Most other local food products, such as meat, dairy products, eggs, grains, and other items are not typically served by Southern Arizona Farm to School Census respondents.
- When asked to list their top five most commonly purchased local food items, respondents reported purchasing the following items: apples, oranges, bread, broccoli, cantaloupe, carrots, strawberries, tangerines, iceberg and other lettuces, kale, meat and poultry, melons, milk, tomatoes, watermelon, onions, peaches, salad mix, and spinach.

*Southern Arizona Farm to School Census Respondents by Frequency of Serving Local Food Category*

<b>Number of Respondents by Frequency of Serving Local Food Categories</b>	Daily	More than weekly	Weekly	More than monthly	Monthly	Occasionally	Never
Local fruit	3	1	2	1	0	1	2
Local vegetables	4	0	3	0	0	1	2
Local milk	8	0	0	0	0	0	2
Local dairy products	1	0	0	2	0	1	4
Local meat	1	1	0	0	0	0	7
Local eggs	0	0	0	0	0	0	7
Local seafood	0	0	0	0	0	0	7
Local plant-based protein items (i.e. beans, seeds, nuts)	0	0	0	1	0	1	5
Local grains and flour	1	0	0	0	0	1	6
Local bakery products	0	0	1	0	0	0	6
Local herbs	0	0	0	0	0	0	7
Other local food	0	0	0	0	0	0	5

*Schools and school districts in Southern Arizona most often rely on distributors for purchasing local foods, though some do purchase directly from agricultural producers.*

- Ninety percent of respondents with active farm-to-school programs in Southern Arizona purchase local foods through an intermediary, such as a distributor. Meanwhile, 40 percent obtain local foods directly from agricultural producers.

*Barriers to local food purchasing include difficulty finding key items available year-round and a lack of suppliers and distributors offering local foods.*

- Other barriers cited include having appropriate facilities, equipment, and staff resources to store and prepare fresh produce. There is also the challenge of pre-planning school meal menus in cooperation with farms to contract produce months in advance of when it will be harvested, delivered, and served to students.

**Economic Tradeoffs of Local Foods Activity**

*Local food promotion such as farm-to-school programs can have positive economic impacts to Southern Arizona's economy; however, certain conditions must be met for those to occur.*

- Based upon this Southern Arizona case study, accounting for the tradeoffs associated with local food purchasing and production can reduce the direct effect of that local purchase by 20 to 40 percent.
- Economic impacts of local foods efforts are generated through import substitution – purchases fulfilled through net new production of foods that otherwise would have been purchased from (and produced) outside the region.
- Import substitution must be coupled with a net increase in agricultural production, either through an increase in the scale of production of produce or a shift from lower-value field crops to higher-value produce crops, to generate sizeable impacts. That said, shifting to local procurement can have a negligible effect depending upon the production and business decisions of individual producers and intermediaries and whether they're expanding their businesses to meet the change in demand or merely shifting supply from one customer to another.
- Increased purchases of local foods can lead to reduced spending for other local goods and services. For example, purchasing directly from a local producer could result in reduced spending on wholesaling services. Or, a shift from producing field crops to vegetable crops due to water resource constraints would lead to an increase in vegetable production, but also a decrease in field crop production and its associated multiplier effects. These economic tradeoffs mean that the net effects of local food spending will be lower than the gross effects.

*Some school and school district food purchases are likely to be 'local' regardless of farm-to-school programs.*

- Milk is a commodity that is typically consumed near where it is produced due to its perishable nature. To account for this phenomenon, the Farm to School Census reports milk purchases separately.
- Thirty-eight percent of reported Southern Arizona school spending on local foods was spent on fluid milk. In Arizona, nearly all milk production occurs in neighboring Pinal and Maricopa Counties, and therefore would be considered local (in-state) whether or not school districts keep track of their local food purchases.
- Other food purchases likely to occur locally include fruits and vegetables that are produced during the winter months in Arizona, when cultivation is not possible in colder climates. For example, lettuce is a commodity for which few non-local options are available for portions of the school year.

*A few key considerations can help local food programs concerned with economic impacts target their efforts to best generate positive impacts to the local economy.*

- Is the purchaser of local food increasing their spending on food or shifting their spending from non-local to local foods?
- Is the local spending on something that is usually sourced from nearby, such as milk?
- Is the producer of local food increasing the scale of their operation to meet the demand created or simply selling existing production to a different buyer?

- If the scale of production isn't increasing, are producers changing what they produce to meet demand?
- If purchases take place through an intermediary such as a distributor or food hub, is the purchase causing them to increase the scale of their operation locally?
- Does the definition of local for all parties involved match?
- If demonstrating economic impacts of local foods to funders or stakeholders, how will you collect data on the actions of food chain actors, including growers, final buyers, and, if applicable, intermediaries?

### ***How was the study done?***

This analysis uses data from the 2015 USDA Farm to School Census for four Southern Arizona counties: Pima, Cochise, Santa Cruz, and Yuma counties. The analysis uses recommendations from the USDA Local Foods Toolkit, and primary data collection from local food system actors (Thilmany McFadden, et al, 2016). Economic impacts were estimated using the IMPLAN 3.1 input output model. The study examined the potential economic impacts of schools shifting food spending to local food options in place of non-local options. This analysis compared the impacts of an increase in vegetable production that was assumed to have no opportunity cost of spending and no natural resource constraints, an increase in vegetable production that accounted for the opportunity cost of school food spending, and an increase in vegetable production that accounted for both spending opportunity costs and natural resource constraints.



## Introduction

Farm-to-school programs encourage local food purchasing by schools and school districts as part of their efforts to provide fresh, healthy school meal options for students and engage students in nutrition education. Farm-to-school programs are part of a broader local foods movement, which represents a burgeoning demand for foods that are source-identified and originate from within a certain proximity to consumers. The concept of “local foods” is rooted in the “source-identified” quality of a food, where “source-identified”<sup>[1]</sup> refers to retaining information on where, by whom, and, often, how a food was produced. Source-identified products are differentiated and de-commodified to the extent that consumers place value on knowing where the product came from. Within the United States, foods are often considered “local” when they were produced within the same county or within a 50-mile radius as consumers, though definitions vary widely.<sup>[2]</sup> The local foods movement aligns itself with values such as corporate social responsibility, environmental sustainability, and in contrast to “big-ag.”<sup>[3]</sup> Though largely untested, the local foods movement touts certain benefits of local foods, such as a shorter supply chain from farm to consumer, resulting in greater freshness and quality of produce; promoting economic development, particularly in rural agricultural communities, through support of local and regional producers; reduced environmental footprint of food consumption through shorter supply chains and more environmentally-friendly production practices; and improved nutrition outcomes via greater consumer awareness and engagement with the food supply chain<sup>[4]</sup>.

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### ***USDA Farm to School Grants***

USDA’s Farm to School grant program provides up to \$5 million in funding annually to support implementation, planning, and training grants for farm to school programs. Grantees include schools and school districts, small- and medium-sized agricultural producers, state and local agencies, and tribal organizations. More information on the Farm to School Grant program can be found at the USDA’s website:

<https://www.fns.usda.gov/farmtoschool/farm-school-grant-program>

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### ***USDA Department of Defense (DoD) Fresh Fruit and Vegetable Program***

USDA’s DoD program is a procurement partnership between the USDA and the DoD Defense Logistics Agency (DLA). Schools can spend their USDA Foods entitlement (typically 15-20% of school food spending) on fresh fruits and vegetables provided through the DoD program. All produce offered through the DoD program is U.S.-grown; however, produce grown in the same state as a school is marketed to them as local. More information on the program can be found at <https://www.fns.usda.gov/fdd/usda-dod-fresh-fruit-and-vegetable-program>

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Efforts to promote local foods occur through a variety of channels, encouraging local foods consumption among different segments of the population. One common promotion strategy focusing on youth is

through farm-to-school programs. Farm-to-school programs are a three-pronged strategy working in K-12 schools to (1) provide nutrition education, (2) develop school garden programs, and (3) encourage procurement of local foods by school foodservice departments. This third activity, local food procurement, is the focus of this study. Funding to support farm-to-school programs is available at federal, state, and local government levels, most notably through the USDA's Farm to School Grant Program, part of the Healthy Hunger Free Kids Act of 2010, as well as through private sources<sup>[5]</sup>. An important driver of farm-to-school procurement is the USDA Food and Nutrition Service Department of Defense (DoD) Fresh Produce Program which funds procurement of fresh produce for schools, with local procurement options identified as Arizona grown. That said, not all farm-to-school programs rely on funding from these sources.

