



Healthy Food: Environments, Access, and Literacy

The **INSTITUTE** for

A collaboration among Geisinger Commonwealth School of Medicine, Johnson College, Keystone College, King's College, Lackawanna College, Luzerne County Community College, Marywood University, Misericordia University, Penn State Scranton, Penn State Wilkes-Barre, The Wright Center for Graduate Medical Education, University of Scranton & Wilkes University

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The Institute

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The Institute is a non-profit research organization dedicated to empowering business and community leaders with researched based strategies for informed decision making.

We conduct independent, empirical research to identify the opportunities, issues and challenges unique to the region and find innovative ways to solve the problems facing our communities.

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Context & Significance

A strong connection between nutrition and health outcomes is well-documented. Food insecurity, or suboptimal diet, results in suboptimal nutritional status, which then directly and indirectly influences overall health and well-being through various clinical or biochemical mechanisms.¹

One published case study serves as an example. It illustrates the relationship between nutrition and overall health. The study examines the case of a seven-year-old girl. Her family received monthly cash assistance, which proved to be inadequate. Despite the aid, the family still experienced episodic food shortages on a monthly basis while waiting for the next payment to arrive. Poor food choices and/or physiological factors manifested during those shortages and were subsequently linked to increased body fat.² The data demonstrate that malnutrition -- be it from food scarcity or a dearth of nutritious foods -- is linked to both acute health impacts and, at least in the case of childhood malnutrition, increased risk of obesity and chronic disease later in life.³

“Nutritional status” is a phrase that encompasses far more than the ability to consume food in sufficient quantity. Excessive consumption of unhealthy foods – those that are calorically dense and have high glycemic load -- is also detrimental to health. For example, a systematic review of the link between fast food and obesity found a positive correlation between fast food consumption and body mass index (BMI), despite other intervening factors.⁴ Obesity, in turn, is an established risk factor for all causes of death, hypertension, high cholesterol, diabetes, heart disease, stroke, and other poor physical and mental health outcomes.⁵

This research seeks to understand better how several related concepts impact overall community health in northeastern Pennsylvania. Those concepts are food access, food deserts and food literacy.

For the purposes of this research, food access is defined as the availability of food in a particular environment, with a focus on the differences in availability of whole and healthy foods versus fast food and other less healthful options. The analysis here uses the USDA definition of food deserts, which includes two census-tract level criteria: low food access (more than one mile from a grocery store for urban areas, and more than 10 miles in rural areas) and low income.

Food literacy can be understood to include critical and functional knowledge of food and food systems and their relationship with health. Previously offered definitions of food literacy generally encompass themes of skills and behaviors, food and health choices, culture, knowledge, emotions and food systems.

Another factor that affects food choices and overall health outcomes is poverty. Income is a key social determinant of health, and lack of resources to pay for food can lead to persistent hunger. Because poverty includes economic issues beyond the scope of food literacy and the food system as a whole, food challenges stemming from insufficient income are not the primary focus of this research.

Regional Data

Health Risk Factors & Outcomes

As noted above, nutrition and obesity are closely tied to general health outcomes. They are factors that increase a person's risk for several chronic diseases. As shown on the table below, the age-adjusted death rates of several obesity-linked diseases are higher in Lackawanna and Luzerne counties compared with the Commonwealth of Pennsylvania as a whole. Of particular note is the rate of death from diabetes, a chronic health condition often linked to diet, which is significantly higher in both counties compared with the statewide rate. Rates are expressed as the number of expected deaths per 100,000 population after accounting for differences in age distributions between the geographic regions.

Age-Adjusted Death Rates by Selected Causes (2014-2016)			
Cause	Lackawanna	Luzerne	Pennsylvania
All causes of death	838.6	842.2	760.3
Myocardial infarction (heart attack)	36.3	32.5	31.4
Cerebrovascular diseases	33.4	31.7	37.3
Coronary heart disease	115.0	129.4	109.0
Diabetes	27.6	31.2	21.4
Ischemic heart disease	106.5	122.1	99.5
<i>Rates are expressed as the number of expected deaths per 100,000 population after accounting for differences in age distributions.</i>			

In the three-county region used for reporting results from the Centers for Disease Control and Prevention's Behavioral Health Risk Factors Surveillance System (BRFSS), the region's population is at least as likely as all other Pennsylvanians to have experienced a heart attack, heart disease, or stroke; have been told they have diabetes; or to be in fair or poor general health. The obesity rate is also near that of the statewide rate. The most recent data tell us that fewer than one in four residents of the region consumes at least five servings of fruits and/or vegetables daily. The data are the same for the Commonwealth as a whole.

Behavioral Health Risk Factors (2015-2017)		
Risk Factor	Lackawanna, Luzerne & Wyoming	Pennsylvania
Adults Age 35+ ever told they had a heart attack, heart disease, or stroke	14%	13%
Adults ever told they have diabetes	11%	11%
Adult obesity (BMI 30+)	30%	31%
Fair or Poor General Health	18%	17%
Adults who consume 5+ servings of fruit and/or vegetables every day*	24%	24%
<i>* Fruits and vegetables data is from 2005-2007. This is the most recent data collected on this risk factor in the BRFSS survey.</i>		

