

# Chapter 1

## Introduction:

### Bringing a Geographical Perspective to Understanding the ‘Obesity Epidemic’

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#### **The Global Context**

Globally, the sharp rise in the rates of obesity among both children and adults is a significant public health concern. Since 1980, in some areas such as parts of North America, the United Kingdom, Eastern Europe, the Middle East, the Pacific Islands, Australasia and China obesity rates have risen three-fold or more (World Health Organization 2003). There are more than one billion overweight adults and at least 300 million of them are obese (World Health Organization 2003). By the year 2000 in the United States, over 64 per cent of the population were overweight or obese (Flegal et al. 2002), accounting for somewhere between 100,000 to 300,000 deaths each year (Flegal et al. 2005, Allison et al. 1999). Similarly, rates of childhood obesity have increased over the same period of time (Wang and Lobstein 2006). In the United States for example since the mid-1970s obesity prevalence among children aged 6 to 11 has increased from 6.5 to 17.0 per cent, and for those aged between 12 and 19 from 5.0 to 17.6 per cent (Centers for Disease Control and Prevention 2006). The rise in obesity rates is not limited to industrialized countries as this increase is often more profound in developing countries than in the developed world. The increasing global prevalence of obesity has led to what has been termed the ‘obesity epidemic’ (Hill and Peters 1998).

A number of negative physical, social and mental health consequences are associated with obesity (Flegal et al. 2007), which now rivals smoking as a public health issue. As a major risk factor for type 2 diabetes, various cancers, cardiovascular disease and hypertension, excess body weight is recognized as a significant health burden for individuals and health systems in many countries (Must et al. 1999). At the same time, the distribution of overweight and obesity is not evenly shared between all social and ethnic groups, or across geographical areas (McLaren 2007, Wang and Beydoun 2007, King et al. 2006). In most developed countries, rates of overweight and obesity tend to be higher among more socially disadvantaged groups. For example, in England obesity rates (obese or morbidly obese) are 68 per cent higher among women in the lowest income quintile of households compared to the highest income quintile (although this trend is less

strong among men) (National Centre for Social Research 2008). There are also inequalities in obesity prevalence between geographical areas. In New Zealand for example, rates of obesity are almost twice as high in the most deprived quintile of neighbourhoods compared to the least deprived quintile (Ministry of Health 2008). Similarly, recent trends in developing countries show a shift in obesity prevalence from higher to lower socioeconomic groups. Obesity-related behaviours and health outcomes are likely to be on the causal pathway between social disadvantage and health and therefore contribute to the sharp increase in health inequalities noted in many countries in recent years.

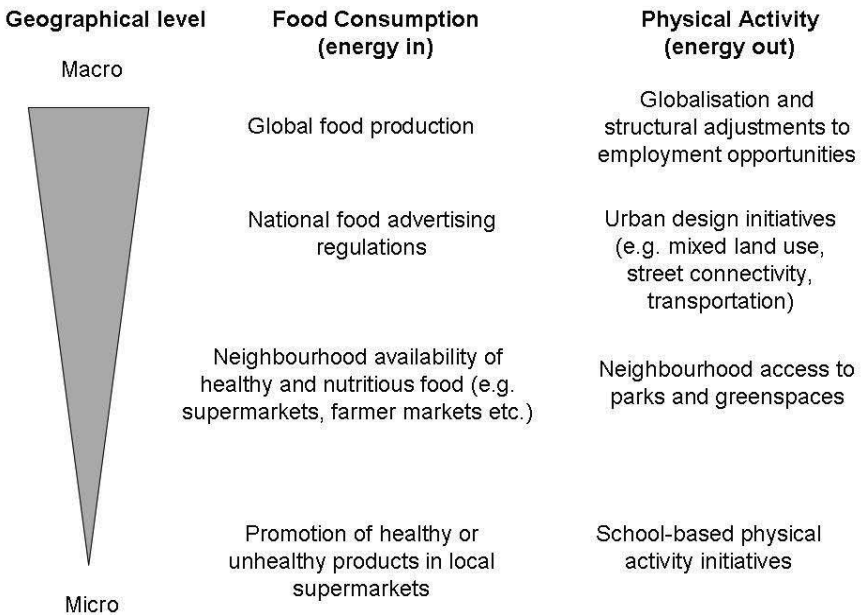
### **Geographical Perspectives**

Although the increasing prevalence of obesity is well documented, explanations for the emerging epidemic, as well as its socio-spatial distribution have proven more elusive. At a fundamental level, obesity arises from an imbalance between the quantity of energy consumed and the amount expended (the energy balance equation). Whilst genetics are a risk factor in explaining an individual's susceptibility to weight gain, it is implausible that they account for the sharp increase in the global prevalence of obesity over such a short period of time. Rather, the rising epidemic reflects profound changes in society over the past two to three decades that have been accompanied by rapid and widespread changes to the environment. These environmental modifications have created a climate that is conducive to increased energy consumption and reduced energy expenditure at a population-level. Therefore, to understand the worldwide rise in obesity prevalence it is necessary to consider a whole host of environmental factors.