To better understand farm-to-school activity occurring nationally, the USDA conducts the Farm to School Census.<sup>[6]</sup> The Farm to School Census gathers information on current and anticipated school participation in farm-to-school activities, procurement practices, products commonly purchased locally, and barriers to participation in farm-to-school activities, among other data. The Farm to School Census is one of the most comprehensive and accessible data sources on local foods activity, within a subject area that generally lacks consistent data beyond the regional level.

One of the commonly cited benefits of supporting the procurement of local foods are its economic development impacts. This analysis relies on data from the 2015 Farm to School Census to establish a baseline of current farm-to-school activity in Southern Arizona and explore the regional economic implications of sourcing foods locally at the institutional level.

The analysis focuses on school districts in Southern Arizona, defined for the purposes of this study as Pima, Cochise, Santa Cruz, and Yuma counties. Southern Arizona is becoming an epicenter of local foods activity. The region has a thriving culinary scene that frequently garners national attention, with a strong emphasis drawing on the region's long culinary tradition and the revival and cultivation of heritage crops.<sup>[7], [8]</sup> Considering these and other factors, the City of Tucson received the coveted designation as a UNESCO City of Gastronomy in 2015.<sup>[9]</sup> While in most parts of the country agricultural production, particularly fruit and vegetable production, is not feasible during all times of the year when school is in session, Arizona's production of fruits and vegetables peaks in winter months, making Arizona well-positioned to supply local fruits and vegetables to farm-to-school programs.

Arizona is a leading producer of many agricultural commodities, ranking as the second largest producing state for lettuce, spinach, broccoli, and cauliflower in 2014.<sup>[10]</sup> Not surprisingly, these are some of the most common local purchases by schools. Yuma County, one of the four counties examined here, is one of the largest producers of leafy green vegetables in the nation. In fact, "[d]uring the winter months, from the first week of December 2014 to the first week of March 2015, 82 percent of the nation's lettuce was shipped from Arizona, primarily from Yuma County."<sup>[10]</sup> Arizona produces around a quarter of the national production of cantaloupe and honeydew. It is also a leading producer of other commodities such as durum wheat and pecans.

Institutional buyers, including schools, represent an important opportunity for food producers and intermediary market channels to sell local foods in a structured and steady arrangement.<sup>[11]</sup> According to the USDA 2015 Local Food Marketing Practices Survey, 39 percent of locally branded food sales by farms in 2015 at the national level were to institutional and intermediary buyers, compared with 35 percent directly to consumers, and 27 percent to retailers.<sup>[12]</sup> Within the four Southern Arizona counties, direct to consumer sales represented \$2.7 million in 2012 (as of the most recent Census of Agriculture) (Table 1), suggesting that the scale of local foods activity in the region may be even larger were intermediated sales to be included. Direct to consumer sales represent sales from a producer to the consumer without an intermediary buyer, for example, farmers’ markets, farm-stand sales, and models such as community supported agriculture (CSAs). As the prevalence of farm-to-school programs increases and interest grows in other programs to promote local foods, there is a need for improved information to fully understand the potential scope and scale of impacts and economic tradeoffs associated with increases in local foods activity, as well as barriers to its future growth. As public funding goes towards programs to promote local foods with an eye towards its economic development outcomes, we propose some key questions for program leaders and policy makers to ask of their efforts. The lessons learned from examining farm-to-school activities in Southern Arizona apply generally to local foods efforts in the region and can inform program planning and assessment to ensure that economic development goals tied to local foods efforts are producing their desired impacts in the community.

*Table 1. Direct to Consumer Sales and Farms by County, 2012*

County	2012 Sales	Farms
<b>Pima</b>	\$1,316,000	102
<b>Cochise</b>	\$1,148,000	122
<b>Santa Cruz</b>	\$54,000	27
<b>Yuma</b>	\$198,000	36

*Source: 2012 Census of Agriculture*

## Regional Economics of Local Foods

Farm-to-school programs focus on the procurement of locally produced foods, nutrition education, and development of school gardens. Programs vary in the scope of their activities and the source of their funding. This analysis examines the procurement component of farm-to-school programs as this is the programmatic area most likely to produce short-term economic impacts. Farm-to-school programs are touted as a way to support regional economic development through opening up opportunities for local agricultural producers. The economic impacts of local procurement occur through a phenomenon known as “import substitution”. Import substitution is the act of replacing goods imported from outside the region with commodities produced within the region.<sup>[13]</sup> This, in effect, means that a greater share of consumers’ spending per dollar stays within the local economy. In actuality, the net effects of local procurement depend on many factors.

This section will explore the mechanisms behind the economic effects of local food procurement.

There are two common assumptions to consider in assessing the impacts of local food procurement: the “**no resource constraints**” assumption and the “**no opportunity cost of spending**” assumption.<sup>[13]</sup> The assumption of “no

resource constraints” is that land, water, and other natural resources are in abundance and agricultural production will rise to fulfill increased local demand for locally produced foods. This assumption is particularly relevant in Southern Arizona, where many parts of the region belong to Active Management Areas (AMAs) or Irrigation Non-expansion Areas (INAs) through the Groundwater Management Act, where expansion of irrigated agriculture is not permitted.<sup>[14]</sup> Therefore, major increases in production of food crops at the local level would likely be coupled with corresponding decreases in the production of other crops, or existing production of food crops would be purchased by local buyers instead of exported out of the region, with no change in agricultural production levels. These are examples of economic tradeoffs. While crop shifting from lower-value crops such as alfalfa to higher-value specialty crops such as vegetables could generate some net positive effects to the economy, other considerations such as infrastructure, climate, and suitability of the land for specific food crops would need to be accounted for in assessing feasibility. Cropland in the four Southern Arizona counties has seen fluctuations from one agricultural census to the next, but the total has remained relatively stable, and, aggregated across all four counties, it has experienced a slight decline between 2002 and 2012 (Figure 1).

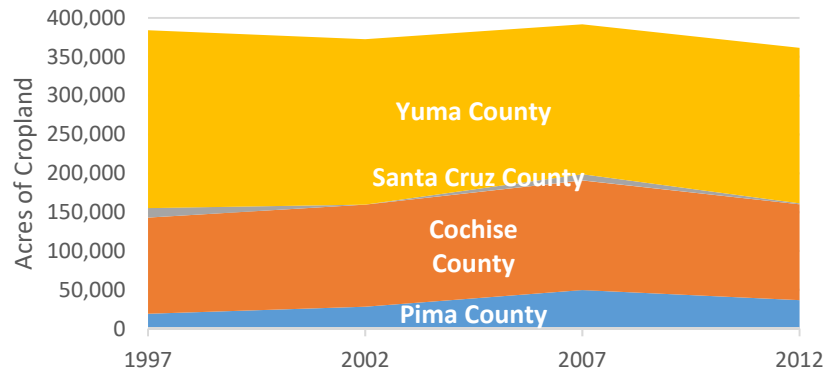
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### *Economic Tradeoffs*

Economic tradeoffs represent foregone alternatives implicit in the choices of economic actors. For example, by spending \$1 on apples, an individual does not spend that same \$1 on oranges. This represents a tradeoff. A farmer with 1 acre of land could choose to grow field crops or plant an orchard – again, a tradeoff.

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Figure 1. Total Cropland by Southern Arizona County



Source: 2012, 2007, 2002, & 1997 Censuses of Agriculture

The “no opportunity cost of spending” assumption applies to the buyers of local food products. When a consumer chooses to purchase locally sourced food over food imported from outside the region, there are actors in the local economy that lose out, such as wholesalers and retailers, depending upon which channel the consumer normally purchases that food through. Assessing the net effects of that local purchase requires considering the negative impacts that may occur when a consumer’s spending pattern shifts. In the case of farm-to-school programs, schools are not necessarily purchasing more food as a result of participating in farm-to-school activities, but rather they would be shifting some of their food budget towards locally procured items versus items imported from outside the region. Any shift in the marketing channel must be considered, whether that be buying directly from producers, from an intermediary such as a food hub (an aggregator of local food products for marketing), or through a traditional food services distributor.

