



# Characterizing the spatial and temporal patterns of farmers' market visits



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## ARTICLE INFO

### Article history:

Received 4 March 2015

Received in revised form

9 June 2015

Accepted 9 June 2015

Available online xxx

### Keywords:

Farmers' markets

Food access

Space-time

Trip-chaining

## ABSTRACT

This research presents a study of visits to farmers' markets, a rapidly growing urban phenomenon in the U.S., from a geographic perspective. Although the social and economic impacts of farmers' markets have received considerable attention recently, examining farmers' market access in space-time is still lacking in the existing analytical frameworks. This study challenges conventional food access measures that have been primarily focused on the spatial separation between markets and consumers' homes and proposes a more realistic space-time based strategy. A survey was conducted on twelve markets in Tucson, Arizona. Analysis results show that majority of market patrons went to a market that was different from the one nearest to their homes, and the market choice, including the geographic location and the associated market operating time, was highly affected by patrons' other daily activities. The particular types of activities combined with farmers' market trips were found to vary temporally and fluctuate based on patron's employment characteristics. Our study suggests that conventional food access measures should be used in caution to assess farmers' market access as these measures can lead to an overestimate of the travel consumers are willing or even able to incur.

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## 1. Introduction

Geography of food access represents one of the important research themes to geographers (Chen & Clark, 2013; Clarke, Eyre, & Guy, 2002; Dai & Wang, 2011; Horner & Wood, 2014; Lee & Lim, 2009; Leslie, Frankenfeld, & Makara, 2012; McEntee & Agyeman, 2010; Smoyer-Tomic, Spence, & Amrhein, 2006). While uneven access to various food opportunities and spatial distributions of food deserts have long been the focus in food access studies, visits to farmers' markets have recently received considerable attention (Brown, 2001; Ruelas, Iverson, & Kiekel, 2012; Sanderson, Gertler, Martz, & Mahabir, 2005; Tong, Ren, & Mack, 2012). In contrast with conventional grocers, farmers' markets are often non-continuous but regularly recurring venues, often outdoor, where local farmers gather to sell their products directly to consumers. Therefore, such markets tend to provide fresh agricultural products, serving as important venues for providing locally produced foods (Gale, 1997; Sanderson et al. 2005; Sommer, Herrick, & Sommer, 1981).

Faced with growing competition from large-scale food

producers and retailers, U.S. farmers' markets underwent a major decline for much of the twentieth century. Through massive global food networks, corporations and high yield growers take advantage of economies of scale to maintain a competitive edge over smaller operations (Alwitt & Donley, 1997; Gale, 1997; Gandee, Brown, & D'Souza, 2003; Singh, 1994; Singh, Hiremath, & Comer, 1991). Today, in most urban settings, supermarkets provide customers with the option of one-stop shopping nearly any hour of the day. With a typical food item shipping between 1500 and 3000 miles, conventional grocers are able to provide a wide variety of produce without being heavily impacted by growing seasons (Smith & MacKinnon, 2007). While some characterize this system as efficient (Gale, 1997; Gandee et al. 2003), it involves tremendous waste and inflated costs due to increases in food volume and intermediary expenses (Andreatta & Wickliffe, 2002; Gandee et al. 2003; Singh et al. 1991). Also as food travels further, increased environmental costs are incurred, freshness and nutritional value of produce are diminished, and the linkage between individuals and their food is obscured (Åsebø, Jervell, Lieblein, Svennerud, & Francis, 2007; Frazier, 2007; Heisley, McGrath, & Sherry, 1991; Kirwan, 2006; McGrath, Sherry, & Heisley, 1993; Sommer et al. 1981; Wolf, Spittler, & Ahern, 2005; Zepeda & Li, 2006).

In recent decades, growing environmental awareness on the

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part of consumers together with increasing concerns for ethics and dietary health have prompted a dramatic rise in availability of “healthy” food options and direct food markets (Brown, 2003; Hinrichs, 2000; Kirwan, 2006; Schmidt, Kolodinsky, DeSisto & Conte, 2011). Accordingly, farmers’ markets have gained significant population in urban neighborhoods and from 1970 to the present, the number of farmers’ markets in the U.S. have climbed from 340 to more than 8000 (USDA, 2015a). By reconnecting consumers with producers and promoting the consumption of locally produced goods, the benefits of farmers’ markets have been identified as strengthening local economies, reducing demand on fossil fuels, increasing access to fresh, nutritious produce, and enhancing the degree of social interaction in shopping (Capstick, 1982; Carpio & Wohlgenant, 2006; Díaz-Knauf, Vargas, Aguilar, & Sommer, 1992; Lockeretz, 2001; Lyson, Gillespie, & Hilchey, 1995; Moore, 2006; Onianwa, Wheelock, & Mojica, 2005; Sanderson et al. 2005; Sommer et al. 1981; Zepeda & Li, 2006). By selling directly to local patrons, growers avoid third party distribution and retail costs, thereby increasing their profit margins and simultaneously reducing consumer costs (Kirwan, 2006; La Trobe, 2001; Lencucha, Williams, Capjack, & Gross, 1998). As a result, these markets serve as crucial venues for small to medium-scale growers who are often unable to compete in more conventional outlets (Andreatta & Wickliffe, 2002; Brown, 2002; Kezis, Gwebu, Peavey, & Cheng, 1998; Payne, 2002). When contrasted with conventional grocers, however, the reduced prices of farmers’ market produce may only be apparent when compared with costs of similar quality, organic foods.

