



## Food deserts, activity patterns, & social exclusion: The case of Tokyo, Japan



Yuran Choi <sup>a,\*</sup>, Tsutomu Suzuki <sup>b,1</sup>

<sup>a</sup> Department of Risk Engineering, Graduate School of Systems and Information Engineering, University of Tsukuba, Tennodai 1-1-1, Tsukuba, Ibaraki 305-8573, Japan

<sup>b</sup> Faculty of Engineering, Information and Systems, University of Tsukuba, Tennodai 1-1-1, Tsukuba, Ibaraki 305-8573, Japan

### A B S T R A C T

#### Keywords:

Food deserts  
Social exclusion  
Walking distance  
Trip behaviors  
Elderly

This study attempts to identify areas with a high level of discrepancy in the probability for an individual to exceed the threshold of walking time for grocery shopping. It is based on an assumption that a higher discrepancy is associated with more relative disadvantages for socially excluded people, the elderly, with no car and unemployed. A geographically weighted logistic model that incorporates individual constraints and spatial accessibility is developed to yield a probability, capturing the spatial variation of relations of factors. In the city of Tokyo, the north-eastern area shows a significant discrepancy for the socially excluded group. The distribution of high level of discrepancy differs compared to that of the area with low accessibility. This study's methodology and results provide convincing evidence that in determining food desert areas, relative accessibility estimated with personal attributes should be taken into account.

© 2013 Elsevier Ltd. All rights reserved.

### Introduction

#### Background and motivations

In recent years, urban policies have focused on the social phenomenon of *social exclusion*, which indicates that some people have difficulties obtaining social or personal opportunities. There are many definitions of social exclusion; therefore, it is difficult to identify one unifying attribute for all of the possible categories. Social exclusion could be influenced by poverty, poor housing, high crime environment, bad conditions for health, discrimination and racism, a low education level or family breakdown (European Commission, 2002; Social Exclusion Unit, 2001). Most previous studies examined the potential causes or predictors to define the level of social exclusion, with a main focus on individual factors (e.g., Burchardt, Le Grand, & Piachaud, 2002; Howarth, Kenway, Palmer, & Street, 1998). Moreover, a number of studies defined “regular” physical and social standards from the resources of a dignified life (Schönfelder & Axhausen, 2003) with the concept of “relative” social exclusion.

More specifically, Jehoel-Gijsbers and Vrooman (2007) characterized social exclusion using the following two categories: (i) Economic/structural exclusion and (ii) Socio-cultural exclusion. In regards to the second category, which is considered in the current study, a normative standard for opportunity to access certain services can be desirable, either theoretically or empirically. That is, defined by enforcement in law or identified values and norms, the qualitative term “low accessibility” can connote a state of social exclusion regarding personal attributes or conditions.

In a general sense, accessibility has been estimated based on the distance from users to destinations (Apparicio, Abdelmajid, Riva, & Shearmur, 2008; McEntee & Agyeman, 2010; Pirie, 1979). Distance, or often travel time, involves cost and the potential to achieve the objective. However, with this point of view, accessibility can only be described in a physical manner, regardless of personal condition. Salomon and Mokhtarian (1998) stated, “[a]ccessibility is a measure of supply, namely potential mobility, and is not a descriptor of behavior.” Furthermore, accessibility should be considered in concert with the traveler's constraints, such as individual socio-economic status (e.g., Axhausen, Zimmermann, Schönfelder, Rindsfuser, & Haupt, 2002; Kwan, 1998; Páez, Gertes, Farber, Morency, & Roorla, 2010), health condition (An & Sturm, 2012; Lee, 2012; Morland, Wing, & Roux, 2002) or personal attitude through psychological mechanisms (Dijst, Farag, & Schwanen, 2008). Accessibility, therefore, can be divided into individual accessibility and locational accessibility (Dijst, Jong, & Eck, 2002). Social exclusion problems are

\* Corresponding author. Tel.: +81 90 6704 1465.

E-mail addresses: [choiyuran@gmail.com](mailto:choiyuran@gmail.com) (Y. Choi), [tsutomu@risk.tsukuba.ac.jp](mailto:tsutomu@risk.tsukuba.ac.jp) (T. Suzuki).

<sup>1</sup> Tel.: +81 29 853 5186.

highly associated with individual accessibility, i.e., the proximity or number of opportunities that one perceives on a personal level, which is often difficult to quantify.

### Literature

Concerning accessibility to certain services, the topic of the “food desert problem” has received increased attention as a type of social exclusion, as it represents the inability of some people in certain areas to access adequate groceries. In an introduction on this topic, *Wrigley (2002)* stated that the term ‘food deserts’ is used to describe an area with relatively poor access to adequate food provision. This issue is significant because it might lead to inequalities in public health (*Apparicio, Cloutier, & Shearmur, 2007*). In Japan, especially in deprived cities, the number of neighborhood grocery stores has declined since the 1990s (*Iwama, Tanaka, Sasaki, Komaki, & Saito, 2009*). Furthermore, Japan has the highest ratio of elderly people (aged 65 and over), recorded as 23.1% in 2010, and the dietary situation of the elderly in Japan is deteriorating due to the decay of neighborhood stores. Because food is a basic essential for a healthy and dignified life, food-supply stores must be considered public facilities.