It follows that the economic benefits of farm-to-school programs tend to be modest due to the moderating force of “countervailing effects” in the wholesale and retail sectors.<sup>[15]</sup> Furthermore, if there are merely shifts in who is purchasing existing agricultural production from the region (local buyers versus buyers from outside the region), effects to the local economy may be negligible. Other economic benefits from such changes, such as reductions in food waste, positive health and educational outcomes, and income diversification for local agricultural producers, are more difficult to measure. Such measurement would require research that is more involved.<sup>[15]</sup>

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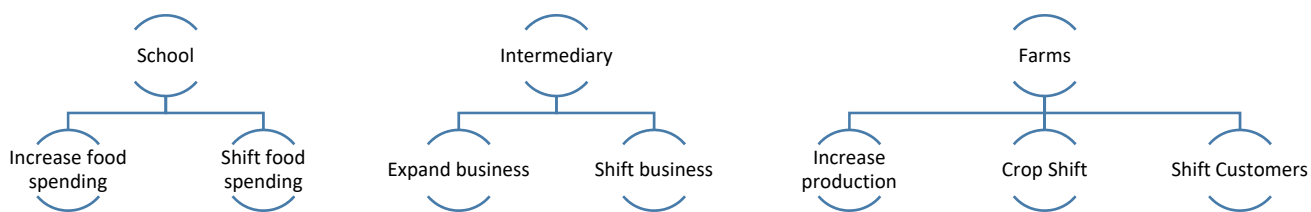
### Food Hubs

Food hubs are “businesses that actively manage the aggregation and distribution of source-identified food products.”<sup>[1]</sup> They serve as marketing intermediaries, oftentimes for small agricultural producers that lack the resources or product volume to market their products to larger buyers, including institutions.

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As can be seen, the mechanisms behind the impacts of local food procurement are complex and could vary significantly on a case-by-case basis. In assessing the impacts of any local food procurement decision, multiple actors across the supply chain can affect the impact of the procurement on the local economy (Figure 2). When a school increases spending on local foods, that increase may come at the expense of non-local foods, or in some cases, it may represent an increase in the food budget. If the school is working through an intermediary such as a distributor or food hub, that intermediary may choose to expand their business to accommodate any net new demand for local foods, or they may choose to shift business away from one customer and towards another, if possible. Finally, for local farms, opportunities to sell to schools could be met with an increase in the scale of their operations by adding acreage. On the other hand, if they are land- and resource-constrained, they may choose to sell existing production that was being sold to other customers to the school instead, or they may choose to shift production of lower-value crops toward production of higher-value fruits and vegetables for their farm-to-school customers.

Figure 2. Farm-to-School Food-Chain Actors and Decisions that Influence Economic Impacts



In any case, the choices of any one actor along the food supply chain could counteract seemingly positive impacts due to the choices of another. For example, suppose a school decides to shift its food spending from non-local to locally-sourced goods. If the intermediary or farm shifts customers – chooses to move business toward that school and away from another customer, instead of expanding their operations – that increase in school spending would have a negligible effect on the local economy. Whether or not a school is expanding their spending on food or simply shifting spending towards local foods, the economic impact will ultimately depend on the actions of farms and any intermediaries.

Another consideration, particularly for institutional buyers such as school districts, is that shifting towards local purchases may require moving business from more traditional food service distributors to local food aggregators such as local food hubs or cooperatives. In such a case, the differences in how traditional food service distributors operate and how regional food hubs operate would need to be considered in assessing economic impacts. For example, if a food hub spends more on labor or real estate compared to traditional distributors, this difference in business spending would need to be considered in the analysis. Intermediated marketing channels for local foods represent between 50-66 percent of the value of local food sales in 2008 at the national level and for the west coast (California, Oregon, and Washington), that figure rises to 85 percent.<sup>[16]</sup> That stated, the role of intermediaries is important to consider.

Finally, intermediaries and agricultural producers may receive higher prices for foods marketed as “local.” A review of existing literature suggests that generally there is a higher willingness to pay by consumers for produce marketed as local.<sup>[17]</sup> In a study examining Nielsen Homescan panel data, however, researchers found that on average, produce (tomatoes, potatoes, peppers, apples, and

grapes) sold through direct to consumer outlets had a lower per-pound price in the Rocky Mountain region, including Arizona, compared with traditionally marketed produce in grocery retail.<sup>[17]</sup> The contribution of shorter supply chains and reduced marketing costs in this price difference is not analyzed. In an analysis of direct to consumer marketing channels in North Carolina, researchers found a local price premium only for grapes in an analysis of commonly purchased produce items sold through direct to consumer marketing channels.<sup>[18]</sup> Other studies have found a higher willingness to pay for local food as the geographic scale gets smaller, or more “local.”<sup>[19]</sup> Limited information exists, however, on willingness to pay for local food by institutional buyers. In an interview, a local distributor suggested that price premiums may exist, but given that oftentimes local produce is also organic, it is difficult to tease-out the price premium attributable to products being local. This analysis does not consider price premiums for produce marketed as “local” purchased by institutional buyers and assumes that schools work to maximize the purchasing power of their food service budgets.

## Farm-to-School Activity in Southern Arizona

This study relies on data from the 2015 Farm to School Census, state and local data on school district food procurement practices, and existing literature on farm-to-school programs to provide estimates of economic tradeoffs implicit in sourcing food locally.

The Farm to School Census was first implemented by the USDA in 2013, and again in 2015, to provide data for assessing program growth and outcomes. The survey is distributed to “school food authorities” (SFAs), therefore some responses are representative of school districts while others represent individual private or charter schools.<sup>[20]</sup> The Farm to School Census typically goes to food service professionals for completion.<sup>[21]</sup> The 2015 Farm to School Census had a national response rate of 70 percent. Of the

467 school districts in Arizona, 57 percent completed the Farm to School Census. For the four Arizona counties selected for this analysis (Pima, Cochise, Santa Cruz, and Yuma) (Figure 3), there were a total of 44 respondents to the Farm to School Census, not all of which reported farm-to-school activities.

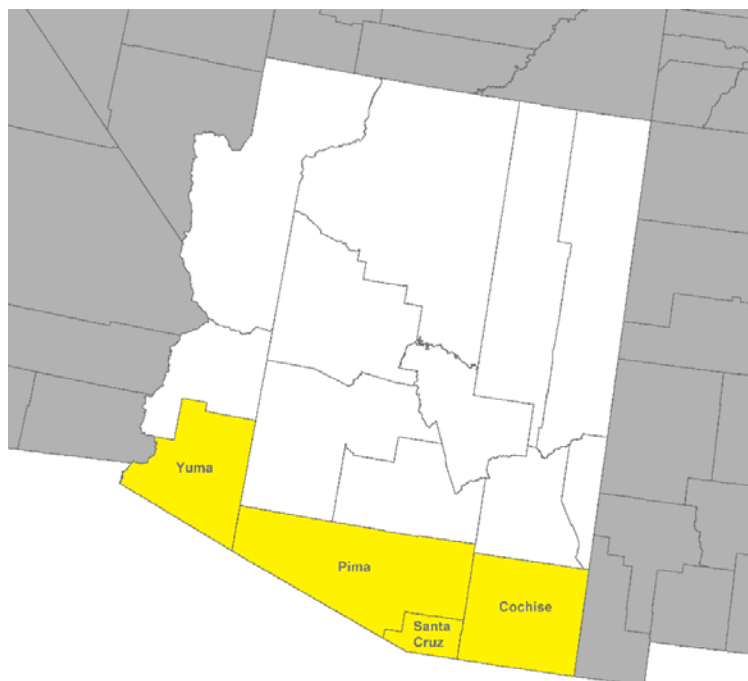
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### **USDA Farm to School Census**

The USDA conducts a nationwide census of farm to school programs. The Farm to School Census was first conducted in 2013 and again in 2015 for the 2013-2014 school year to provide a baseline understanding of existing local food activity through schools, as well as to set and measure progress towards program goals. While focused on procurement practices, the Census also provides information on farm to school curricula being implemented and school garden programs. Information about the Farm to School Census can be found at <https://farmtoschoolcensus.fns.usda.gov/>.