The same qualities that render farmers’ markets practical and competitive venues for small-scale growers conversely detract from the accessibility and convenience they afford customers. Due to the periodic nature of farmers’ markets combined with limited locale means, they are inherently less convenient than most conventional grocers and therefore contend with a unique set of challenges. Among other various obstacles, limited hours of operation (due to the constraints imposed on small farming operations by restricted workforces) at few, discrete locations have been identified as two major obstacles (Govindasamy et al. 1998). To the best of our knowledge, no existing studies have considered farmers’ markets’ unique spatio-temporal characteristics in evaluating their accessibility. Further, the ways consumers accommodate markets’ participation in space-time have remained unexplored and less clear.

This paper examines access to farmers’ markets in the context of their unique space-time characteristics. Comparing with traditional measures of food access – focusing on a distance from home, we highlight that food access varies based on markets’ operating times as well as by customer daily travel agenda. This study aims to investigate how various consumers integrate market participation into their daily activity programs and how their access to a farmers’ market can be more realistically understood and evaluated in space and time. In the next section, we provide a review of previous research on farmers’ markets and food access. This is followed by a description of the study area and survey design. Section 4 analyzed the types of trips made by farmers’ market patrons and how these vary in space and time. Finally, discussion and conclusions are provided.

## 2. Background

Owing to the critical linkage between diet and health, there is a comprehensive literature on the topic of food access. Where food access is uneven across socioeconomic lines, similar disparities can be seen in consumption of healthy foods. Studies such as those by Power (2004) and Kirkpatrick and Tarasuk (2003) demonstrated

strong correlations between income level and health quality of food eaten. While it should not be assumed that low levels of consumption always equate to lack of availability (Dibsdall, Lambert, Bobbin, & Frewer, 2003), studies (Alwitt & Donley, 1997; Ball, Timperio, & Crawford, 2009; Chung & Myers, 1999; Hendrickson, Smith, & Eikenberry, 2006) indicated that stores offering greater selections of products, especially supermarkets, are less likely to be located in lower income areas. Even in instances where poor and affluent areas have access to similarly priced items, the variety and quality of foods may still differ substantially (Alcaly & Klevorick, 1971; Morland, Wing, Diez Roux, & Poole, 2001).

In general, a range of studies noted that socioeconomic status can pose a critical barrier to healthy food access. Lower socioeconomic status, often assessed using a combination of multiple variables including income, education and occupation, has been found to be highly correlated with purchases or consumption of less healthy food (Darmon and Drewnowski 2008; Galobardes, Morabia, & Bernstein, 2001; Hulshof et al. 1991; Mishra, Ball, Arbuckle, & Crawford, 2002; Rankin et al. 1998). Research also reported food access disparities among different racial/ethnic groups. For example, studies showed that racially mixed, predominantly black or minority neighborhoods have fewer supermarkets or healthy food stores than predominantly white ones (Block & Kouba, 2006; Moore & Diez-Roux, 2006; Morland & Filomena, 2007; Raja, Ma, & Yadav, 2008), and such a pattern remained even after the relevant socioeconomic covariates were controlled for (Powell, Slater, Mirtcheva, Bao, & Chaloupka, 2007). Other barriers to food access include language (Jacobus & Jalali, 2011; Kunkel, Mastro, Ortiz, & McKinley, 2013; Vahabi & Damba, 2013), cultural preference (Shaw, 2006; Vahabi & Damba, 2013), gender (Caraher, Dixon, Lang, & Carr-Hill, 1998; Donkin et al. 1998) and disabilities (Huang, Rosenberg, Simonovich, & Belza, 2012).

Among others, a substantial body of food access research has focused on the geographic context by examining the spatial separation between markets and consumers’ homes given that convenience of market locations has been identified as a critical factor affecting customer participation (Govindasamy et al. 1998; Huang et al. 2012; Jack & Blackburn, 1984). Such a proxy has been found to produce varied results depending on the method of measurement employed (Apparicio, Cloutier, & Shearmur, 2007; Ball et al. 2009; Clarke et al., 2002; Smoyer-Tomic et al. 2006). One common strategy used in a multitude of studies (Chung & Myers, 1999; Cotterill & Franklin, 1995; Groom, 1966; Morland et al. 2001) evaluates accessibility based on a count of markets present within a defined geographic area (e.g. county, zip code, neighborhood, etc.), generally dividing markets into types or classes, and then comparing these numbers with the overall socioeconomic characteristics of the region.

Alternative food accessibility assessment relies upon the travel distance/time between individual market locations and the residences of prospective customers (Rose and Richards 2004; O’Dwyer & Coveney, 2006; von Oppen, Njehia, & Ijaimi, 1997; Yeager & Gatrell, 2014). In some studies, mode of transportation has also been incorporated. Kunreuther (1973) demonstrated differences in food market selection between low and medium-income families—in part due to the substantial proportion of low-income families using public transportation or walking, and the limited availability of public transportation. In another study, Dai and Wang (2011) found greater spatial accessibility to food stores in less advantaged socioeconomic neighborhoods in southwest Mississippi, but concluded these neighborhoods were still at a disadvantage due to lack of car ownership. Suarez-Balcazar, Martinez, Cox, and Jayraj (2006) specifically considered mode of transport to farmers’ markets in low-income, predominantly African-American Chicago neighborhoods.

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