

The National Poverty Center's Policy Brief series summarizes key academic research findings, highlighting implications for policy.

The NPC encourages the dissemination of this publication and grants full reproduction right to any party so long as proper credit is granted the NPC. Sample citation: "Title, National Poverty Center Policy Brief #x".

## Highlights

- Despite numerous empirical studies, and the interest these studies have attracted from policy makers, until the current study there has not been a systematic economic analysis of food deserts. This is surprising, given that economics is typically defined as the study of the allocation of scarce resources.
- Though intuitively understood, defining a food desert is actually quite complicated, and as a consequence, existing data sources may simply be inadequate for documenting their existence.
- Assuming that a food desert can be identified, simply noting that an area has little nutritious food available tells us nothing about whether the underlying causes are related to supply, demand, or both.
- Overall, very little progress has been made on understanding *why* food deserts exist. This is hardly surprising, given that their very existence is so hard to establish.

## An Economic View of Food Deserts in the United States

Prepared from a paper by Marianne Bitler and Steven J. Haider

Though specific definitions vary, a "food desert" is typically understood to be an area with limited access to affordable and nutritious food. Numerous studies have documented their existence in one form or another.<sup>1</sup> Despite the considerable academic and policy attention focused on food deserts in recent years, Bitler and Haider are the first to address the issue from the perspective of economic theory. The authors not only discuss the implications of economic theory for establishing whether and why food deserts might exist, they also review existing empirical literature from this perspective. They find that while certain local areas can indeed be thought of as food deserts, data and identification issues are sufficiently problematic that researchers cannot convincingly document the presence or absence of food deserts on a national scale.

### An Economic View of Food Deserts

#### The Product

Intuitively, we know that the product of primary concern is readily available healthy, nutritious food. As a functional definition, however, something much more precise is necessary. Fresh fruits and vegetables are healthy, but so too are frozen. Certain meals purchased already prepared or from restaurants can also be healthy. White bread is more nutritious than donuts, but less nutritious than whole grain bread. Moreover, whether healthy food is readily available depends on more than just the number of supermarkets in a given census tract. There may not be a supermarket, but there may be fruit stands. There may not be a grocery within walking distance of the home, but there may be one on the drive to work. If so, conventional definitions of proximity/accessibility may be misleading.

#### Demand

The most basic determinants of the demand for healthy food are income and prices. Standard theory suggests that the demand for healthy food, assuming it is a normal good, will increase with income level, implying that we would expect there to be more food stores in high income areas than lower income areas, even if there were a sufficient number of stores in each. There are, however, several other issues that may impact the demand for food among

1. See, for example, Lewis, Sloane, et al. (2005) who find that there are fewer healthy restaurants in poor Los Angeles neighborhoods than in more affluent ones; Powell, Slater, et al. (2007) who find that nationally, poor and minority neighborhoods have fewer chain supermarkets than do more affluent, whiter neighborhoods; and Rose and Richards (2004) who find that food stamp recipients who live closer to supermarkets consume more fresh produce than those who live further away.

the poor. One is time-cost. This becomes relevant when one decides to purchase relatively unhealthy fast food versus relatively healthier ingredients that need to be prepared. Heterogeneity in preferences may also exist. Ethnic cuisines differ in key ingredients and cooking methods, and this will impact both the types of products regarded as acceptable substitutes, and the types of markets frequented.

## Supply

The most basic determinants of supply are the input costs to running a retail food outlet, which include labor, land, capital, transportation costs, and wholesale product costs. Supply declines as each of these increases. To the extent that the poor often live in areas with low wages, high unemployment and low land prices, we would not expect land or labor costs to be particularly important, though the capital necessary to open a retail food outlet may be scarce, and small scale grocers may be unable to secure low wholesale product prices. These factors do not explain, however, why larger retailers, who have access to capital and can purchase in bulk, would not open stores in low-income areas. Other factors, such as fixed costs, and economies of scale, scope, and agglomeration may all play a role—though only if we can ascertain why they are systematically more important in poor areas than in more affluent ones.