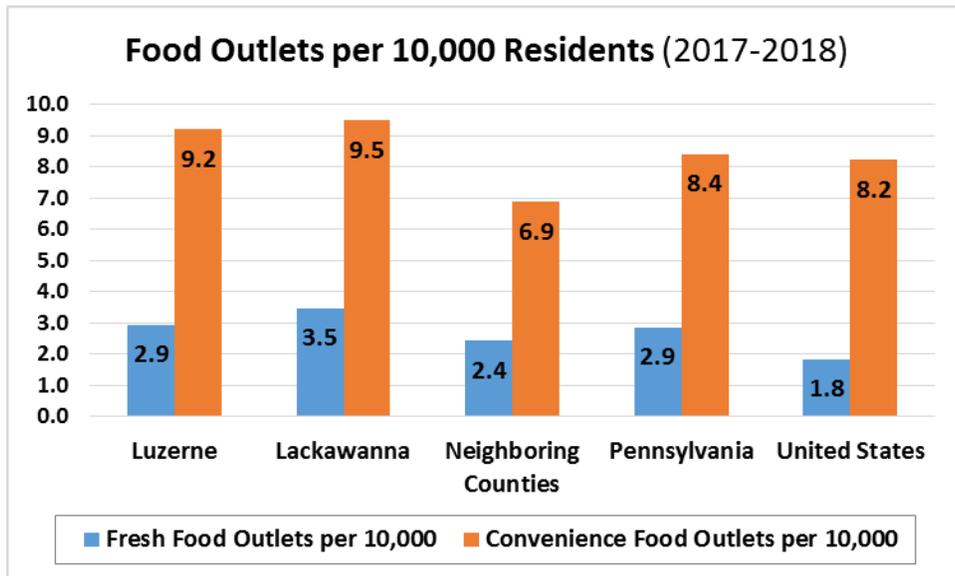
Furthermore, Lackawanna and Luzerne Counties most recently ranked 54th and 60th out of 67 counties in Pennsylvania on measures of Health Outcomes (including length and quality of life), according to the Robert Wood Johnson Foundation's County Health Rankings and Roadmaps program. In the parallel ranking of Health Factors, which includes factors such as smoking, obesity, physical inactivity, clinical care, physical environment and socioeconomic factors, the two counties ranked 40th and 56th respectively of Pennsylvania's 67 counties.⁶ These results demonstrate that the region, as compared to Pennsylvania, has significant health challenges both generally and with respect to indicators linked to food and nutrition.

County-Level Food Choices

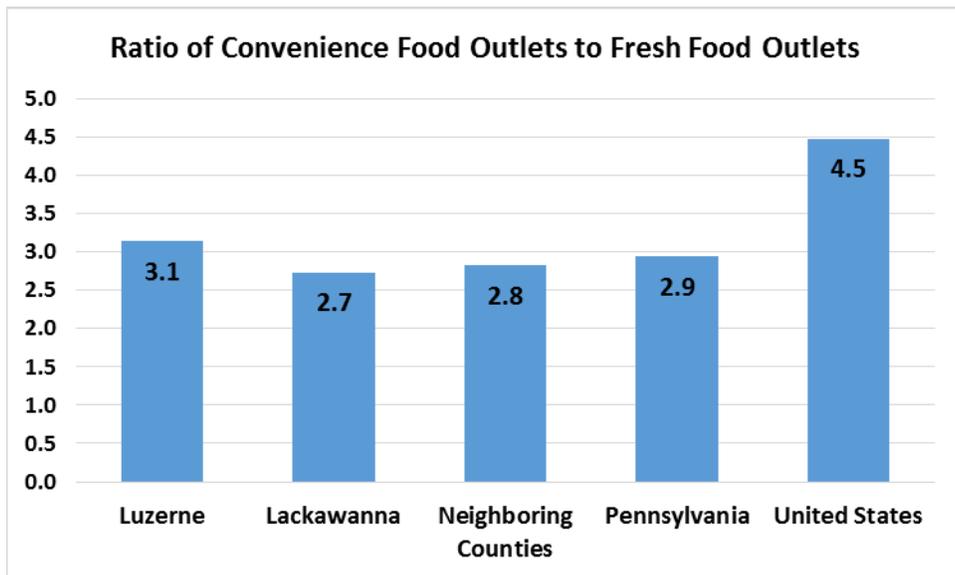
For individuals, a variety of factors shape food choices. These factors include taste preferences (including individual preferences as well as cultural preferences among different ethnic groups), economic considerations, and convenience. Another important factor influencing food choices is the geographic distribution of food outlets. The availability and type of food outlets in a community will influence the food choices made by those who live there. This manifests in a number of ways. For example, in prior research, increased density of fast food outlets has been found to correlate with unhealthier lifestyles and poorer health outcomes.⁷ One study undertaken in Pennsylvania found living in a food desert, an area with limited access to retail food outlets, was positively correlated with childhood obesity.⁸

The chart below shows the number of food outlets per 10,000 residents in two categories, based on proprietary data sourced from Chmura Economics via JobsEQ. Fresh food outlets include supermarkets and other kinds of grocery stores (excluding convenience stores); specialty food stores like butcher shops, bakeries, fruit and vegetable markets; and other specialized food stores. Convenience food outlets include convenience stores and limited-service restaurants (which include fast food and other counter-service restaurants). Though both categories represent an imperfect classification of outlets serving healthier versus less healthy options, this framework serves as a proxy for analyzing the relative concentrations of healthy food outlets versus outlets where fresh, whole or healthy food options may be more limited.

Lackawanna and Luzerne counties both have a higher concentration of convenience food options (9.2 and 9.5 outlets per 10,000 residents, respectively) compared with eight adjacent counties, the Commonwealth as a whole and the nation. However, the counties also have an equal or higher concentration of fresh food outlets as well. This may be explained by the two counties' greater degree of urbanization compared with neighboring counties.



The chart below shows the ratio of convenience food outlets to fresh food outlets at the same point in time. Lackawanna County has the lowest ratio of the geographic areas analyzed, and both counties (and the neighboring eight-county region) are well below the national average and just about even with the statewide average. Nonetheless, in each geography, convenience food outlets outnumber fresh food outlets by no less than 2.7 to one.