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*Figure 3. Pima, Cochise, Santa Cruz, and Yuma Counties – Analysis Area*





According to the National Center for Education Statistics, there were 151 education agencies providing free public elementary or secondary education in these Southern Arizona counties in 2013, including

*Table 2. Southern Arizona Farm to School Census Respondents by County*

County	Respondents	Universe	Percent of Students in County Covered by Census
Pima	17	96	55.2
Cochise	14	29	64.3
Santa Cruz	4	11	37.8
Yuma	9	15	87.2
<b>TOTAL</b>	<b>44</b>	<b>151</b>	<b>60.8</b>

Sources: 2015 Farm to School Census; National Center for Education Statistics

44 Southern Arizona education agencies that responded to the 2015 Farm to School Census, 11 reported conducting farm-to-school activities (Table 3). One SFA reported initiating farm-to-school activities in the 2014-2015 school year, 10 planned to start activities in the future, and 22 reported not currently engaging in farm-to-school activities, with no plans to do so. Common reasons cited for not engaging in farm-to-school activities are the difficulty of finding key items available locally year-round, difficulty finding distributors or local producers who are bidding, and difficulty working through existing procurement channels. Of the 11 SFAs that reported currently engaging in farm-to-school activities 10 had useable census responses.

*Table 3. Farm-to-School Participation Status among Southern Arizona Farm to School Census Respondents*

Conducts Farm-to-school Activities	Respondents
Yes	11
No, but started activities in 2014-2015 school year	1
No, but plan to start activities in the future	10
No activities currently and no plans	22

Of the 10 SFAs reporting participation in farm-to-school activities, six respondents represented individual schools. Respondents representing more than one school (school districts or charters with multiple locations) represented two, four, seven, and 90 participating schools, according to Farm to School Census responses (Table 4). The total number of students represented by these responses ranged widely from 60 students in Patagonia Union High School District to nearly 50,000 students in Tucson Unified School District (Table 4).

*Table 4. Southern Arizona Schools and School Districts Indicating Participation in Farm-to-School Programs in 2015 Farm to School Census*

School / School District	Participating Schools	Total Schools	Total Students
Antelope Union High School District	1	1	292
Catalina Foothills Unified District	7	8	4,983
Cochise Community Development Corporation	1	1	375
CPLC Community Schools dba Toltecalli High School	1	1	125
Crane Elementary District	2	12	6,175
Mexicayotl Academy, Inc.	1	2	171

private and charter schools (Table 2).<sup>[22]</sup> In total, the 44 responding schools or school districts represent over 60 percent of K-12 students in the four counties.

Statewide, there were 265 Farm to School Census respondents from Arizona, with 57 reporting being actively engaged in farm-to-school activities. Of the total

Patagonia Union High School District	1	1	60
St David Unified District	-	2	422
Tucson Unified District	90	118	49,308
Wellton Elementary District	1	1	272
Yuma Elementary District	4	18	8,950

One important consideration for farm-to-school programs is what constitutes “local” food. While there is no official definition, most Southern Arizona SFAs (seven of 10) consider food produced within the state of Arizona as local (Table 5). That was followed by two SFAs that consider food produced within the same city or county as local, and one that considers food produced within a 200-mile radius as local. Statewide, 62 percent of respondents considered in-state produced food as local. Nationally, 24.6 percent of Farm to School Census respondents consider food produced within the same state as local, followed by 20.4 percent that consider food produced within the same city or county as local. Food produced within a 50-mile radius and 100-mile radius represent over 16 percent of national Farm to School Census respondents each. Again, this contrasts with the most common definition of local food for U.S. consumers as foods originating from within a 50-mile radius (over 70 percent), followed by from within the same county (over 40 percent).<sup>[2]</sup>

Table 5. Southern Arizona School Food Authorities’ (SFAs’) Geographic Definition of “Local”

Definition of Local	Respondents
Produced within the state	7
Same city/county	2
Produced within a 200-mile radius	1
Produced within a 50-mile radius	0
Produced within a 100-mile radius	0
Produced within a day's drive	0
Produced within the region	0
Geographic along with other restrictions / Other	0

### Buying Practices

Local food purchases occur in one of two ways – purchases are either made directly from the agricultural producer or manufacturer, or they are made through an intermediary buying channel such as a distributor, a food hub, or a program that aggregates local produce. Four of 10 SFAs reporting farm-to-school activity used direct buying channels, with some respondents using more than one (Table 6). The most common direct buying channel was direct purchases from food processors and manufacturers, with three SFAs. Two SFAs made purchases through a Community Supported Agriculture (CSA) model and one SFA purchased directly from an agricultural producer.

Table 6. Southern Arizona School Food Authorities (SFAs) Local Food Direct Buying Practices

Direct Buying Channel	Respondents
Obtains local food direct from food processors and manufacturers	3
Obtains local food via a Community Supported Agriculture (CSA) model	2
Obtains local food direct from individual food producers (i.e. farmers, fishers, ranchers)	1

Obtains local food direct from farmer, rancher, or fisher cooperatives	0
Obtains local food direct from farmers markets	0

Nine of 10 SFAs that indicated engaging in farm-to-school activities reported purchasing local foods through intermediary channels. The most commonly used intermediary is a food distributor with six respondent SFAs, followed by federal school food and nutrition programs such as USDA foods (a program providing domestically grown produce to school participating in federal school nutrition programs) (five respondents) and the Department of Defense (DoD) Fresh Produce program (four respondents) (Table 7).

Table 7. Southern Arizona School Food Authorities (SFAs) Local Food Intermediary Buying Practices

Intermediary Buying Channel	Respondents
Obtains local food from distributors	6
Obtains local food from USDA foods	5
Obtains local food from DoD Fresh Program vendors	4
Obtains local food from food buying cooperative	1
Obtains local food from food hub	0
Obtains local food from food service management companies	0
Obtains local food from State Farm to School program office	0
Obtains local food from another intermediary source	0

The DoD Fresh Produce program is cited as a major driver of school SFA acquisition of local produce. The DoD Fresh Produce Program provides up to 20 percent financial assistance to schools (as a share of schools' USDA entitlement funds) for the procurement of fresh produce, including local foods which are identified in their catalogue Arizona grown. According to the Arizona Department of Education, in the 2013 school year, statewide DoD program participants spent 11 percent of their program funding, or \$501,000, on items designated as locally grown. Top fresh produce items purchased statewide that year were lettuce (41 percent), celery (39 percent), broccoli (15 percent), cauliflower (five percent), and vegetable soup mix (five percent).<sup>[23]</sup> Total DoD program spending for the four Southern Arizona counties for the 2013-2014 school year was roughly \$903,000, of which \$82,000 (nine percent) was local procurement.

Table 8. Food Item Categories Purchased Locally by Southern Arizona School Food Authorities (SFAs)

Local Food Purchased	Yes	No	Not now but in the future	Don't know
Bought local fruit	8	2	0	0
Bought local vegetables	8	2	0	0
Bought local milk	7	1	0	1
Bought local other dairy	1	3	0	2
Bought local other meat	2	4	0	1
Bought local eggs	0	4	0	1
Bought local seafood	0	4	0	1
Bought local plant-based protein items such as beans, seeds, nuts	0	3	0	2
Bought local grains and flour	1	3	0	2

Bought local bakery products	2	3	0	1
Bought local herbs	0	3	0	2
Bought other food	0	3	0	2

Southern Arizona SFAs that report purchasing local foods for farm-to-school activities most commonly do so through intermediaries versus directly from farmers. Some schools purchase from intermediaries, as well as directly from producers. The food items most commonly purchased locally are fruits and vegetables (eight SFAs each) followed by milk (seven SFAs) (Table 8).

