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Dietary inequalities: What is the evidence for the effect of the neighbourhood food environment?☆

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ABSTRACT

This review summarises the evidence for inequalities in community and consumer nutrition environments from ten previous review articles, and also assesses the evidence for the effect of the community and consumer nutrition environments on dietary intake. There is evidence for inequalities in food access in the US but trends are less apparent in other developed countries. There is a trend for greater access and availability to healthy and less healthy foods relating to better and poorer dietary outcomes respectively. Trends for price show that higher prices of healthy foods are associated with better dietary outcomes. More nuanced measures of the food environment, including multidimensional and individualised approaches, would enhance the state of the evidence and help inform future interventions.

Contents

☆This Keynote Review introduces the Health and Place Virtual Special Issue on Diet and Nutrition Environments available online at http://www.journals.elsevier.com/health-and-place/

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1. Background

Socioeconomic disparities in dietary quality exist in developed countries across the globe (Ball et al., 2004; Ecob and Macintyre, 2000; Robinson et al., 2004) and are contributing to the inequitable distribution of conditions such as obesity and cardiovascular disease (Fox and Smith, 2011; McLaren, 2007; Mente et al., 2009). Dietary intake is recognised as a complex behaviour of multifactorial origin, whereby individual and environmental factors interact to influence what people eat (Foresight, 2007; Story et al., 2008). Areas with little or no provision of healthy foods are believed to contribute to disparities in diet-related conditions such as obesity and diabetes, particularly in the United States (US) (Larson et al., 2009; Walker et al., 2010).

There is growing evidence that the neighbourhood food environment is an important determinant of dietary behaviour and obesity (Giskes et al., 2011; Holsten, 2009; Lovasi et al., 2009) and an increasing consensus over the need to adapt the environment to make healthy choices easier, particularly for individuals from disadvantaged backgrounds (Department of Health UK, 2010). Recent recommendations from the United Nations stressed the need for member states to provide equitable access and availability to foods that contribute to a healthy diet and discourage the production and promotion of foods that contribute to an unhealthy diet (United Nations General Assembly, 2012).

The literature examining associations between neighbourhood environmental factors and socio-economic indicators or diet has grown in recent years (Caspi et al., 2012b). The neighbourhood food environment literature has tried to address many different research questions using a variety of different outcome and exposure measures and very few valid or reliable measures (Charreire et al., 2010; Gustafson et al., 2012; McKinnon et al., 2009b). This diversity in methodologies combined with the ecological design of the vast majority of studies has made interpreting this body of literature challenging within the standard systematic review paradigm. As a result, previous reviews of the evidence have made recommendations for further research rather than concise conclusions about the strength or range of effect sizes of the current evidence base (Caspi et al., 2012b; Giskes et al., 2011; Gustafson et al., 2012; Larson et al., 2009; Walker et al., 2010). This paper offers the first synthesis of previous review articles to determine the evidence for socioeconomic disparities in the neighbourhood food environment and explores the potential for quantifying the relationship between the food environment and dietary inequalities.

2. Organising the evidence

Leading academics in the food environment field have called for research to use conceptual models that theorise and test the mechanisms by which specific environmental exposures interact with individual factors to influence health behaviours such as diet (Cummins, 2007; McKinnon et al., 2009a; Oakes et al., 2009). A widely used model of the food environment is that of Glanz et al. in 2005 (Fig. 1). It considers the policy, environmental, social and individual determinants of diet. The model links dietary behaviour directly to a collection of three settings: *community nutrition environment, consumer nutrition environment and organisational nutrition environment.* The model also suggests that the effect of these settings plus a fourth setting, the *information environment* (media and advertising), may be moderated or mediated by demographic, psychosocial or perceived environmental factors.

Most of the food environment research to date has focused on the *community nutrition environment* (Caspi et al., 2012b; Thornton and Kavanagh, 2010b) which measures the accessibility of food sources in the context of residential neighbourhoods. These studies use Geographic Information Systems (GIS) or other methods to determine the geospatial location of food sources to measure accessibility in terms of outlet proximity, density and to lesser extent diversity (Charreire et al., 2010; McKinnon et al., 2009b). Proximity assesses the minimum distance between food outlet and residence or proxy location, using road network, Euclidean distance or travel time. Density quantifies the availability of different types of food outlets within a specific area such as census tracts or buffer zones around centroid, home or food outlet. Density calculations may include total count, count per population, per square area or kernel density estimation (density calculation weighted by distance from origin). Diversity measures the different types of outlets for example the number of different fast food outlets.

The *consumer nutrition environment* reflects factors that consumers encounter within a retail food outlet such as the types of food available, price, promotions, placement, range of choice, freshness or quality and nutrition information. Assessment of the in-store environment typically requires internal audits by observation using a checklist or market basket tool (McKinnon et al., 2009b). A range of such tools have been developed where the majority measure product availability and price. A smaller number of tools consider additional factors such as product quality or variety (Gustafson et al., 2012). Fewer studies have explored consumer nutrition environment factors probably due to the time

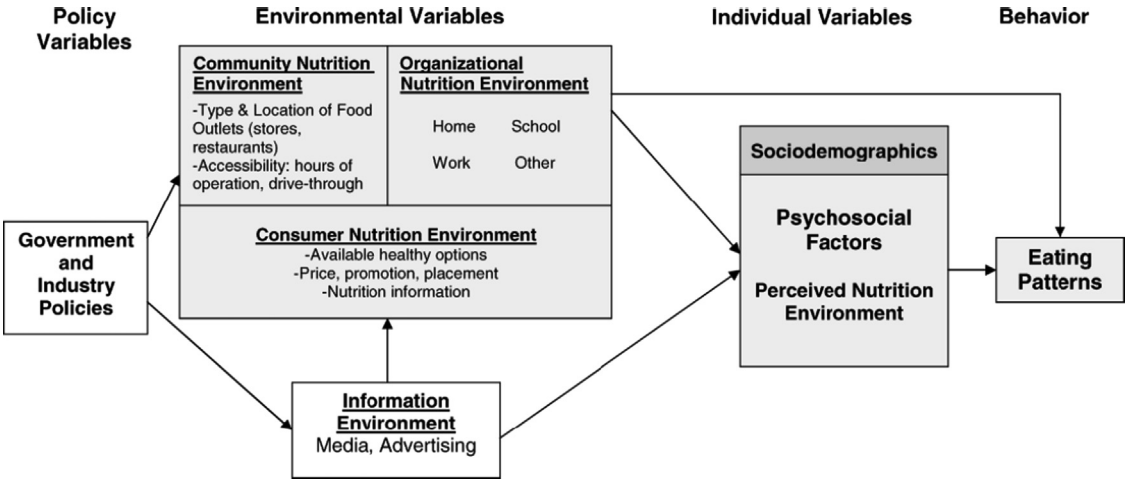

Fig. 1. Model of nutrition environments (Glanz et al., 2005).