Researchers are beginning to pinpoint a suite of environmental features at a range of spatial scales that are integral to influencing energy consumption and reducing energy expenditure. Adequate theorising and empirical testing of the pathways through which environmental factors contribute to obesity is an essential step to understanding the 'obesogenic' characteristics of the environments in which people live, work and play. This wider perspective is consistent with the resurgence of interest in the public health and epidemiology literature on 'place-based' determinants of health and health inequalities. Researchers are increasingly recognizing that the identification of mechanisms linking the features of places to a range of health outcomes (e.g. mortality and morbidity) and health-related behaviours (e.g. smoking) has significant potential for developing successful policy initiatives. Adapting the environment in which people live with a view to improving health outcomes underpins policy frameworks such as the WHO Healthy Cities programme and various urban renewal strategies (Blackman 2006, Davies and Kelly 1993).

The assertion that the environment is integral to understanding obesity raises a number of questions. What is meant by the 'environment'? What are the key environmental features then affect energy intake and energy expenditure? At which

geographical scales do these mechanisms operate? In this context, the environment is defined broadly and refers to all factors that are external to the individual including the social, political, economic, built or biophysical spheres. There are numerous theoretical pathways through which features of the environment can influence obesity. The environment can exert a putative influence on obesity at different spatial scales ranging from the macro (e.g. global or national) to the micro (e.g. in schools or workplaces). Figure 1.1 demonstrates a selection of environmental characteristics at assorted scales that potentially shape individual-level food consumption (energy in) and physical activity (energy out). For instance, food consumption may be influenced by macro-level forces such as global food production or international trade agreements. These forces can alter the availability and cost of foods of different nutritional value. At the national-level, the regulation or codes of conduct for advertising food, particularly to children, varies between countries. Different degrees of exposure to advertising and other marketing strategies between countries may partially explain international variations in obesity levels. Finally, at the local level, promotional offers on energy dense food in a neighbourhood supermarket may influence the purchasing decisions, and ultimately the nutritional intake, of its customers.



**Figure 1.1** Examples of environmental characteristics at a range of spatial scales that potentially influence i) food consumption (energy in) and ii) physical activity (energy out)

With regards to energy expenditure, levels of physical activity may be influenced by patterns of trade associated with globalisation and urbanisation which in turn shape the types of employment opportunities available in different places. In many countries these structural adjustments have been associated with a shift from manual (and often physically active) occupations to more sedentary employment opportunities. At an intermediate level, the urban design strategies of central and local governments are likely to influence the 'walkability' of urban areas. For instance, mixed land use and the variety of community resources accessible locally, such as places of work, parks and retail outlets, increase opportunities for local residents to walk or cycle around their neighbourhood, which in turn is likely to increase physical activity at the population-level. At a micro-level, the strategies of local schools to integrate regular physical activity into the school day can vary significantly. Similarly, characteristics of other settings such as workplaces may assist or hinder employees in remaining physically active.

### **Policy Perspectives**

Given the sharp rise in obesity rates worldwide and the associated health, economic and social costs, it is perhaps unsurprising that weight and obesity has become a policy priority for many national governments. Key policy documents in most countries tend to use staunch language such as 'fighting', 'tackling' or 'battling' the obesity epidemic, implying that firm evidence-based action is being taken. Although the fundamentals of building healthy public policy and creating supportive environments have been central pillars of health promotion theory and practice since they were formally incorporated into the WHO's Ottawa Charter in 1986, to date, strategies to address obesity have been primarily focused on behavioural, educational and medical interventions with a view to encouraging individuals to eat more healthily and exercise more. This individualized perspective is consistent with the neoliberal political agenda implemented over the past 20 to 30 years in developed countries including the United Kingdom, United States and Australia. Health promotion policies in these countries have been consistent with this philosophical direction and tended to devolve responsibility for health from the state to the individual.