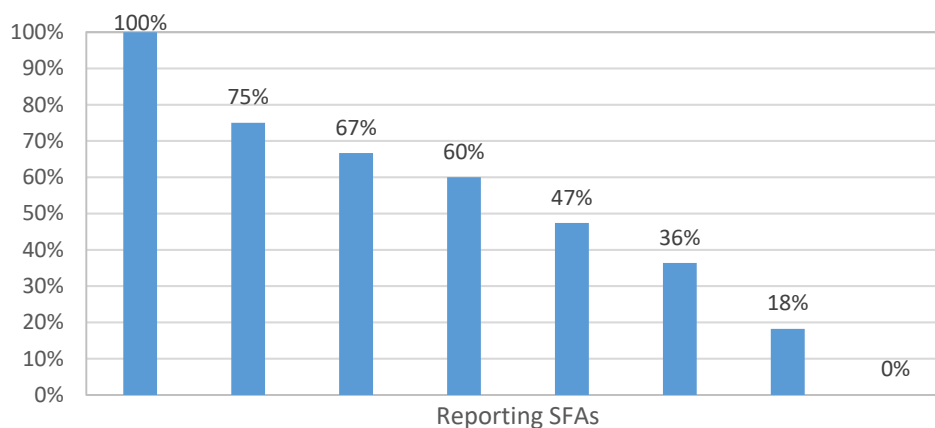
Total reported food expenditures by the 10 SFAs that indicated participating in farm-to-school activities ranged from \$12,000 to \$1.3 million, with an average of \$365,330 (Table 9). Including expenditures on fluid milk, expenditures on local foods ranged from \$0 to \$550,000 (0 percent to 100 percent of total costs), averaging \$113,050 (27 percent of total costs). Not including expenditures on fluid milk, local food expenditures ranged from \$0 to \$450,000 (0 percent to 54 percent of total costs), averaging \$70,550 (10 percent of total costs).

Table 9. Local Food Expenditures of Southern Arizona School Food Authorities (SFAs) Participating in Farm-to-School Programs

Item	Average	Minimum	Maximum
Total food expenditures	\$365,330	\$12,000	\$1,300,000
Food expenditure (local foods) including milk	\$113,050	\$0	\$550,000
Percent of food cost that was local, including fluid milk	26.6	0	100
Food expenditure (local foods) not including milk	\$70,550	\$0	\$450,000
Percent of food cost that was local, not including fluid milk	9.9	0.00	53.6

Examining reported SFAs' spending on local foods as a share of total food spending, there is wide variation in the proportion of total food spending represented by spending on local milk (Figure 4). When considering the share of spending on local food not including milk, however, the share of total food spending on local foods is more consistent amongst reporting SFAs.

Figure 4. Local Milk Share of Total Local Food Purchases by Southern Arizona School Food Authorities (SFAs)



Fluid milk is commonly sourced locally because it is highly perishable.<sup>[24]</sup> In assessing local food activity, it is important to realize that sales of fluid milk were most likely a pre-existing local food purchase and must be accounted for in estimating net effects of programs to promote new use of local foods. In Arizona, it is typical for milk to come from large dairies in Pinal and Maricopa counties (91 percent of Arizona’s fluid milk production in 2012), which by most definitions would be considered locally procured (A. Schimke, personal communication).<sup>[25, 21]</sup> Of eight SFAs reporting local food purchases greater than \$0, milk purchased locally ranged from 0 percent of local food purchases to 100 percent of local food purchases (Figure 4). Of the two respondents that reported zero spending on local milk, both respondents also defined local as from within the same city or county, a narrower definition than most SFAs. It is likely that many SFAs that did not report any local food activity or farm-to-school programs make what could be considered local purchases of milk, but do not track whether they are purchasing from in-state vendors.

Considering that milk is typically purchased locally, many of these local purchases are likely not net-new local food activity, but rather previously existing activity being captured through the Farm to School Census and through a drive to classify local food activity as such.

Respondents were asked to list their top five most commonly purchased local food items. Responses included several commodities produced heavily in Arizona, such as different types of lettuce, melons, spinach, and broccoli:

- Apples
- Blood oranges
- Bread
- Broccoli
- Cantaloupe
- Carrots
- Iceberg lettuce
- Kale
- Lettuce
- Meat/poultry
- Melons
- Milk
- Onions
- Oranges
- Peaches
- Salad Mix
- Spinach
- Strawberry
- Tangerines
- Tomatoes
- Watermelon

By category, local milk was served with the greatest frequency, with eight respondents indicating serving local milk daily (Table 10). There was one additional SFA that reported serving local milk compared with the number of SFAs that reported purchasing local milk (seven SFAs). Local fruit and vegetables were also commonly served on a daily or weekly basis. Most other local food products, such as meat, dairy products, eggs, grains, and other items are not typically served by reporting SFAs.

Table 10. Frequency of Serving Local Food Items by Southern Arizona School Food Authorities (SFAs)

<i>Number of Farm to School Census Respondents by Frequency of Serving Local Food Categories</i>	Daily	More than weekly	Weekly	More than monthly	Monthly	Occasionally	Never
Local fruit	3	1	2	1	0	1	2
Local vegetables	4	0	3	0	0	1	2
Local milk	8	0	0	0	0	0	2
Local dairy products	1	0	0	2	0	1	4
Local meat	1	1	0	0	0	0	7

Local eggs	0	0	0	0	0	0	7
Local seafood	0	0	0	0	0	0	7
Local plant-based protein items (i.e. beans, seeds, nuts)	0	0	0	1	0	1	5
Local grains and flour	1	0	0	0	0	1	6
Local bakery products	0	0	1	0	0	0	6
Local herbs	0	0	0	0	0	0	7
Other local food	0	0	0	0	0	0	5

The most common venue in which local food products were served was through school lunch programs, with nine respondents. Of the SFAs, four reported using local foods in school breakfast programs (Table 11).

Table 11. Use of Local Foods Purchased by Southern Arizona School Food Authorities (SFAs)

Use of Local Foods Procured	Respondents
Used local foods in breakfast program	4
Used local foods in lunch program	9
Used local foods in supper program	0
Used local foods in snacks program	1
Used local foods in Fresh Fruit and Vegetable Program	2
Used local foods in CACFP (i.e., in a pre-k setting such as Head Start, etc.) program	0
Used local foods in CACFP at-risk afterschool program	0
Used local foods in summer meals program (i.e., meals in summer food service programs, Seamless Summer, or the NLSP under accredited summer school programs)	2

A number of benefits are often attributed to farm-to-school programs. SFAs reported enjoying greater acceptance of their new meal patterns and experiencing less food waste because of their farm-to-school efforts (Table 12). Other less frequently reported benefits include reduced school meal program costs, increased school meal participation, and greater community support for the school meal program. One SFA reported that another benefit of their program was that “[t]he students have greatly enjoyed creating and tending the school garden with their science teacher.”<sup>[6]</sup>

Table 12. Benefits Realized because of Participation in Farm-to-School Program

Benefit	Respondents
Enjoying reduced food waste as a benefit of farm to school	4
Enjoying lower school meal program costs as a benefit of farm to school	2
Enjoying greater acceptance of the new meal pattern as a benefit of farm to school	5
Enjoying increased participation in school meals as a benefit of farm to school	2
Enjoying greater community support for school meals as a benefit of farm to school	2
Enjoying other benefit of farm to school	1

It warrants reiterating that this analysis focuses on the benefits of farm-to-school programs to the regional economy. Other benefits to schools and students are not explored in this analysis, but could include nutritional, educational, and other outcomes. For example, serving local foods in the school cafeteria is just one of many farm-to-school activities that Southern Arizona SFAs are engaged in (Table 13).