## The Market

At its most basic level, the market is where firms and consumers meet to exchange goods for money. It is usually assumed that consumers in the retail food market have little market power, and that individual firms, too, have little market power. Under such circumstances the standard predictions of perfect competition result: the availability of goods and price are determined by the direct interaction of supply and demand, with long-run price

being determined by long-run average total cost, and products being offered that do not lead to negative economic profits. Lower demand results in lower prices, and higher demand results in higher prices. Perhaps the simplest economic model that captures the essence of food deserts arises from a slight modification of this standard model. It is possible that demand is so low that it intersects the supply curve to the left of the minimum average total cost (where the supply curve is downward sloping, rather than upward sloping). In such a situation, lessening demand increases, rather than decreases, price. Moreover, if demand were to decrease sufficiently, the demand curve would no longer intersect with the supply curve at all—implying that the market would be left completely unserved. Thus, one economic rationalization of a food desert is the situation where demand in a market is sufficiently low that the relevant long-run average total costs are declining. Other possibilities also exist; it may be the case, for example, that food stores do indeed have market power, particularly in areas where there is little product availability. A firm with market power has the incentive to increase price and restrict quantity.

## Implications for Identifying Whether Food Deserts Exist

The preceding discussion has several important implications for identifying whether food deserts exist. First, nutritious food is best thought of as part of a continuum, can come in many forms, and can be obtained many places. Standard data sources are not able to capture this adequately. Even good firm data (TDLinx, for example) tend to focus on supermarkets, ignoring other potential sources of food, and data on consumers (for example, the Consumer Expenditure Survey) cannot tell us whether a respondent with a poor diet has limited

access, or simply chooses not to consume healthy food. Rural areas, with long distances between establishments, might be incorrectly identified as food deserts if informal markets (such as produce stands) are overlooked, and urban areas may be misclassified if restaurants are ignored. Second, the typical definition of a food desert includes areas where nutritious food is available only at prohibitively high prices, so focusing on availability alone could miss many food deserts. Unfortunately, price data covering all geographic areas are not readily available.

Properly defining a geographic area is also crucial to identifying food deserts, but how best to do this is unclear. Based on commute times, the appropriate area would be larger in rural and suburban areas than urban areas, though to the extent that poor people lack cars, the reverse could be true. If defined too tightly, some areas could appear as food deserts despite readily available food; if defined too loosely, the overall area may appear to have sufficient food, despite certain sub-areas being underserved. Economic models that look at the “full price” of a good (list price of a product plus the individual-level transportation cost to purchase it) do not require the definition of a specific geographic market, but greatly increase the data burden. It is also important to remember that studying geographic variation in one aspect of food may or may not identify true food deserts. If the aspect chosen, say fresh fruit, is indicative of other food availability (complements, in economic terms) then it is sufficient; if that aspect is a substitute for others, then it is not.

Finally, it is interesting to consider whether “food desert” is meant to be an absolute concept, or a relative one. A too narrow definition of healthy food (i.e. fresh fruits and vegetables), applied across areas, might be innocuous to a relative definition,

but would certainly make it difficult to properly discern an absolute food desert.

## Implications for Identifying Why Food Deserts Exist

Even if it were established that certain areas lack nutritious food, we must still understand why this scarcity exists in order to determine whether a policy intervention is warranted, and if so, what sort of intervention might be effective. To do so, we must separate the supply and demand factors that may be leading to food deserts. For example, standard economic theory suggests that government intervention may increase “economic efficiency” in the presence of an externality or market failure. Supply side externalities and market failures (such as barriers to entry due to fixed costs related to infrastructure and zoning, for example) are easier to identify, and perhaps also to remedy via policy, than those on the demand side (such as lack of information).

Insufficient demand is a possibility of course, and if we were to observe any reasonably priced nutritious food in an area identified as a food desert, that may well be the explanation. Consider the following scenario: the local population in a given area may value healthy food, but not be able afford regular home cooked meals due to the ingredient and time costs involved. If this were not well understood, public policies intending to address the issue might not work. For example, if the government were to mandate the opening of a grocery store in the area selling products at the same price as at large suburban stores, food purchases might not be affected, since families’ budget and time constraints have not been altered. On the other hand, given that the reason for the food desert is low income, an increase in SNAP (food stamp) allotments might be more effective.