Neighborhood Scale Data: Food Deserts

Food deserts are one widely discussed aspect of food access.

Food deserts are geographic regions where there is limited access to fresh foods, such as fresh fruit,

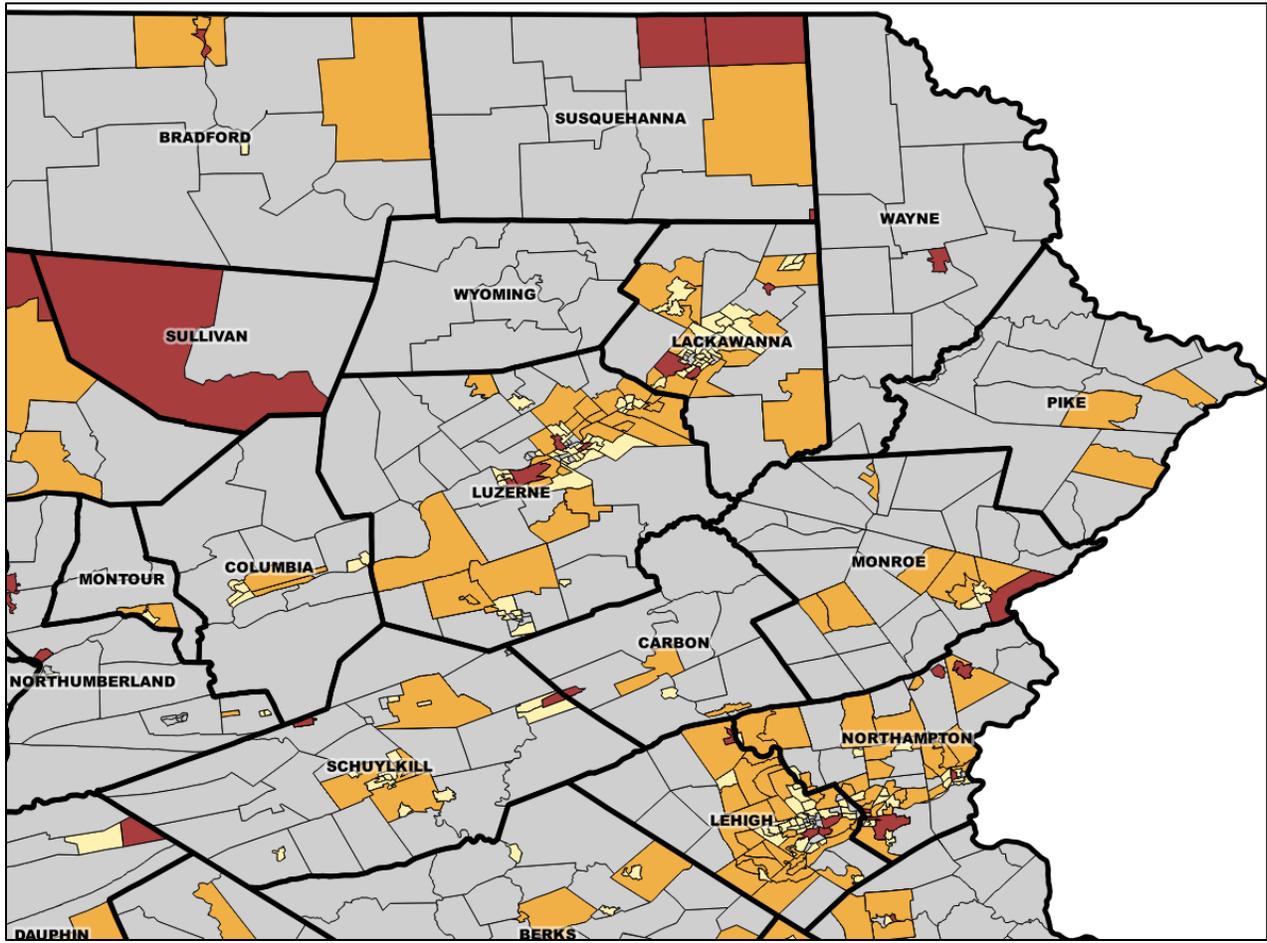
vegetables, and other healthful whole foods. Food deserts are largely characterized by a lack of grocery stores, farmers' markets, and other healthy food outlets, and are frequently found in impoverished communities.⁹

The United States Department of Agriculture's Economic Research Service compiles granular data on food access and socioeconomic characteristics. The map below shows regional data from 2017 on food access by census tract. Census tracts in red meet the US Department of Agriculture's baseline criteria for being categorized as food deserts. The two criteria are:

1. *Low income.* Low income tracts refer to those in which the poverty rate is greater than 20 percent, or the median family income is less than or equal to 80 percent of the statewide or metropolitan area median.
2. *Low access to food within one mile for urban areas or 10 miles for rural areas.* A tract is determined to be low access if either 500 or more residents or 33 percent or more of the population live more than 1 mile from a supermarket in urban areas or more than 10 miles from a supermarket in rural areas.¹⁰

Notably, a food desert or low-access designation does not necessarily indicate that a tract has no supermarkets or fresh food outlets. The designation only means a significant portion of residents live more than one mile from any supermarket (within or outside that tract) for urban residents or more than 10 miles for rural residents. Supermarkets include large grocery stores and supercenters that accept SNAP. One limitation of these data is that the database of supermarkets used dates to 2010. Since that time, various store openings and closures have occurred in the region.