Table 13. Farm-to-School Related Activities and Southern Arizona School Food Authorities (SFAs) that Participated in 2013-2014 School Year

Activity	Responses
Served locally produced foods in the cafeteria	8
Served locally produced foods as a Smart Snack (a la carte, as fundraisers, etc.)	0
Served locally produced food or providing farm to school activities as part of afterschool programs	2
Served products from school-based gardens or school-based farms in the cafeteria	1
Held taste testing/demos of locally produced foods in the cafeteria, classroom, or other school-related setting	4
Held taste testing/demos of product from school-based gardens or school-based farms in the cafeteria, classroom or other school-related setting	2
Used Smarter Lunchroom strategies to encourage student selection and consumption of locally produced foods (e.g., product placement, food prompts, creative signage, etc.)	1
Used cafeteria food coaches (e.g. adults or students in the cafeteria encouraging kids to eat health/local foods)	2
Used USDA Team Nutrition materials as part of taste testing or educational activities	1
Conducted edible school gardening or orchard activities as part of a school curriculum	2
Conducted edible school gardening or orchard activities as part of an after-school program	0
Conducted student field trips to farms or orchards	4
Had farmer(s) visit the cafeteria, classroom or other school-related setting	3
Promoted local efforts through themed or branded promotions (e.g. Harvest of the Month, Local Day, Taste of Washington, etc.)	2
Promoted locally produced foods at school in general (e.g. via cafeteria signs, posters, newsletters, etc.)	0
Generated media coverage of local foods being used in schools (e.g. press interviews or other activities that resulted in local coverage)	1
Hosted farm to school related community events (e.g. invited parents to lunch, corn shucking contests, etc.)	0
Celebrated Farm to School Month (October 2013)	0
Integrated farm to school concepts, including school gardening activities, into educational curriculum (math, science, language arts, etc.)	2
Provided training to school food service staff on farm to school or school gardens	3
Worked with local food producers to develop a specific food product using local foods	1
Implemented farm to school activities as part of overall school efforts to reduce food waste	1
Evaluated changes in student acceptance and food waste as a result of implementing farm to school activities	1
Other farm to school activity	0

### *Barriers to Local Food Buying*

For those SFAs indicating that they did not participate in local procurement through farm-to-school programs, the Farm to School Census asks why not. Twenty-two responding SFAs indicated having no current



farm-to-school activities and no plans to begin. The most common reasons cited were difficulty in finding key items available year-round and difficulty in finding new suppliers, growers, or distributors (Table 14). Other commonly cited reasons were that local producers do not bid on SFA procurement opportunities, a lack of information about product availability, and that local items are not available from primary vendors.

Table 14. Reasons Why Southern Arizona School Food Authorities (SFAs) Did Not Procure Local Food Products

Reason Why District Does Not Procure Local Food Products	Respondents
Hard to find year-round availability of key items	6
Hard to find new suppliers/growers or distributors	6
Local producers aren't bidding	5
Hard to get information about product availability	5
Local items not available from primary vendors	4
Hard to coordinate procurement of local with regular procurement	3
Lack of availability of processed/precut products	3
Vendors for local items don't offer a broad range of products	2
Higher prices	2
Lack of reliability in delivering ordered items	2
Hard to place orders with vendors	2
Getting on time deliveries	2
Lack of kitchen equipment to process/prepare local foods	1
GAP or other food safety requirements	1
Getting product delivered that meets your quality requirements & other specs (i.e., size)	1
Inability to pay farmers according to farmers' needs due to school district payment procedures	1
Unstable product prices	0
Lack of compliance with your institution's purchasing regulations and policies	0
Having quantity delivered equal to quantity ordered	0
Resolving problem deliveries	0
Other problem with local procurement	
<p>We have our food delivered from an outside school district</p> <p>We order our produce from FFAVORS distributed by Stern produce [this is the DoD program]</p> <p>We use a caterer</p> <p>Live too far from any store</p> <p>We receive all our produce from the company we order our food from.</p> <p>Our school uses a cater services therefor we do not purchase any items</p> <p>Our area doesn't have this kind of access.</p> <p>Not enough time to find, bid, make orders, and meet all requirements.</p> <p>We do not have the infrastructure to house produce adequately. Our lunch serving area is 20' by 20' with no storage area.</p>	

A recent survey of fruit and vegetable farms in the mid-Atlantic region asked producers about reported and perceived barriers to farm-to-school program adoption.<sup>[25]</sup> For farms actively selling to schools,

major barriers to selling to schools included: (a) schools lacking the ability to cook from scratch or serve fresh food due to lack of facilities, staff abilities, etc.; (b) not having the budgetary capacity to pay the prices asked by producers; (c) lack of investment by the school food authorities; and (d) obstacles created by the required school contracting or bidding processes. For producers not selling to schools, most of these same barriers applied, as well as a perceived mismatch of the seasonality of their produce and the school year, as well as not having enough product volume to sell to schools. These concerns match closely with the barriers cited by Southern Arizona SFAs. In particular, a number of food chain actors interviewed mentioned the difficulty of pre-planning months in advance between schools and agricultural producers to ensure that the harvested produce corresponds with school menu offerings.

### *Role of Local Food Intermediaries*

Intermediaries such as distributors and wholesalers are commonly involved in delivering food from producers to individual consumers and institutional buyers. The wide variety of actors involved in food systems, and the diversity of their operations, create challenges for determining the economic impacts of local food activity.<sup>[26]</sup> As demonstrated in the Farm to School Census data, the most commonly used market channel for purchasing local foods was distributors. Typically, this is not a deviation from food procurement practices in general. Local food aggregators, such as food hubs, are an alternative to traditional food distributors. The economic footprint of a business in a region depends on its operations and how it spends money in the local economy on inputs to production and labor. Shifting spending away from an intermediary such as a traditional food distributor and toward a food hub can create economic impacts in the economy because of the differences in how those types of businesses spend their resources in the local economy.

The concept of the farmer's "share of food dollar" is a way of understanding potential impacts to producers selling through local food marketing channels.<sup>[27]</sup> The farmers' share of the food dollar is the amount of money that goes to farmers versus marketing intermediaries such as wholesalers and retailers on a per dollar basis. Agricultural producers that sell to individual consumers through local and direct-to-consumer marketing channels receive a greater share of each food dollar spent by consumers versus through retail settings where retailers absorb an additional margin. Whether this applies to food dollars spent by institutional buyers is not as clear. Data from the 2015 National Food Hub Survey suggests that over half of food hub expenditures go towards purchasing goods to be sold.<sup>[1]</sup> According to the U.S. Census Annual Wholesale Trade Survey, gross margin (total sales minus the cost of goods sold) for merchant wholesalers of farm product raw materials was 8.3 percent of sales on average in 2013, suggesting that overhead for traditional wholesalers is less than for local intermediaries such as food hubs.<sup>[28]</sup>

## Study Methods

This analysis uses recommendations presented in the Economics of Local Food Systems toolkit published by the USDA.<sup>[13]</sup> They offer a toolkit of methods to analyze the economics of local foods initiatives, from data gathering to performing economic impact analyses. They point to the need to consider the countervailing effects of constraints on agricultural production and household consumption in calculating the net economic impacts of local food initiatives.

Drawing data from the Farm to School Census and the 2013 NASS Annual Statistics Bulletin for Arizona, among other sources, the net economic impacts of farm-to-school activity scenarios within the four-county Southern Arizona region are modeled using IMPLAN 3.1, an input-output (I-O) model commonly used to estimate regional economic impacts.<sup>[29, 30, 31, 32, 33]</sup>

Economic impacts consist of three components: direct effects, indirect multiplier effects, and induced multiplier effects. Direct effects measure the initial direct change in the economy in question, for example, a school increasing its spending on food. Indirect multiplier effects

measure business-to-business transactions such as when agricultural producers purchase goods and services within the local economy needed for their farms and ranches to operate, generating additional rounds of spending in the local economy. Those supplier businesses also require inputs and supplies for production, and so on. When inputs are not available within the region or are offered at a lower price outside the region, businesses may source their inputs from outside the region, resulting in “leakage”. Leakage represents the escape of money from the local economy. With each round of purchases, money leaks from the economy and subsequent rounds of transactions dissipate in their magnitude.

Induced multiplier effects represent the effects of individuals employed in the affected industries taking their paychecks and spending them at other local businesses on groceries, doctors’ visits, entertainment, and other household purchases.

Buyer-supplier relationships within the local economy vary by industry, and therefore result in different indirect and induced multiplier effects. For example, some industries employ more people or pay higher wages, and therefore these industries have higher induced multiplier effects. Economic impacts via indirect and induced multiplier effects might occur when a school switches some of their purchases from conventional to local produce purchased through a food hub or directly from a producer, thereby shifting local economic activity away from wholesale and towards agricultural production and/or local intermediaries.

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### *Economic Impact Analysis and Input Output Models*

Economic impact analyses assess the total effects to regional economies resulting from changes in demand for final goods. They rely on input-output (I-O) models, which quantify the flow of money through regional economies in inter-industry, business-to-business and household-to-business transactions, as well as the leakages of money from the economy through imports of goods and services. Input output models are based on national economic data and are adapted for use in estimating economic impacts at the state, county, and other regional levels.