Many studies in this line of research have focused on area-based aggregated-level factors of food deserts. The reason lies behind the assumption that the opportunity for food access is homogenous among areas with similar characteristics, for example, shopping environment and demographic attributes (e.g. *Apparicio et al., 2007; Ball, Timperio, & Crawford, 2009; Berg & Murdoch, 2008; Bodor, Nicholas, Rose, & Farley, 2008; Clarke, Eyre, & Guy, 2002; Hubley, 2011; Sharkey, Scott, Daikwon, & Huber, 2009; Smoyer-Tomic, Spence, & Amrhein, 2006; Zenk, Schulz, Israel, James, & Wilson, 2005*). *Zenk et al. (2005)* considered the poverty level and the major race in an area as food desert factors. *Sharkey et al. (2009)* analyzed the relation between proximity and density of food suppliers in an area, considering the average vehicle access, income level or employment status of households in the area. *Smoyer-Tomic et al. (2006)* explained the food desert neighborhoods as areas with higher percentage of low-income and elderly households, and relatively low proximity to supermarkets. In these examples, it is presumed that a greater percentage of people will have difficulties in areas with a higher ratio of elderly people and people with no vehicle. In contrast, studies have reported no significant association between deprivation and the availability of groceries using area-based analysis (*Winkler, Turrell, & Patterson, 2006*).

At the individual level, research has attempted to clarify which group of people is more likely to experience difficulty in shopping. These studies are based on the assumption that the degree of inconvenience, or disparity, is distinctive according to personal attributes and shopping behavior (*Choi & Suzuki, 2012*), which is not aggregated into zones. This assumption implies that even in an area with low food accessibility, the level of inconvenience or shopping difficulties can differ according to the personal condition. Therefore, area-based analysis could be biased. In the more recent literature, attempts were made to develop models that can explain the relationship between areal attributes and actual shopping patterns. *Páez et al. (2010)* proposed the model-based estimates of individual traveled distance to calculate accessibility. However, they focused on estimating the accessibility rather than identifying the gaps between different groups within an equal environment. These gaps may represent the meaning of social exclusion. Meanwhile, there also have been studies that investigated the risk by the loss of critical food suppliers in the region. *Russell and Heidkamp (2011)* emphasized the impact the loss of a major supermarket has on the current food system. *Choi and Suzuki (2013)* studied

protection strategies for critical facilities in a food desert neighborhood.

### Objectives

The objective of the present study is to develop a model to identify areas that have a large discrepancy in the probability of an individual exceeding the threshold of comfortable accessibility in grocery shopping in the city of Tokyo. A binomial level of inconvenience for grocery shopping is defined as “high” if one’s walking time for shopping exceeds a certain threshold and “low” otherwise. The probability of experiencing a high level of inconvenience is calculated using a logistic regression with the binary dependent variable while simultaneously incorporating individual constraints and aggregated accessibility as explanatory factors. Hence, the gap between groups with different attributes can be observed in the same area. A higher gap level indicates that in that area, the inferior group has a higher probability of experiencing shopping difficulties than the other group. For a more locally focused insight, the relations between each factor are investigated by adopting a geographically weighted logistic regression (GWLR) that captures spatial variation by calibrating a regression model at different points in space. With this method, a landscape of spatially differentiated gaps of probability between groups and the influence of each factor can be depicted on a map. Overall, the main contribution of this study is that it generates the probability of each group of people experiencing shopping difficulties, which is unique within the line of food-deserts-related studies, to our knowledge. The result answers the question of which area includes people who are elderly, who do not have cars and whose life territory is limited to the area near home (unemployed) and thus have relatively higher burden in travel. The method avoids the biased assumptions that every area with a higher proportion of disadvantaged people and low accessibility is problematic, as mentioned in the literature review. Moreover, the method is examined as an effective approach to differentiate the range of calculating accessibility based on the personal condition, regarding the physical constraints. It enables the integration of the spatial opportunity for shopping and personal constraints. Ultimately, the result provides convincing evidence for urban policies to determine which areas and which groups of people require a support system. Policies can then promote the opening of new stores or protect stores in food deserts, thus improving opportunities for people to shop for groceries on a daily basis, or even can embed the local agriculture markets in appropriate places as urban food systems (*Gatrell, Reid, & Ross, 2011*).

### Methodology

#### *Accessibility and inconvenience*

As *Páez, Scott, and Catherine (2012)* described in their comprehensive review, two categories of accessibility measurement can be found in related research: a normative and a positive approach. A positive approach assigns weights for the distance from origin to the store, and sometimes for the size of the store, based on the gravity theory. A normative approach posits a critical normative value beyond which people should not be expected to travel. Numerous examples can be found in the food desert-related literature, both for the positive (e.g., *Clarke et al., 2002; Lee & Lim, 2009*) and the normative approach. In shopping for groceries, the quality of opportunity can be determined by whether one can reach the stores that provide the desired products. The opportunity of variety is also important. The basic conception is that a person does not ‘get annoyed’ or ‘feel inconvenience’ due to the need to travel

Download English Version:

<https://daneshyari.com/en/article/6538854>

Download Persian Version:

<https://daneshyari.com/article/6538854>

[Daneshyari.com](https://daneshyari.com)