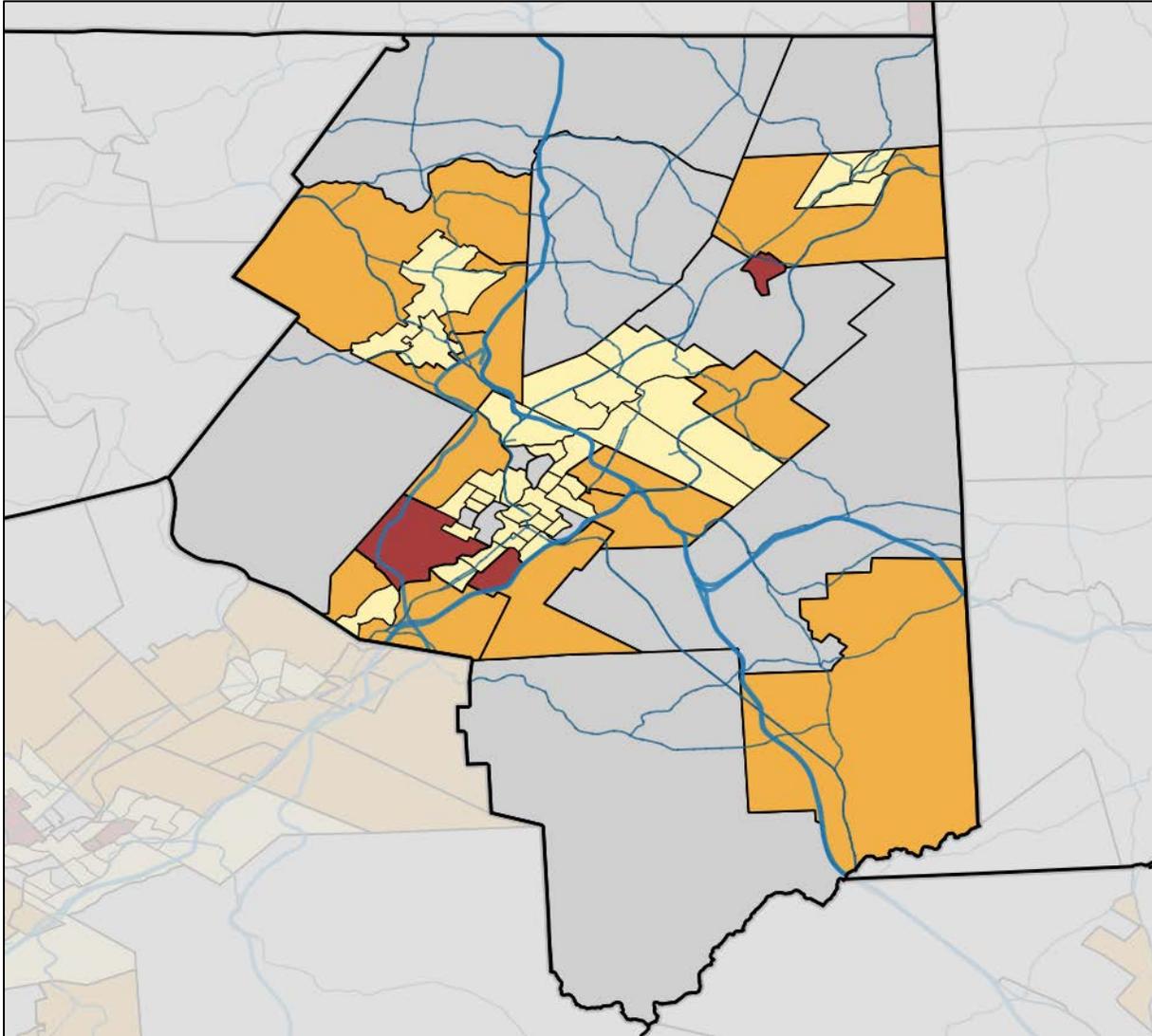
Census tracts considered to be food deserts, shown in red below, are found in both Lackawanna and Luzerne counties, as well as most neighboring counties. Throughout the broader region, food deserts exist in urban, suburban, and rural communities.