Finally, it is important to remember that different supply and demand factors may be operating in different areas. In rural areas, fixed costs would be expected to raise costs since there are fewer people to spread them over. In urban areas, the paucity of large parcels of land may be a factor. On the demand side, transportation may be an issue, particularly in suburban settings. Furthermore, it is important to differentiate between general issues about low income neighborhoods, and issues that only are relevant to assessing the availability of healthy food. Is it just affordable nutritious food that is lacking from an area, or is there a dearth of other products (banks, medical care) as well? If it is the latter, the best policy intervention might address the reason for high business costs more generally.

## What Do We Know About Food Deserts From Existing Research?

Using the above discussion as a reference point, the authors focus on several important issues as they examine a number of empirical studies on food deserts in the United States.

### Data

The types and sources of data that are used in food desert research vary tremendously. National studies (for example, Powell, Slater, et al. 2007) tend to use commercial databases such as those of Dun and Broadstreet. The benefits of such data are that they are readily and uniformly available at the national level. The drawbacks are that they often include only a crude classification of store type, and may miss many places where food is actually purchased. Studies at a more local level (for example, Sharkey and Horel, 2009) often use much more complete data on food availability, but the methods used to collect these data are very labor intensive and not feasible at the

national level. An important contribution of smaller scale studies is that they provide information on the quality of data typically used in national studies. Rose, Bodor et al (2009) show that the number of census tracts that would be characterized as food deserts in New Orleans declines by almost two-thirds when actual fruit and vegetable availability, rather than existence of a grocery store, is included.

### Absolute vs Relative

Most studies of food deserts use a measure of food access that is, at least to some extent, relative in nature. Powell, Slater et al. (2007), for example, find that there are fewer chain supermarkets in low income zip codes than in higher income ones, even controlling for other factors. Such a conclusion, however, does not imply that there are *insufficient* chain supermarkets in low income areas—just that there are fewer. A few studies (for example, Rose, Bodor et al., 2009) have specified an absolute measure of access, usually specifying the distance within which a store or a certain quality of food needs to be present. Such absolute measures require much more data than is typically available to researchers.

### Geographic Area

It is common in the literature to focus on access to food outlets within geographic entities defined by the Census Bureau (census tracts or block groups) or within radial or network buffers. Use of Census data is due largely to convenience—it is exceedingly difficult to obtain national data on neighborhood characteristics at a finer level than block groups due to confidentiality requirements. Using Census definitions as boundaries is problematic though, because there could be a store just over the line, and there could be considerable variation in distance to food outlets within a tract. Calculating buffer zones around the centroid of a census tract (e.g. Rose, Bodor et al. 2009

and Neckerman, Bader et al 2009) is an improvement, but there could still be variation within, and the appropriate distance to consider must still be chosen. This, of course, is complicated by the fact that the “appropriate” distance will vary by individual, depending on their transportation options.

### Definition of Nutritious Food

Several studies clearly document that inferences about the existence of food deserts vary according to the definition of healthy foods. Rose, Bodor, et al. (2009) find that the number of New Orleans census tracts identified as food deserts varies considerably depending on the chosen measure of healthy food availability.<sup>2</sup> Raja, Ma, and Yadav (2008), in a study of Erie County, NY find that a focus on supermarkets would suggest minority neighborhoods have less access to healthy food, but the inclusion of small grocery stores overturns this finding. Overall, there is substantial empirical evidence that due to the substitutability of retail food outlets, examining only a piece of food availability will likely provide misleading results regarding food deserts.

### Inclusion of Price Information

Comparatively few studies examine price. There is evidence that price varies by type of retail outlet, but the evidence is very mixed about whether prices are higher in poor neighborhoods. Indeed, based on the few food desert studies that have monitored price, there is little evidence that the poor pay more for food on average than do the more affluent.

### Why do Food Deserts Exist?

Very little research has been done on the question of why food deserts exist. While an implicit assumption in much of the existing

research is that supply side factors cause food deserts, the authors are unaware of any study that has systematically examined whether supply or demand factors explain the existence of food deserts. Appropriate (effective) policy responses rely heavily on the identification of the causes of food deserts. There are several studies that discuss existing and potential policy options (e.g. Rose, Bodor et al 2009 and Neckerman, Bader et al. 2009), but they do not directly consider the underlying cause of food deserts or the economic arguments that motivate the policy response. The authors are also unaware of any study that tries to ascertain whether the causes of inadequate availability are food specific, as opposed to a general dearth of retail and other services.