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Economic impacts are estimated using what is known as an input-output model.<sup>[34, 35]</sup> Input-output models are derived from input-output tables which capture the business-to-business and business-to-household transactions within an economy. The tables are essentially accounts of all the inputs needed by each industry, from each industry, to produce their respective outputs. Households (labor), government (taxes), investment (capital consumption), and exports (imports) are built into the model to account for these uses of and production of inputs and outputs. Through matrix multiplication, the table can be used to model the multiplier effects of shocks to an economy such as an increase in demand for a good produced by an industry.

While the Farm to School Census provides information on purchasing practices by SFAs, it does not provide information on the purchasing prior to engaging in farm-to-school activities, and it does not provide information on local agricultural producers' responses to the local procurement opportunities. This analysis, as a result, will look at the different scenarios in which farm-to-school programs could potentially have non-zero economic impacts. This could occur in two ways – an increase in local agricultural production either through an increase in the scale of production or through crop shifting from lower value crops to higher value crops. In both cases, it would also be possible for the SFA to bypass the intermediary and purchase directly from the agricultural producers. These factors will be modeled additively:

- Case 1: Increase in local agricultural production of food crops
- Case 2: Increase in local agricultural production of food crops through crop-shifting from lower-value field crops to higher-value fruit and vegetable specialty crops (accounting for resource constraints)
- Case 3: Increase in local agricultural production of food crops through crop-shifting from lower-value field crops to higher-value fruit and vegetable specialty crops and decrease in wholesale activity (accounting for import substitution and resource constraints)

As part of this analysis, we conducted interviews with local food system actors and found reports of mixed responses by producers and intermediaries to local procurement opportunities. When asked if producers are expanding their operations to fulfill demand for local produce, interview respondents indicated that in some cases there is expansion; however, for other producers there is not. Similarly, distributors report that local food procurement is typically with existing customers, though there are cases where contracts have been secured for purposes of local food procurement. A regional food distributor reported that most often, SFA buyers are shifting their purchases from conventional produce to local produce. It is therefore difficult to generalize about the net effects of farm-to-school local procurement in Southern Arizona.

The next section presents the results of the three scenarios in which local foods programs would have positive economic impacts to the region.

## Study Results

On average, farm-to-school programs in Southern Arizona reported spending \$70,550 in FY2014 on local food, not including milk. Milk is excluded from local spending as it is typically sourced locally and most milk is produced in Maricopa and Pinal counties within Arizona, but outside of the Southern Arizona study area for this analysis. Within IMPLAN, the model’s geographic scope is set to include Pima, Cochise, Yuma, and Santa Cruz counties, aggregated. Economic impacts are reported in terms of sales for simplicity and to accord with sales as the unit of measure for transactions between schools, producers, and any intermediaries. For purposes of this analysis, we will assume that schools and school districts are operating in such a way as to maximize the purchasing power of their food service budgets and therefore it will be assumed that local foods are not sold to school districts at a price premium.

### *Case 1: Increase in local agricultural production of food crops*

This is a simple increase in agricultural production generating sales of \$70,550 to schools. It assumes no resource constraints and no opportunity cost of spending. A simple increase in local agricultural production will be modeled in the IMPLAN I-O model with the full value of sales going to vegetable and melon production. Vegetables and fruits were the most commonly purchased local food by Southern Arizona farm-to-school programs, according to the Farm to School Census, and the fresh vegetable industry is one of Arizona’s largest agricultural industries. This simple increase in agricultural production would result in a total estimated economic impact, including multiplier effects, of \$90,800 in sales to the regional economy (Table 15).

*Table 15. Summary of Sales Impacts by Case Scenario*

Case	School Spending on Local Foods	Countervailing Effect(s)	Net Direct Sales Impact	Total Sales Impact Including Multiplier Effects
<b>Case 1</b> <i>No Constraints or Opportunity Costs</i>	\$70,550	N/A	\$70,550	\$90,800
<b>Case 2</b> <i>Resource Constraints</i>	\$70,550	(\$14,250)	\$56,300	\$66,650
<b>Case 3</b> <i>Resource Constraints &amp; Opportunity Cost of Spending</i>	\$70,550	(\$26,450)	\$44,100	\$47,400

### *Case 2: Increase in local agricultural production of food crops through crop-shifting from lower-value field crops to higher-value fruit and vegetable specialty crops (introducing resource constraints)*

Introducing resource constraints into our model, we assume that to grow produce to sell to schools, farms must shift existing cropland (and corresponding water use) away from lower-value field crops towards production of specialty fruit and vegetable crops. These are the most commonly procured local food items in Southern Arizona according to the Farm to School Census. Resource constraints are modeled by maintaining constant crop acreage. We model a shift from alfalfa hay, a comparatively low-value, high-water-use crop commonly grown in the U.S. southwest, to higher-value crops, in this case, spinach and broccoli. Based on the acres of cropland needed to grow \$70,550 worth of spinach and

broccoli (using 2013 yield and price data for Arizona), shifting that acreage out of alfalfa cultivation to spinach and broccoli would result in a decrease of \$14,250 in sales of alfalfa hay. This would lead to a net increase of \$56,300 in sales in the regional economy.<sup>[27]</sup> Those direct sales generated a total economic impact of \$66,700 in sales, including multiplier effects (Table 15).

*Case 3: Increase local agricultural production of food crops through crop-shifting from lower-value field crops to higher-value fruit and vegetable specialty crops and decrease in wholesale activity (introducing import substitution with resource constraints)*

Finally, we introduce an additional adjustment for the opportunity cost of spending into the model. In other words, when money is spent by a school on local foods through a regional agricultural producer, that money is no longer spent through a distributor/wholesaler to procure those foods. A decrease in wholesale activity uses IMPLAN's wholesale sector and margins the value of sales within the model. Including the countervailing effect of a reduction in wholesale trade in the local economy, in addition to net effects of crop shifting on value of production, the direct effect of the local food purchase is lower than in the previous two cases. The net increase in sales is reduced to \$44,100, with a total economic impact, including multiplier effects, of \$47,400 in sales. The decrease in wholesale activity is less than the original \$70,550 that would have been spent on wholesale by the school because it is assumed that only the wholesale 'margin', or the value paid to the wholesaler for its services, would have remained in the local economy and the cost of imported produce would have represented a leakage from the local economy.

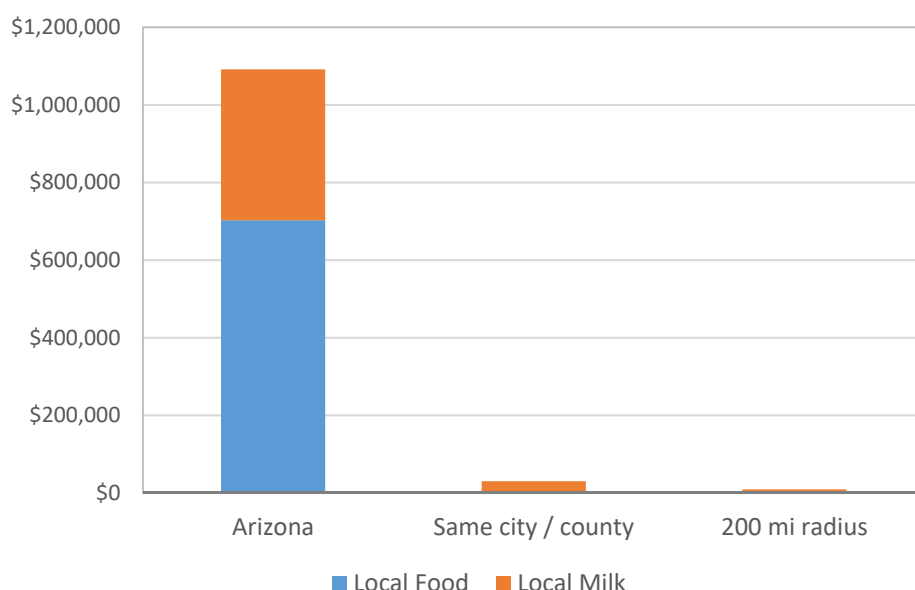
The net economic impact is still positive in both cases where we introduce adjustments for countervailing effects. However, by accounting for the realities of natural resource constraints and alternative outlets for school procurement, the net impacts to the economy are smaller compared to simply assuming an increase in agricultural production.