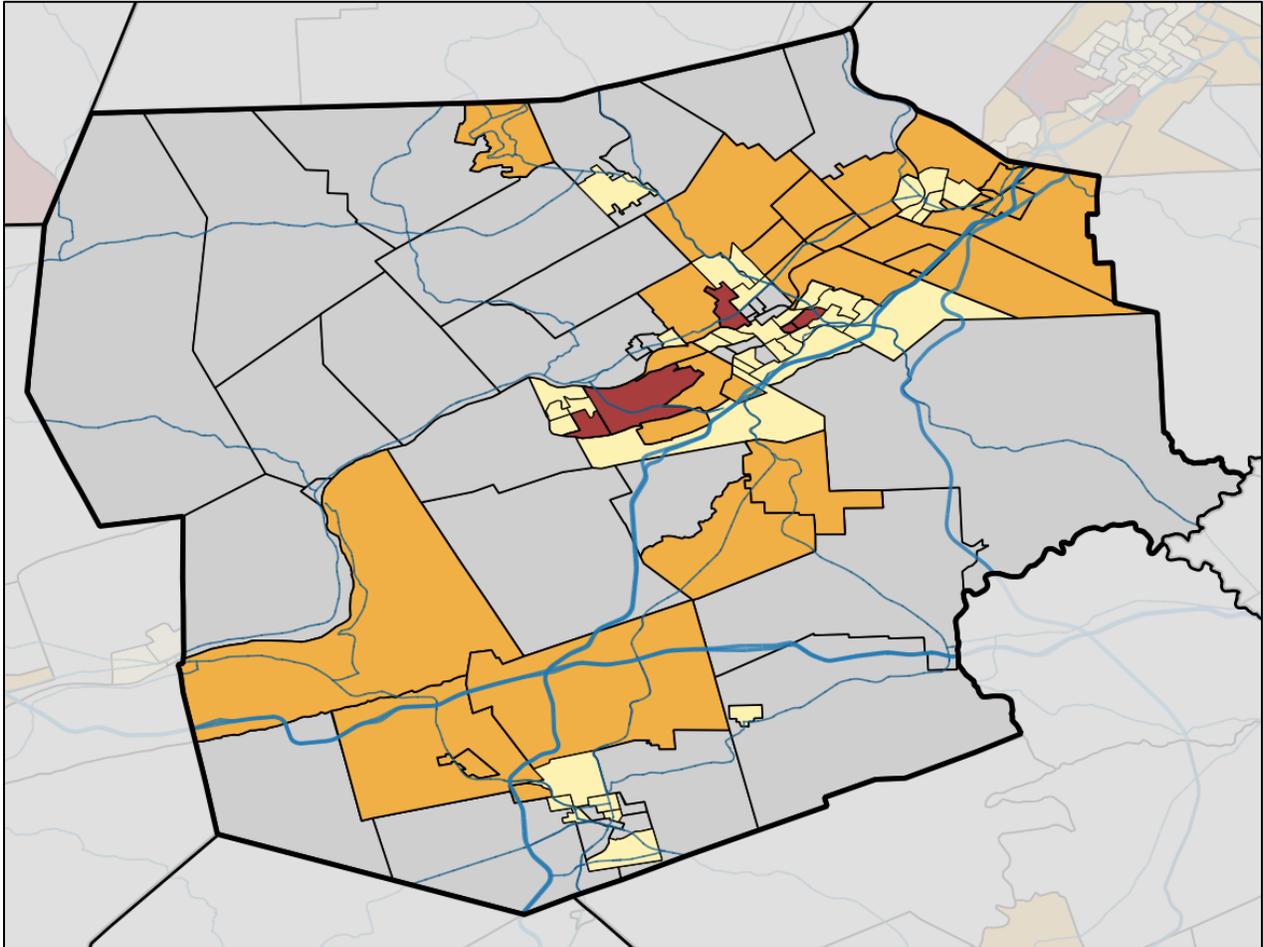
Shown in orange on the above map are tracts that meet the same criteria for low food access but are not low-income tracts. These types of communities cover a broader portion of the region, including significant portions of Lackawanna and Luzerne counties. Though these areas are less impoverished, they still represent communities where distance could represent a barrier to fresh food, especially for households in these tracts without access to a car.

Finally, the tracts shown in yellow on the map represent tracts that meet a broader definition of low-access, using a distance threshold of one-half mile instead of one mile for urban areas. This more inclusive definition extends low-access designations to large portions of the urbanized core of Lackawanna and Luzerne counties, including the majority of tracts in the cities of Scranton and Wilkes-Barre.

The map below shows Lackawanna County in greater detail. There are three food deserts in Lackawanna County, shown in red. The largest in terms of geographic area includes the borough of Taylor. Nearby, a tract on the Scranton's south side also meets the criteria. Another tract that is coterminous with the borough of Jermyrn also meets the criteria. Numerous other tracts in the county meet the low-access criteria but are not low income (shown in orange), including neighborhoods around Scranton, Old Forge, the Abingtons, Jessup, and Carbondale. Finally, the yellow tracts show communities that meet a more inclusive threshold for limited food access (including low-income and non-low-income tracts). These areas include most tracts in the City of Scranton, the City of Carbondale, Clarks Summit, and several boroughs in the Lackawanna Valley including Dickson City, Throop, Olyphant, and Blakely.



Like Lackawanna County, Luzerne County has several food deserts as well. They include two tracts in the northern part of Wilkes-Barre, the southeastern parts of Nanticoke, the western parts of Hanover Township, and the borough of Edwardsville. Shown in orange, many other areas have low food access (with one-mile and 10-mile urban and rural thresholds) but are not low income. These areas include many towns within the Wyoming Valley, including Larksville, Wyoming, Exeter, Dupont, and Avoca, as well as Harvey's Lake, parts of Mountain Top, and several communities along the I-80 corridor. Finally, the yellow tracts show communities that meet a more inclusive threshold for limited food access with one-half mile thresholds for urban areas (including low-income and non-low income tracts). Using this more inclusive threshold adds Freeland, parts of Hazleton, Dallas, Pittston, West Pittston, and numerous tracts in and around Nanticoke and Wilkes-Barre.