Although individualistic approaches to improving health outcomes have been the international vogue for some years, they can be heavily criticized. Overlooking the complex social contexts in which health-related 'decisions' are made is likely to be a major impediment to successful policy development. Health-related behavioural decisions such as smoking and alcohol intake as well as food consumption, nutritional intake and physical activity of course are not taken in a vacuum, but rather are shaped by the political, social, cultural and physical contexts in which they are made. As Caballero (2007) notes '...political leaders still tend to regard obesity as a disorder of individual behaviour, rather than highly conditioned by the socioeconomic environment' (p. 4). Policy approaches that

predominantly focus on changing behaviour through educational programmes are unlikely to be sufficiently potent to reduce the prevalence of obesity. Most people will struggle to alter their behaviour in environments that promote high energy intake and physical inactivity. It is therefore unsurprising that policies to address the sharp increase in obesity prevalence have had limited success.

The notion that the environmental context is important for understanding health outcomes is supported by the recommendations from the recent report from the World Health Organization's Commission on Social Determinants of Health (2008) entitled *Closing the Gap in a Generation: Health Equity Through Action*. The report emphasizes the wider conditions of daily life that are integral to understanding and improving health outcomes (see Pearce and Dorling 2009 for an overview). Conditions include providing healthy places to live, work and play in order to lead a healthy life. For example, the report advocates urban planning initiatives that promote healthy behaviours, including ensuring the availability of fresh and nutritious food as well as providing safe places to walk and exercise and a mix of land uses. However, the various policy approaches to addressing the obesity epidemic are often at odds with the more holistic recommendations of the Commission.

Given the persistent rise in the prevalence of obesity and overweight, policy responses that target amending individual behaviour change would seem to be inadequate. It is increasingly being appreciated by researchers and policy makers that successful interventions to address the obesity epidemic require concerted efforts at a range of scales, but with a particular emphasis on modifying the environments in which individual-level decisions are made. In short, to achieve successful behavioural outcomes it is important to recognize that the social, physical and cultural context matters. Policy initiatives that successfully address the high prevalence of obesity will require strategies that alter environments to enable healthy eating and encourage physical activity.

## **Structure and Content of the Book**

This edited book draws together the international evidence for environmental explanations of rising obesity rates. It examines the numerous ways in which the contexts in which people live their lives promote an imbalance between energy intake and energy expenditure. Whilst this book will focus on the environmental or geographical explanations of the 'obesity epidemic', it will also demonstrate the necessity of multidisciplinary thinking in addressing the obesity epidemic. This edited collection draws on the expertise of researchers from a range of disciplines engaged in obesity-related research including geographers, nutritionists, epidemiologists, sociologists and public health researchers. We hope that this book will be of interest to researchers and policy makers in these fields and beyond.

*Structural Overview*

This volume comprises 15 chapters that are divided into six sections. The first section (Part I) provides an introduction and overview of the obesity issue, including a discussion of why a geographical approach to examining this public health issue is important. Parts II and III then consider the environmental aspects of the two sides of the energy balance equation: energy in and energy out. Various environmental issues from the global to local scales relevant to the emerging obesity epidemic will be discussed. Part IV provides a policy perspective by evaluating potential environmental interventions that could be targeted at addressing the rise in obesity prevalence. Once again this section is structured around the energy balance equation. In Part V, consideration is given to the research challenges for those working in the environmental determinants of obesity field. Discussion of the methodological and conceptual developments and concerns, approaches to measuring obesity-related characteristics of small areas, as well as an important critique of the predominantly quantitative work examining environmental determinants of obesity is provided. The final section (Part VI) draws all of this work together and suggests some future directions for geographical work on obesity.

*Part I: Introduction*

The first section provides the historical and theoretical context for the book. In Chapter 2, Popkin sets the scene by providing an historical perspective on the emerging obesity epidemic. Drawing on a wealth of personal experience, the chapter is framed in the context of the ‘nutrition transition’ whereby there has been a global shift from under-nutrition and hunger to obesity over the past three to four decades. Whilst the tendency in developed countries to consume more energy-dense foods (particularly fats, sugars, and processed foods), coupled with significant reductions in energy expenditure is well established, recently the same trends have been noted in developing countries such as India and China. As well as a detailed documentation of this transition, Popkin discusses the implications for the global health burden, particularly with regard to health outcomes such as diabetes, cardiovascular disease, asthma and cancer. Finally, the author provides a synthesis of the global drivers of obesity such as the increased availability of energy dense and sweetened food, as well as the shifts in physical activity at work and for travel and leisure. The implications of these macro-level changes on the health burden of obesity are considered.