## Discussion and Key Lessons

These examples illustrate the moderating influence of countervailing effects on the economic impacts of local food purchases through farm-to-school programs. It is important to emphasize that these scenarios are those scenarios in which there would be a net increase in sales within the local economy. In many instances, shifting to local procurement can have a negligible effect depending upon the production and business decisions of individual producers and intermediaries.

Another important consideration is the potential mismatch between the geographic scope of the analysis and the most common definitions of “local” by Southern Arizona School Food Authorities (SFAs). Figure 5 shows reported spending on local food and milk categorized by the reporting SFA’s definition of “local”. Overwhelmingly, respondents consider local to be from within the state of Arizona. Only two respondents with local purchases defined local as smaller than the state level, and their purchases were comparatively small.

Figure 5. Southern Arizona School Food Authorities (SFAs) Spending on Local Food and Milk by Definition of Local



The economic impact analysis presented in the previous section is based upon the assumption that all local spending occurred within the study area (Pima, Cochise, Santa Cruz, and Yuma counties). While it is fair to assume that much of that production might have occurred within the study area, there is the potential for additional leakages, which would further moderate the economic impacts. On the other hand, for those SFAs that consider local to be within the same city or county, or within a specific radius, their reported spending could be significantly undercounting purchases from within the study area, but that do not fit their definition of local. Establishing a consistent definition of local for coordinated local food efforts is helpful for purposes of evaluating economic outcomes.

While the issue of milk counting towards local food purchases is addressed in the Farm to School Census by having it accounted for separately, there are other, more location-specific cases of local buying practices that have been and will be local regardless of efforts to promote local foods. In the case of

Arizona, lettuce is a commodity for which few non-local options are available for portions of the year. According to a recent study by the University of Arizona Cooperative Extension, Arizona supplies over 80 percent of the nation's lettuce between December and March, and that figure can reach as high as over 90 percent in

individual weeks.<sup>[30]</sup>

According to statewide DoD program data for the 2013 school

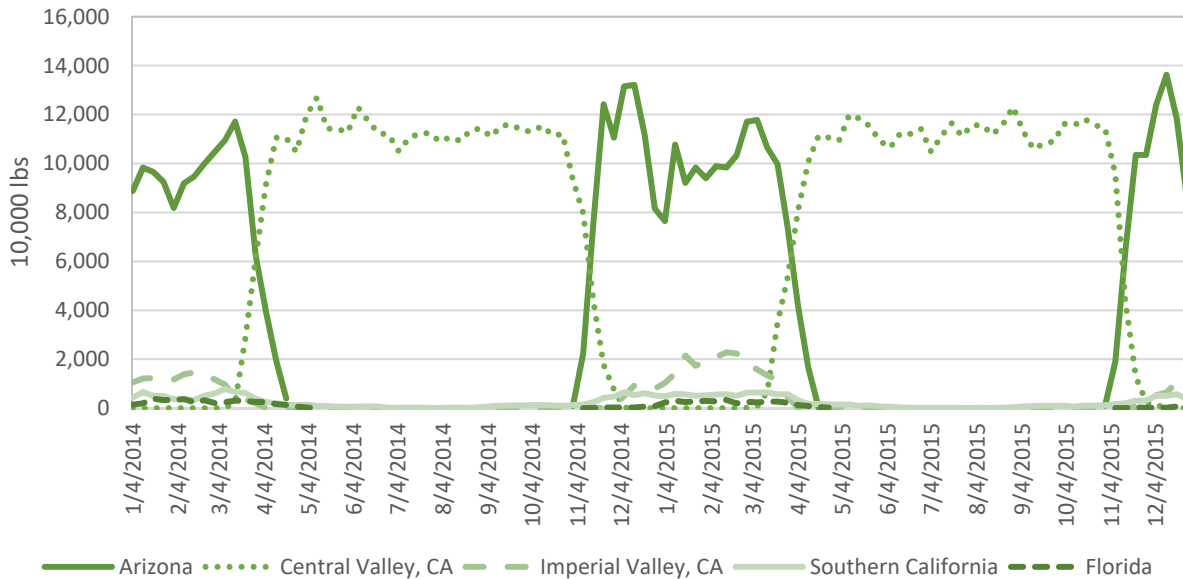
**Counterfactual**

*In economics, a counterfactual refers to an alternative, unobserved scenario, similar to the concept of a control in a scientific experiment.*

year, 41 percent of local spending through the program was on lettuce.<sup>[24]</sup> Figure 6 depicts weekly lettuce movements by production region in the United States for calendar years 2014 to 2015.

Production shifts almost exclusively between California's Central Valley and Arizona throughout the course of the year.

Figure 6. Weekly Lettuce Movements by Production Region, 2014-2015

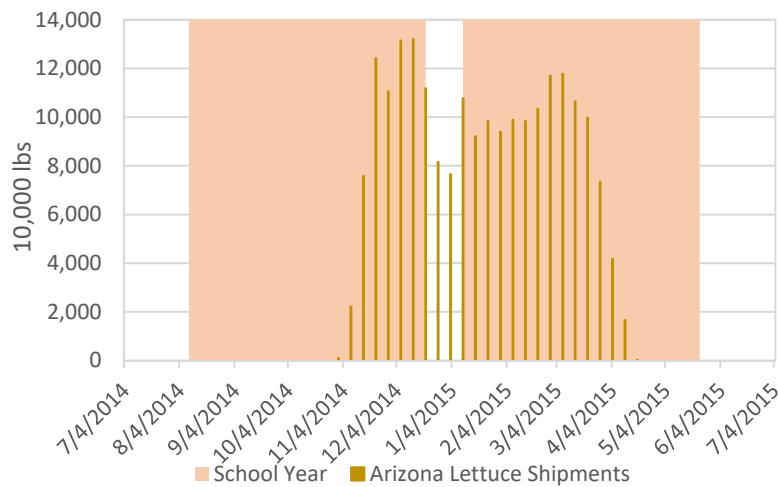


Source: Kerna, Duval, & Frisvold (2017) [36]

Overlaying a typical academic year with Arizona lettuce shipments, it's clear to see that except for August through November and April through May, Arizona schools are likely receiving most of their lettuce from in-state (Figure 7).



Figure 7. Arizona Weekly Lettuce Shipments and Academic Year



Source: USDA AMS Specialty Crop Shipment Data & Tucson Unified School District academic calendar

This brings to light an important point for regions that are highly specialized agricultural producers representing a large share of national production of specific commodities. Lack of non-local options should be considered in assessing the net impacts of local foods initiatives. Economists emphasize the need to establish a realistic and well-defined counterfactual to assess the true “economic impacts” of institutional spending.<sup>[37]</sup> One could say the same for farm-to-

school programs. Part of developing a baseline includes considering current local foods activity, and local foods activity that would occur regardless of program efforts.

The challenges mentioned in this analysis refer specifically to farm-to-school programs, however, the lessons apply more broadly to local foods efforts in general. The considerations raised in this analysis can inform program planning and assessment to ensure that investment of public resources towards local foods efforts with economic development goals have the greatest chances of producing their desired impacts. With that in mind, we propose a checklist of questions for local foods groups to consider if one of their objectives is to create economic impacts to their local community (Figure 8):

Figure 8. Key Questions for Exploring Economic Impacts of Local Foods Efforts

**Local Foods Economic Impact Considerations**

- Is the purchaser of local food increasing their spending on food or shifting their spending from non-local to local foods?
- Is the local spending on something that is usually sourced from nearby, such as milk?
- Is the producer of local food increasing the scale of their operation to meet the demand created or simply selling existing production to a different, local buyer?
- If the scale of production isn’t increasing, are producers changing what they produce to meet demand?
- If purchases take place through an intermediary such as a distributor or food hub, is the purchase causing them to increase the scale of their operation locally?
- Does the definition of local for all parties involved match?

**Demonstrating Economic Impacts**

- How will you collect data on the actions of food chain actors, including growers, final buyers, and, if applicable, intermediaries?

Regional economic effects of local foods efforts, such as farm-to-school programs, are complicated to assess given varying definitions of local, the potential for negligible effects resulting from individual food-chain actors' decisions, and a lack of information to build reliable counterfactual scenarios. For programs interested in promoting local food activity to support the local economy, these considerations can help guide activities to ensure that investment of time and money in local foods programs are generating the desired economic impacts.

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