Factors Associated with Limited Access to Food

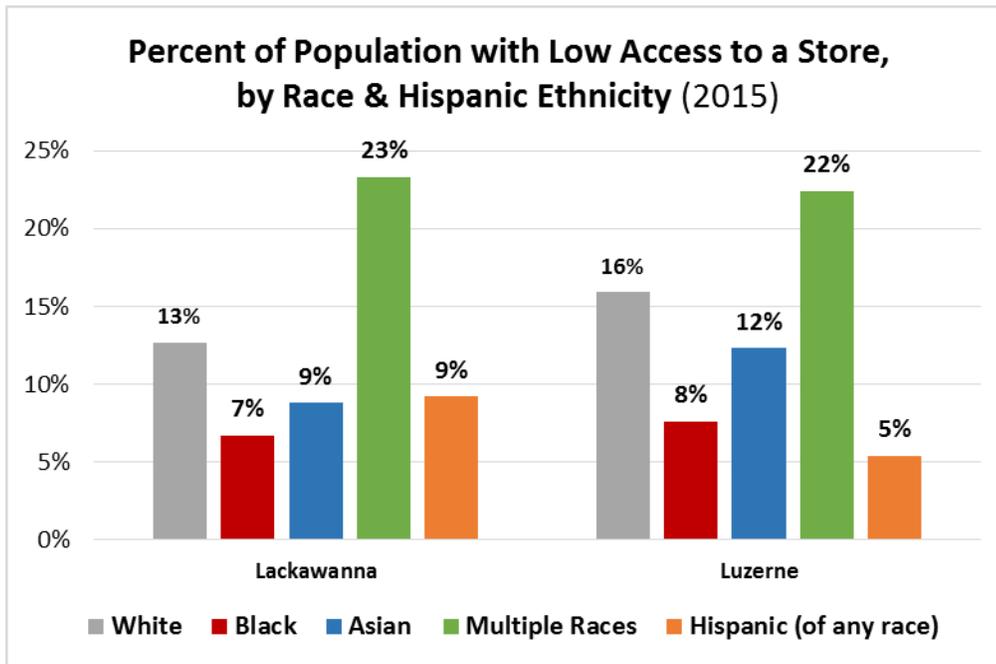
Because socioeconomic and demographic characteristics are not uniform across geographic areas, factors like age, income and race can be associated with limited access to food. Demographic data presented below is sourced from the USDA Food Environment Atlas and uses the same definition of low access as above: more than one mile from a grocery store in urban areas and more than 10 miles in rural areas. It is important to note that relationships identified here may not necessarily be causal in nature.

Seniors (people age 65 and older) were slightly less likely to have low access to a store than the overall population, while children (age 18 and younger) were slightly more likely to have low access than the overall population. More than 4,300 of all households in the region, representing 1.6 percent of Lackawanna County households and 1.9 percent in Luzerne, meet *both* the criteria of not having a car available and having low access to a store. Among all households regardless of grocery store access, approximately nine percent have no car available, according to the most recently available Census Bureau American Community Survey estimates.

Low Access to Grocery Store by Population Segment (2015)	Lackawanna		Luzerne	
	Count	Percent	Count	Percent
Population with Low Access to Store	27,069	12.8%	50,063	15.8%
Seniors	4,843	12.0%	9,428	15.4%
Children	5,747	13.5%	9,939	15.9%
White	25,649	12.7%	47,683	15.9%
Black	402	6.7%	955	7.6%
Hispanic (of any race)	987	9.2%	1,163	5.4%
Asian	331	8.8%	405	12.3%
Multiracial	649	23.3%	965	22.4%
No Car & Low Access to a Store (% of all households)	1,542	1.6%	2,790	1.9%

There were some differences across racial groups and between Hispanic and Non-Hispanic residents as well. Rates of low access were higher among the white population than several other nonwhite racial groups in both counties, and rates of low access were lower among Hispanic and Latino residents (of any race). Just five percent of Hispanic/Latino residents of Luzerne County had low access. Higher concentrations of Hispanic residents in certain neighborhoods that are not defined as low access may explain this finding. As shown on the access map of Luzerne County, there are no low access tracts in the city of Hazleton -- home to a large community of Hispanic residents -- using the standard definition. Rates of low access were moderate among Asian residents and considerably higher for residents of multiple races.

Overall, these findings illustrate a prevalence of food access challenges across multiple racial and ethnic groups in both counties. As of 2015, there were estimated to be more than 77,000 total residents in the region living with low access to a food store. Of these, more than 3,700 were nonwhite and more than 2,150 were Hispanic or Latino regardless of race.



The cost of food also influences food decision-making. One measure of the relative cost of healthful versus less healthful food choices used by the USDA Food Environment Atlas is the ratio of the price of low-fat milk to the price of soda. As of 2010 (the most recent data available), the price of milk in the region is marginally higher than the statewide and national averages. The price of soda regionally and statewide is 97 percent of the national average price.

Low-Fat Milk & Soda Prices (2010)	Lackawanna & Luzerne	Statewide Average
Price of milk, % of national average	102%	101%
Prices of sodas, % of national average	97%	97%
Price of low fat milk/price of sodas	98%	96%

Overall, regional data show that structural and geographic barriers to healthy food, including cost and lack of proximity to food stores, exist in many corners of Northeastern Pennsylvania and affect a broad range of population segments. These issues are very likely contributing to the region’s unfavorable health outcomes in areas influenced by nutrition, including diabetes, heart disease and general health and wellness.

Food Literacy

In the face of the identified environmental and demographic disparities in food access, increasing food literacy through education may help counteract these structural disparities in food access and have a positive effect on health outcomes.

Definitions for the concept of food literacy vary, but generally encompass themes of skills and behaviors, food and health choices, culture, knowledge, emotions, and food systems.¹¹ The Food Literacy Center defines food literacy as “understanding the impact of your food choices on your health, on the environment and on our economy.” The Food Literacy Center focuses much of its emphasis on early education on food and nutrition.¹²

While geographic and financial barriers to healthy food choices exist in Northeastern Pennsylvania, these are not the only drivers of food decision-making. The level of education may play a role, and programming aimed at increasing food literacy and awareness has shown promising results.

