Health & Place 15 (2009) 578–585

Contents lists available at ScienceDirect

Health & Place

journal homepage: www.elsevier.com/locate/healthplace

Neighbourhood socioeconomic inequalities in food access and affordability

Kylie Ball *, Anna Timperio, David Crawford

Centre for Physical Activity and Nutrition Research, School of Exercise and Nutrition Sciences, Deakin University, 221 Burwood Highway, Burwood VIC 3125, Australia

ARTICLE INFO

Article history:
Received 2 April 2008
Received in revised form
18 September 2008
Accepted 29 September 2008

Keywords:
Socioeconomic
Diet
Access
Affordability
Inequalities
Food access
Neighbourhoods

ABSTRACT

This study investigated whether the availability and accessibility of supermarkets and fruit and vegetable stores, and the availability, variety and price of foods within these stores, varied across areas of different levels of socioeconomic disadvantage in Melbourne, Australia. Data on food store locations, and food variety and price within stores were obtained through objective audits of 45 neighbourhoods of varying socioeconomic disadvantage. Geographical accessibility of healthy food stores was mostly better amongst those living in more advantaged neighbourhoods. Availability of healthy foods within stores only slightly favoured those in advantaged neighbourhoods. However food prices favoured those living in disadvantaged areas.

Introduction

Despite the health benefits of a varied and nutritious diet, many individuals do not consume diets consistent with dietary guidelines. Individuals of low socioeconomic position (SEP) are particularly at risk of consuming diets that are less than optimal, including fewer vegetables, fruits and high fibre foods, and more high-fat foods than their counterparts of higher SEP (Ball et al., 2004; De Irala-Estevez et al., 2000; Johansson et al., 1999). While socioeconomic differences in dietary intake are well documented, relatively little is known about their underlying causes.

Most studies that have considered associations between SEP and diet have focused on the role of cognitive factors, such as nutrition knowledge, attitudes or beliefs about health (e.g., Hearty et al., 2007; Parmenter et al., 2000; Wardle and Steptoe, 2003). Recently, however, greater focus has been directed at the potential contribution of the physical, structural, and material environment. Increasing evidence, particularly from the US, suggests that residents of socioeconomically disadvantaged neighbourhoods may have poorer access to affordable healthy foods. For example, studies have reported that there are fewer large supermarkets in more socioeconomically deprived areas (Alwitt and Donley, 1997; Baker et al., 2006; Block and Kouba, 2006; Chung and Myers, 1999; Moore and Diez Roux, 2006; Morland et al., 2002; Powell et al., 2007; Zenk et al., 2005).

Clearly food choice may be influenced not only by store location but also by the availability, variety and price of items within the stores. Some evidence from the US and elsewhere shows that there are fewer healthy choices available in stores in deprived areas compared with less deprived areas (Baker et al., 2006; Horowitz et al., 2004), or that retail prices for the same foods are higher in more deprived areas (Crockett et al., 1992; McDonald and Nelson, 1991; Sooman et al., 1993). However, evidence of poorer food environments in socioeconomically disadvantaged neighbourhoods remains contradictory. Other studies from the US (Cassady et al., 2007; Chung and Myers, 1999), UK (Cummins and Macintyre, 1999, 2002), Canada (Apparicio et al., 2007; Latham and Moffat, 2007; Smoyer-Tomic et al., 2006, 2008; Travers et al., 1997), New Zealand (Pearce et al., 2007) and Australia (Winkler et al., 2006a, b) found few or no differences in food price, food availability or access to supermarkets between deprived and affluent areas (Apparicio et al., 2007; Chung and Myers, 1999; Latham and Moffat, 2007; Mooney, 1990; Smoyer-Tomic et al., 2008; Travers et al., 1997; Winkler et al., 2006a, b), or otherwise differences favouring more, rather than less, deprived neighbourhoods (Cassady et al., 2007; Cummins and Macintyre, 1999, 2002; Pearce et al., 2007; Smoyer-Tomic et al., 2006).

Contradictory findings concerning the accessibility of affordable foods across neighbourhoods of different levels of affluence may reflect real differences in accessibility across locations. However, these discrepant findings may also be attributable to methodological factors. One limitation of much of the existing research is the tendency to collect data from only a limited

* Corresponding author. Tel.: +61 3 9251 7310; fax: +61 2 9244 6017.
E-mail address: kylie.ball@deakin.edu.au (K. Ball).

1353-8292/$ - see front matter © 2008 Elsevier Ltd. All rights reserved.
doi:10.1016/j.healthplace.2008.09.010

number of localities, or to use a convenience sample of low and high socioeconomic areas, such as 'uptown' vs. 'downtown' (e.g., Block and Kouba, 2006; Chung and Myers, 1999; Mooney, 1990; Travers et al., 1997), and also to rely on limited measures of accessibility. For instance, some studies (Alwitt and Donley, 1997; Baker et al., 2006; Cummins and Macintyre, 1999; Morland et al., 2002; Moore and Diez Roux, 2006; Powell et al., 2007) have used a relatively crude measure based on the number of stores (or stores/person) in an administratively defined area, such as a census tract or zipcode. Those studies do not take into account the presence of stores located in close proximity to residents' homes, but within a neighbouring census tract or zipcode. Other studies (Pearce et al., 2007; Zenk et al., 2005; Winkler et al., 2006a) have examined distance to stores, but calculate distance from a geographical 'centroid' rather than from residents' actual homes. Many of these studies have not also considered food range and prices within those stores. Other studies have examined food availability and prices within a selected number of stores, but with poor or no indication of the accessibility by residents to the stores themselves (Cassady et al., 2007; Finke et al., 1997; Travers et al., 1997). One of few studies to include multiple empirical indicators of accessibility (albeit all based on geographic measures) found different associations with neighbourhood deprivation depending on the indicator used (Apparicio et al., 2007), underscoring the importance of incorporating comprehensive empirical indicators of food accessibility within the same study.