### Concluding Discussion

A number of innovative studies using detailed data at the local level clearly document that some areas have less access to nutritious food than others. Some (e.g. Rose, Bodor, et al. 2009) even show that this access is sufficiently low that it could be difficult to purchase an objectively-defined healthy diet. However, these studies also point to numerous problems that exist with the data that have been used in large-scale studies. So much so, in fact, that there would seem to be very little basis for making any general statement about the existence of food deserts in the US as a whole. This should not be mistaken for the conclusion that no food deserts exist in the US. There are areas that are usefully described this way. Sufficient evidence does not exist, however, to determine whether food deserts are systematically responsible for other well-documented problems, such as the fact that the poor tend to eat unhealthy diets (Bhattacharya and Currie 2001, and Basiotis, Carlson, et al. 2002),

nor is there sufficient understanding of why these areas exist to allow the formulation of effective policy. If the necessary data can be obtained, and increasingly sophisticated econometric models developed, numerous avenues for fruitful research exist.

### References

- Basiotis, P.P., A. Carlson, S.A. Gerrior, W.Y. Juan, and M. Lino. 2002. “The Healthy Eating Index: 1999-2000.” Center for Nutrition Policy and Promotion Paper No. 12. Washington, DC: US Department of Agriculture, Center for Nutrition Policy and Promotion.
- Bhattacharya, Jayanta and Janet Currie. 2001. “Youths and Nutritional Risk: Malnourished or Misnourished?” in *Risky Behavior Among Youths: An Economic Analysis* (Jonathan Gruber, ed.). Chicago: University of Chicago Press.
- Lewis, L.B., D.C. Sloane, L.M. Nascimento, A.L. Diamant, J.J. Guinyard, A.K. Yancey, G. Flynn. 2005. “African Americans’ Access to Healthy Food Options in South Los Angeles Restaurants.” *American Journal of Public Health* 95(4): 668-73.
- Neckerman, Kathryn M., Michael Bader, Marnie Purciel, and Paulette Yousefzadeh. 2009. “Measuring Food Access in Urban Areas” National Poverty Center Working Paper.
- Powell, Lisa M., Sandy Slater, Donka Mirtcheva, Yanjun Bao, and Frank Chaloupka. 2007. “Food Store Availability and Neighborhood Characteristics in the United States” *Preventive Medicine* 44:198-95.
- Raja, Samina, Changzeng Ma and Pavan Yadav. 2008. “Beyond Food Deserts:

2. They considered the presence of a super market, the presence of each of six groups of fruits and vegetables contained in the U.S. Thrifty Food Plan at any type of store, and the cumulative shelf space devoted to fresh fruits and vegetables in any type of store.

Measuring and Mapping Racial Disparities  
in Neighborhood Food Environments”  
*Journal of Planning Education and Research*  
27:469-82.

Rose, Donald J., Nicholas Bodor, Chirs M.  
Swalm, Janet C. Rice, Thomas A. Farley,  
and Paul L. Hutchison. 2009. “Deserts  
in New Orleans? Illustrations of Urban  
Food Access and Implications for Policy.”  
National Poverty Center Working Paper.

Rose, Donald J. and Rickelle Richards.  
2004. “Food Store Access and Household  
Fruit and Vegetable Use Among  
Participants in the US Food Stamp  
Program.” *Public Health Nutrition*  
7(8):1081-8.

Sharkey, Joseph R. and Scott Horel. 2009.  
“Characteristics of Potential Spatial Access  
to a Variety of Fruits and Vegetables in  
a Large Rural Area,” National Poverty  
Center Working Paper.

*Major funding for the National Poverty Center is  
provided by the Office of the Assistant Secretary  
for Planning and Evaluation, U.S. Department of  
Health and Human Services.*



National Poverty Center  
Gerald R. Ford School of Public Policy  
University of Michigan  
735 S. State Street  
Ann Arbor, MI 48109-3091  
734-615-5312  
npcinfo@umich.edu