A 2013 study by the Food and Nutrition Service of the US Department of Agriculture found that among recipients of SNAP benefits (formerly known as Food Stamps), several educational programs were effective in increasing daily fruit and vegetable intake among both low-income elementary school students and low-income seniors. Two of these programs provided nutrition education in schools, as well as supplemental take-home materials and activities. The take-home materials helped parents and caregivers learn about ways to provide healthier foods on a tight budget. The third program provided direct education and take-home materials to adults aged 60 to 80 and senior centers. In addition to increasing fruit and vegetable consumption, children participating in the elementary school programs were more likely to choose low-fat or fat-free milk.¹³

Previous research has been particularly effective in demonstrating links between nutrition education and healthier choices in children and teens. One national study of high school students found that under a broad range of conditions, nutrition education resulted in increased knowledge, more positive attitudes toward nutrition and a measurable desire to include more healthful foods in their diets. That study also found that educator attitudes toward, and experience in, nutrition education were important factors in influencing students’ food choices.¹⁴ Links between increased food knowledge and higher vegetable intakes have also been established across cultural contexts, as well as a link between parents’ nutrition knowledge and the food choices of their children.¹⁵ Research has also shown general nutrition classes to be effective at increasing healthy food choices among college students in a large university setting.¹⁶

Barriers to Food Literacy

Recent research has examined barriers to food literacy. One conceptual framework divides barriers to food literacy into five major types¹⁷:

1. Knowledge, such as lack of information
2. Attitudes, such as lack of interest
3. Skills and abilities, such as lack of acquisition or application skills
4. Resources, such as lack of time
5. Environmental conditions, such as social norms, limited food choice, or other context-specific limitations.

The last three of these five types represent external factors. These are among the most significant, representing more than half of reported barriers in one study. Examples of frequently identified external barriers include lack of learning time for individuals, lack of interested and trained teachers in school settings, lack of funding for community programming, and community food insecurity.¹⁸

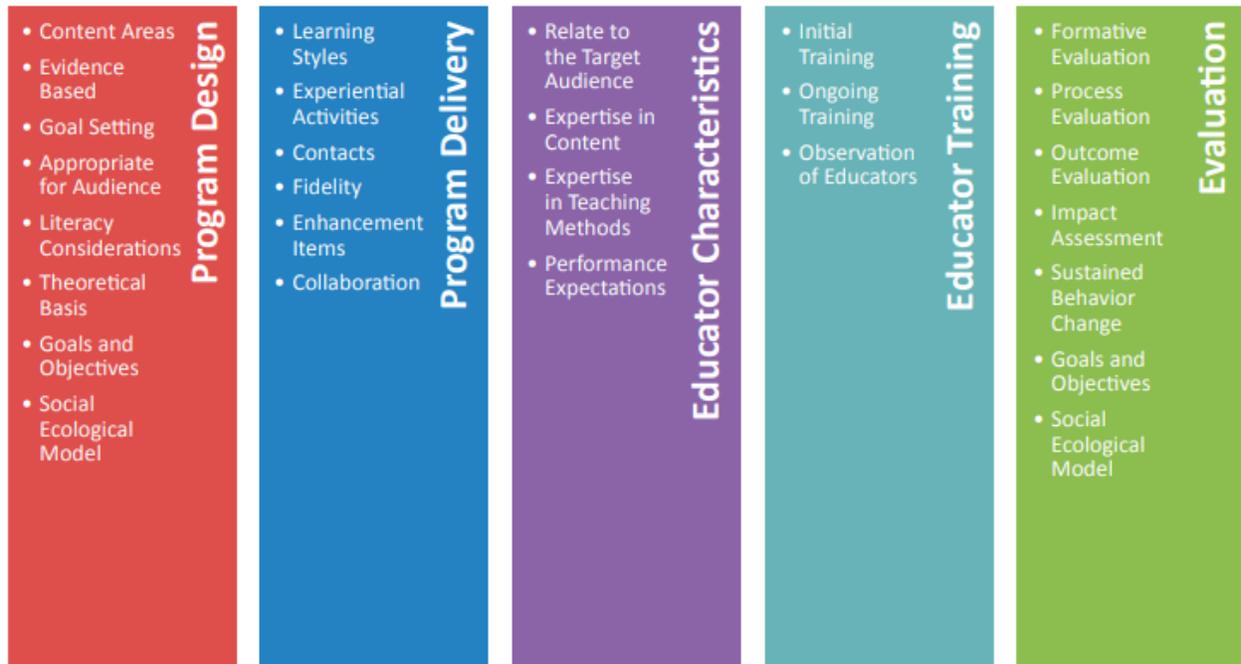
As with many aspects of health, these external barriers to food literacy are also likely shaped by social determinants of health (SDOH). In 2018, The Institute published research on social determinants. That report identified SDOH as circumstances that can substantially affect individual and population health outcomes. They may appear as social, economic or physical characteristics that affect health, risk and/or quality-of-life. Dimensions of SDOH include, but are not limited to, income, education, race, ethnicity, LGBTQ+ status, and age. Statistical analysis of regional data showed that in Northeastern Pennsylvania, effects of social determinants on health outcomes are likely at least as strong as in statewide data.¹⁹

These social determinants are likely to be closely interrelated with some of the external barriers to food literacy mentioned. For example, language or cultural barriers could inhibit individual or community capacity to acquire food knowledge. Poverty and income constraints, at both the individual and community level, are also likely to affect food literacy through limitations on food choices and inadequate time or money for nutrition education.

Promoting Food Literacy & Expanding Food Access: Best Practices

Regional food access data show that some pockets of the region lack nearby access to food outlets. Food access challenges vary by neighborhood, however. While the term “food desert” calls to mind a community without a large retail supermarket, many communities have a network of smaller convenience food options. A study of food environments in Buffalo, New York found that many predominantly nonwhite neighborhoods were not served by supermarkets but were served by networks of smaller grocery stores. That study suggested that rather than attempting to attract large supermarkets to underserved neighborhoods, it may be more efficient to support existing smaller grocery stores.²⁰ One example of this principle could be working with independent grocery and convenience store owners to expand healthy food options at those stores.