In Chapter 3, Kim and Kawachi provide a theoretical overview of the literature on environmental determinants (or contextual effects) of obesity. In particular, the authors note that work has tended to focus on the ‘obesogenic’ (obesity promoting) or ‘leptogenic’ (encouraging healthy eating and physical activity) properties of local environments. Key theoretical frameworks for examining the environmental determinants of obesity, most notably the well established ANGELO (Analysis Grid for Environments Linked to Obesity) and the International Obesity Task Force

(IOTF) Work Group conceptual framework are outlined. Finally, the scene is set for subsequent chapters by providing a broad overview of the key environmental themes that are integral to considering obesity-related health outcomes. These themes include neighbourhood socioeconomic status, social capital, features of the built environment, as well as school-based characteristics.

### *Part II: Food Environment and Obesity*

International data on food consumption have shown a major shift towards the consumption of high energy food. The environmental factors at the broadest level that have shaped dietary intake in many countries are outlined in Chapter 4 by Hoek and McLean. The authors outline the political, social and economic factors that operate at a national- or international-level to influence dietary intake. Key issues that are discussed include: changes to global food production including its economic imperatives; the implications of targeted government subsidies for food production; the marketing of food that is high in fat, salt and sugar; and the political influence exercised by the food industry. Thornton and Kavanagh (Chapter 5) then shift the discussion from the international scale to factors at a more local level that are critical to the understanding of obesity prevalence. These authors provide a theoretical overview of the local food environment and the potential implications for obesity prevalence. The discussion includes a critical evaluation of neighbourhood (micro-level) factors such as neighbourhood access to food outlets, supermarkets, fast food outlets and advertisements, and the possible links to individual health and nutrition-related outcomes. In the final chapter of this section (Chapter 6), Walton and Signal focus on the critical issue of childhood obesity. They evaluate the environmental factors at a range of geographical scales that are pertinent to understanding the epidemic in childhood obesity. The chapter includes discussion of the trends in childhood obesity over time, the contemporary and future health significance of these changes, the role of the physical environments around schools, availability and quality of school meals, and children's food marketing budgets.

### *Part III: Physical Activity, Environment and Obesity*

In Part III of this edited collection, discussion switches from the food consumption (energy in) side of the energy balance equation to a consideration of the key environmental factors associated with physical activity (energy out). In the first section of the chapter (Chapter 7) Giles-Corti and colleagues present an overview of the changes to the physical environment at the broadest level, which in recent years that have had profound implications for physical activity and related health outcomes. This chapter critically discusses some of the key macro-level drivers of the worldwide reduction in physical activity levels. The themes that emerge include globalization, industrialization and mechanization and urban planning strategies.

Following on from the discussion of the broad macro-level determinants, Turrell considers key features of the local environment that influence physical activity-related health outcomes (Chapter 8). The author presents a systematic review of research evaluating the association between the physical activity environment and various health outcomes with a biologically plausible link. Consideration is given to environmental factors relating to the physical infrastructure (street connectivity, land use mix, residential density, walkability, opportunity structures, transportation, and aesthetics) as well key aspects of the neighbourhood social environment (crime and safety, incivilities, and social capital). Finally in this section, Oliver and Schofield examine aspects of the physical activity environment that specifically influence children's physical activity levels and obesity-related health outcomes (Chapter 9). Neighbourhood characteristics such as a local environment that is conducive to active transport and local access to recreational facilities are discussed. The important role that non-residential settings such as schools (e.g. through the curriculum or the physical design of buildings and layout of school grounds that encourage/discourage play) have in influencing physical activity levels among children is discussed.

#### *Part IV: Obesogenic Environments and the Policy Responses*

Previous sections of this book have described the emergence of the obesity epidemic and raised some important explanations at various scales from the global to the local for this international trend. In Part IV a range of potential policy responses are presented. In particular detailed critiques of a range of environmental interventions at various scales that could potentially influence firstly food consumption and secondly physical activity levels are provided. In Chapter 10, Giskes considers potential policy interventions to alter aspects of the food environment at different geographical levels to improve nutritional intake and address obesity levels. At the broad (international and national) level, policy interventions could include adjustments to agricultural subsidies and taxes which may influence the production and pricing of energy dense foods. Other approaches that warrant consideration include adopting food standard regulations which are aligned with public health nutrition regulations (e.g. maximum fat or sugar contents); targeting the labelling of food to clearly indicate nutritional content; and the subsidized distribution of food, particularly to geographically isolated populations. At a more local level, restrictions on food marketing (especially to children) and interventions to alter locational access to healthy or unhealthy food outlets may have efficacy.