The present study aimed to extend understanding of how local food environments vary across socioeconomic areas, using more comprehensive indicators of availability and accessibility than have been applied in the majority of past studies. Specifically, we examined whether the availability and accessibility of supermarkets and fruit and vegetable stores, and the availability, variety and price of different foods within these stores, varies across areas of different levels of socioeconomic disadvantage in Melbourne, Australia.

Methods

Geographical coverage and sampling of areas

As part of the SocioEconomic Status and Activity in Women study (SESAW; see Ball et al., 2006 for more details), data were collected from fruit and vegetable grocery stores and supermarkets across 45 Melbourne[1] neighbourhoods (suburbs) of different levels of socioeconomic disadvantage (see Fig. 1), selected as follows. Based on 2001 Census data, the Australian Bureau of Statistics has assigned to suburbs a socioeconomic index for areas (SEIFA) score based on relative disadvantage (considering attributes such as the proportion of residents with low income, low educational attainment and unskilled occupations) (Australian Bureau of Statistics, 2003). All suburbs within 30 km of the Melbourne central business district were ranked according to SEIFA score (hence termed neighbourhood socioeconomic position or SEP), and grouped into septiles from low to high SEP. Fifteen suburbs were then drawn at random from each of the lowest, middle and highest septiles.

The Australian electoral roll[2] was used to draw a random sample of 4800 women aged between 18 and 65 years in each of the 45 neighbourhoods. These women were posted either a diet or a physical activity survey, and respondents were also asked to complete the alternative survey. A total of 1567 women participated in the dietary study: 504 from high, 584 from mid and 479 from low socioeconomic neighbourhoods. More detailed methods and survey results are presented elsewhere (Ball et al., 2006). For the purposes of the present analyses, only data on participants' place of residence was used (to calculate access to food stores from home).

All fruit and vegetable grocery stores and major chain supermarkets (defined as those belonging to one of the largest five supermarket chains in Australia) across the 45 study areas and adjacent suburbs were identified through exhaustive searches of online telephone (www.whitepages.com.au) and service directories (www.yellowpages.com.au) in 2004–05, listings on company websites and local government/council food premise registers. Excluding 13 stores (seven in low, one in mid and five in high SEP areas) which were either closed or refused participation, a total of 50 fruit and vegetable stores and 71 supermarkets across the 45 study neighbourhoods were then audited by one of four trained research staff. The stores were all visited over a period of 3 weeks in April 2006 (autumn/fall season in Melbourne) to minimise seasonal variations in availability and price. The four auditors were trained together and all initially audited the same store independently. Comparison of responses showed high consistency (over 90% agreement), and the few items that were inconsistent for one auditor were easily resolved.

Measures

Consistent with the recommendations of Apparicio et al. (2007), this study employed three measures to indicate accessibility to healthy foods: density (average number of stores within a set buffer zone, as well as number of stores relative to population density within neighbourhoods); proximity (distance from residents' homes to the nearest store); and food variety and price (but not quality).

Store density and proximity

Participants' residential addresses and all stores identified ($n = 134$) were geocoded using a Geographic Information System (ArcView 3.3, ESRI, Redlands, 2002) and overlaid with the road network (VicMap Transport v2004, owned and supplied by State of Victoria). The numbers of supermarkets and fruit and vegetable stores within a 2 km buffer zone (via the road network) from study participants' homes were tallied. A 2 km buffer zone was chosen since this had been suggested as a reasonable travel distance to food outlets (Donkin et al., 1999). In addition, the total numbers of supermarkets and fruit and vegetable stores within each of the 45 study neighbourhoods was calculated and expressed relative to the population of each neighbourhood (number of stores/10,000 residents). Neighbourhood population data were obtained from 2001 Australian Census data (ABS, 2003). The distances via road networks from each woman's home to the nearest supermarket and fruit and vegetable store were calculated beginning and ending at the closest point to the centroid of the home and store, respectively, using road/road infrastructure data supplied by the State of Victoria (VicMap Transport v2004). Examination of proximity via road networks provides a more realistic assessment of accessibility than straight line distances, in that it represents distance actually travelled to reach the store.

Food availability and variety

Data on the availability, variety, and price of fruits, vegetables, and snack food items in the stores were gathered during store audits using a structured checklist. A range of grocery items, including 14 fruits, 23 vegetables and 16 snack foods, were

[1] *Melbourne is the capital of the State of Victoria, and is the second largest city in Australia with a population of approximately 3.5 million.

[2] Registration on the electoral roll is compulsory for all Australian citizens aged 18 years or older.