Nutrition education programs are also an important area of intervention to improve food-related health outcomes. Research from the US Department of Agriculture has identified a series of twenty-eight best practices in nutrition education for low-income audiences:



Source: "Best Practices in Nutrition Education for Low-Income Audiences" US Department of Agriculture

This framework emphasizes several categories of best practices. In the area of program design, the curriculum should be evidence-based, include accurate content in key content areas and it should be based on appropriate behavior-change theories. The content should also be appropriate for the target audience and consider their language and literacy level.

Programs should accommodate different learning styles, including visual, auditory and hands-on components. There should be experiential learning with minimal lecture. Contacts should be frequent enough and of long enough duration to achieve learning objectives.

Educators are also important in program success. They should have expertise in both the content and teaching methods and be able to relate to the target audience. They should be trained appropriately, both initially and on an ongoing basis, with appropriate observation to ensure sufficient quality of education.

Finally, there should be appropriate evaluative processes in place to measure impacts, sustain behavior change and progress toward meeting goals and objectives.²¹

Conclusions

Data on health outcomes show that the Northeastern Pennsylvania region, compared to the Commonwealth as a whole, has significant health challenges, both generally and with respect to indicators linked to food and nutrition. There are also structural barriers to food access. Social determinants, such as income and poverty, language barriers and education, shape health outcomes broadly and can serve as external factors affecting food literacy.

Geography also drives structural issues related to food access. There are several food deserts in the region. There are numerous tracts with limited food access – including rural, suburban, and urban communities. To address these gaps, more supermarkets may not be the most feasible answer – instead, there can be an effort to incorporate healthier options into existing food systems.

Because many barriers to food literacy are external, increased nutrition education alone is insufficient to achieve widespread food literacy. Nonetheless, work to increase individual, school, and community-scale food literacy may be an effective way to mitigate the challenges posed by these structural barriers. Research has shown that nutrition education is broadly effective at increasing food knowledge and changing behaviors.

Based on existing conceptualizations of food literacy, interventions should focus on building knowledge (both functional and critical) and changing attitudes toward food and nutrition. Nationally, there appears to be significant attention given toward education among children and young adults. This may reflect a need to start early to change community-wide food norms over the course of generations. However, it is also important to consider food literacy interventions for adults. Parents' knowledge can affect children's food choices. Education for vulnerable or historically marginalized populations, like nonwhites and non-English speakers, must also be considered, keeping in mind what is known about social determinants of health.

Some infrastructure for addressing regional food challenges is already in place. The Fresh Food Farmacy program, an initiative in Geisinger, is set to invest in distributing fresh, healthy food in order to improve long term health outcomes. Additionally, the region's network of food pantries and food banks work to provide healthful foods to those in need. Health education is offered in public schools, though the extent to which nutrition is taught and at what grade levels varies somewhat between district and school. Programs funded through the Area Agencies on Aging also cover nutrition, including the Senior Farm Market Nutrition Program, which provides vouchers to older adults to redeem for fresh food at farm markets.

Recommendations

There are several principles that can guide further action in the area of nutrition education and programming in Northeastern Pennsylvania.

First, existing pilots and programs aimed at providing fresh foods directly to those most in need as well as broad education and outreach to children and adults should continue and be further supported as dictated by community needs and ongoing assessment of outcomes.

In order to address geographic barriers to food access, there may be an opportunity for a new collaborative effort to work with independent convenience or neighborhood store owners in order to make healthier options more available in these types of outlets. This may be a more appropriate and effective strategy than attempting to attract full-service grocery stores to underserved neighborhoods.

There may also be opportunities for community-based solutions to food security issues such as community gardens, urban agriculture, or other innovative approaches to food systems. Going forward, further research or exploration of potential pilot projects is warranted.

Parallel efforts can also be made to ensure healthier food choices are made available in school settings and reducing the availability of less healthy options such as soda in schools. There is limited data available on presence of healthy options versus less healthy ones in schools, including on the presence and comparative cost of beverage options.

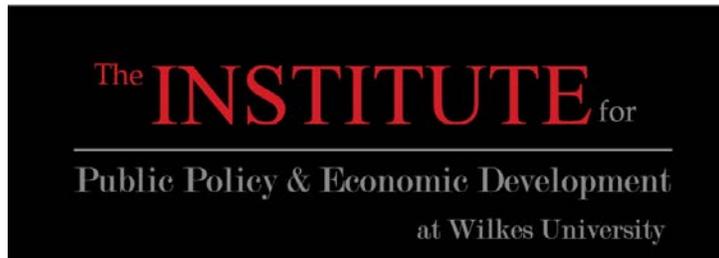
Finally, existing outreach and education programs for children and adults should be reevaluated, modified, or expanded where necessary in keeping with the best practices outlined above. In summary:

- Programs should accommodate different learning styles, including visual, auditory and hands-on components. There should be experiential learning with minimal lecture. Contacts should be frequent enough and of long enough duration to achieve learning objectives.
- Educators should have expertise in both the content and teaching methods and be able to relate to the target audience. They should be trained appropriately, both initially and on an ongoing basis, with appropriate observation to ensure sufficient quality of education.
- Finally, there should be appropriate evaluative processes in place to measure impacts, sustain behavior change and progress toward meeting goals and objectives.

Educational programming on nutrition should be expanded into appropriate contexts such as in schools and early childhood education centers (for both students and their families), antipoverty and social assistance programs, and in health care settings such as health care clinics.

Endnotes

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A partnership among Geisinger Commonwealth School of Medicine, Johnson College, Keystone College, King's College, Lackawanna College, Luzerne County Community College, Marywood University, Misericordia University, Penn State Scranton, Penn State Wilkes-Barre, The Wright Center for Graduate Medical Education, University of Scranton & Wilkes University

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