The subsequent chapter evaluates environmental policy approaches designed to improve physical activity levels (Chapter 11). Riva and Curtis begin by establishing a clear need for action to modify environments so that they are more conducive to being physically active. After reviewing some key policy frameworks, the authors provide a review of the environmental interventions that are relevant to raising physical activity levels including active transportation and safe commuting as well as land use planning and design. Settings such as schools and workplaces, as well

as socioeconomic and informational environments are also reviewed. The chapter concludes by evaluating some of the important barriers to successful policy intervention at the environmental-level in the area of physical activity.

### *Part V: Future Research Challenges*

In the penultimate section of this book, attention turns to the key methodological and theoretical challenges faced by researchers with an interest in the environmental determinants of physical activity. The focus of this section is to outline important methodological developments from a range of disciplines that have considerable potential to advance this field of research. In Chapter 12, Moon details the technical and methodological challenges faced by researchers examining the influence of place-based factors on obesity-related health outcomes. Using a range of case studies, the author covers key methodological issues that can influence the establishment of causality in geographical studies of obesity such as self selection, collinearity and mobility. The chapter outlines some methodological and conceptual opportunities to researchers that have to date been under utilized in obesity-related research such as experimental studies, multilevel analysis and genomics. The following chapter also provides a range of cutting edge methods for advancing the obesity research agenda (Chapter 13). The focus of this chapter by Clarke and colleagues is on methods for measuring and representing obesity-related characteristics of small areas (often neighbourhoods). As previous chapters note, identifying and measuring components of the local food and physical activity environments is a key challenge for researchers. This chapter details a range of approaches to measuring features of neighbourhoods including locational access to resources such as food stores and greenspace, mixed land uses, walkability indices, and exposure to advertising. Innovative approaches for measuring these features will be outlined (e.g. Geographical Information Systems (GIS), Global Positioning Systems (GPS) and various audits/observational techniques). Technical concerns such as MAUP and spatial autocorrelation are briefly reviewed. The authors also present a novel approach to estimating the prevalence of obesity for small areas – microsimulation – an advance that has considerable theoretical and policy potential.

In the final chapter of this section (Chapter 14) Kearns provides a thought provoking overview of the obesity research agenda from a sociocultural perspective including the ‘rules’ governing obesogenic environments. Issues such as gender, age, ethnicity, traditions, and religion are considered. The chapter includes some international perspectives such as a case study of Pacific peoples in New Zealand. The chapter provides an important critique of the predominantly quantitative and reductionist work that has dominated the literature on the geography of obesity and provides some critical reflection for researchers in this field. There is a commentary on qualitative approaches to understanding these issues, including some suggested priorities for future lines of enquiry.

## Part VI: Conclusions

The final section (Chapter 15) draws the book together. A conclusion is provided that synthesizes some of the key environmental features that are pertinent to understanding and tackling the obesity epidemic. We finish by suggesting some research priorities for the future.

### Conclusion

The worldwide growth in obesity rates over the past few decades and the ensuing health, economic and social burden has firmly placed weight close to the top of the health agenda of most developed countries. Despite the actions of international agencies such as the WHO, a notable omission from the policy approaches in most of these countries is an explicit recognition that many characteristics of the environment are fundamentally important to understanding and addressing the obesity epidemic. Obesity-related policy initiatives continue to focus on altering individual behaviour, even though they are almost doomed to failure. The chapters in this volume review the evidence on the contributory role of environmental factors in the global increases in obesity rates, and in so doing highlight the inadequacy of policies and intervention strategies that do not extend beyond individual-level biological, behavioural, social and psychological factors. A wide range of factors at a multitude of geographical scales are examined including rapid globalisation and urbanisation, certain aspects of the 'built environment' such as the pervasive presence of fast food outlets selling energy-dense foods, as well as urban planning measures that promote car use and limit opportunities for walking and recreation. The evidence supports the conclusion that in combination these environmental changes have contributed to an increase in energy intake while at the same time sharply reducing the amount of energy we require for basic everyday activities.

This edited collection highlights some of the key ways in which environmental features are accounting for the rapid rise in global obesity prevalence. The book draws attention to the characteristics of the environment that are critical in determining the social distribution of obesity and its related health outcomes. Understanding which characteristics of the 'toxic' environment are pertinent has considerable potential for developing the theoretical understanding of obesity, as well as delivering successful policy interventions.

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