

Part I

Describing and Explaining Health in Geographical Settings

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Chapter 1

Introducing Geographies of Health

It is difficult to pick up a newspaper or magazine, or to listen to a television or radio broadcast without being alerted to a health “problem,” whether this be concerned with poor quality screening for a disease, timely access to care, a possible risk arising from environmental contamination, or lack of access to the basic resources needed to live a healthy life. We may find it hard to define what we mean when we say we are healthy – though perhaps easier to describe our feelings of being unwell – but “health” is something we all have, or have had. At the same time, we all live somewhere on the earth’s surface; most of us have homes, some have workplaces, others spend time at school or engaged in retirement activities. We occupy locations and, in the course of our lives, move from place to place. We all have our own “geographies” as well as our biographies.

We aim to convince you in the course of this book that our “health” and our “geographies” are inextricably linked. The screening we get for diseases will be available differentially from country to country or from one health region to another. Where you live affects the treatment you get. The risks arising from environmental contamination, be this poor air quality or polluted groundwater, are not uniform over space. If you live on a busy main road, very close to a source of electromagnetic radiation, or near a site disposing of hazardous waste, you may be more at risk of illness than others who do not. Where you live affects your risk of disease or ill-health and therefore your well-being. Access to basic resources, such as nutritious food, clean water, decent housing, and rewarding (and properly rewarded) employment is also geographically differentiated. Where you live affects how accessible or available are such resources. These relationships are further complicated if you experience any type of disability; typically, access to resources to enhance health and well-being are greatly hindered.

If you approach this book with a geographical imagination already well developed via other books or courses you will, we hope, find the statements above uncontroversial, though if you are new to geographies of health we intend to persuade you that the subject of “health” is a rich source of material that bears study by the geographer. If we can stimulate more of you to take up “geographies of health” as an area for further enquiry or research we will be delighted. But we hope, too, to interest other readers; those who come to the subject with a background in health research – perhaps public health, general practice,



or nursing – or another social or environmental science, and who are intrigued by what geographers might have to say on the subject.

To set the scene, we need to explain some basic ideas and concepts. For some readers (perhaps some geographers) we need to say something about health, illness, disease, and disability. These are high-level concepts which are far from unproblematic, but we will endeavor to say something about these in this first chapter so that some of the early material makes sense. For other readers (primarily non-geographers), we need to introduce some fundamental geographical principles and concepts.

Having laid some of this groundwork we want then to consider five case studies: examples of work we consider as part of geographies of health. Our purpose in describing these studies is two-fold. First, we wish at a very early stage to introduce some pieces of research in the geographies of health in order to capture the imagination. Second, we intend to use them in order to show something of the richness and diversity of geographical research on health. There are several contrasting approaches to “doing” geographies of health, and there is no single style of enquiry accepted by those working within this field. We shall not say very much in this chapter about these different styles, though we hope it will be clear from what we do say that the differences exist. Instead, we shall leave until Chapter 2 the task of explaining how these five studies differ, and we shall use other examples to show how there are, broadly speaking, five alternative modes of explanation within the geographies of health. It will emerge later that this classification is far from clear-cut, but it serves as a useful organizing device. It will also become clear from the rest of the book that by no means all approaches are widely used in studying the geographies of health. Nonetheless, we think it is essential at an early stage to set out different styles and approaches to understanding the geographies of health.

Health and Geography: Some Fundamental Concepts

This section considers some concepts needed for a basic understanding of “health” and of “geography.” They are examined separately – and in a real sense the remainder of the book represents an attempt to show the intimate connections between the two. Clearly, entire books are devoted to each; our aim is simply to provide some ideas that will aid the grasp of later material.

Concepts of health

Health has been defined in many ways. In 1957, the World Health Organization invited us to see health as more than simply the absence of disease; rather, “a state of complete physical, mental and social well-being” (World Health Organization, 1957). This ideal state does not, however, assist us very much since, according to the definition, most if not all of us are unhealthy at all times! We could instead take health to mean the availability of resources, both personal and societal, that help us achieve our individual potential. This is consistent with a more recent definition of health (Epp, 1986), stemming from the Ottawa Charter, where health is defined as a resource for everyday living that allows us to cope with, manage, and even change our environments. Alternatively, we might think of health as being physically and mentally “fit” and capable of functioning effectively for the good of the wider

society. Linked to this is the idea of health as personal or mental “strength,” fitness, or energy, or engaging in what we might think of as healthy behaviors or lifestyles (drinking alcohol in moderation, getting regular physical exercise). Further still, we could think of health as a commodity, to be given or lost, bought or sold; we “invest” in health perhaps by taking out private health care insurance, and lose it when we break a leg or become ill. Clearly, then, there are many ways to construct “health”.

Consider how you behave if you feel unwell. This might take the form of a headache or a sore throat. In the first instance you would possibly decide to manage this symptom yourself, perhaps by taking to bed or by self-medication using an over-the-counter remedy. If the symptoms persisted, or took a different form, you might consult a health professional: perhaps a nurse in a clinic, or a general physician. You do this because the symptoms represent a departure from your usual healthy state. You may be examined and tested for signs of some underlying pathology or disturbance in the body’s functioning. You experience some discomfort, some pain perhaps; you feel ill. *Illness*, then, is a subjective experience. The health professional, however, is concerned to offer a diagnosis; to “identify the specific underlying pathology in the patient’s body that is producing the signs and symptoms, distinguish it reliably from other possible diagnoses, and label it correctly with the name of a medically recognized *disease*” (Davey and Seale, 1996: 9). Put simply, people suffer illnesses, while doctors diagnose diseases. The doctor or physician wishes, then, to cure the patient of the disease; the patient will, of course, wish to be cured of any disease, but also wants to be freed from feeling ill.

Disease and illness may or may not be associated, in that it is perfectly possible to feel ill without there being any detectable biological abnormality, while the person who has been diagnosed with such an abnormality might feel quite well. For example, those who are debilitated by a feeling of complete lethargy may find that a health professional is unable to detect any obvious “cause” (and hence conditions such as myalgic encephalomyelitis, or ME – also known as chronic fatigue syndrome – may go unrecognized by doctors; it may be a condition they are not prepared to diagnose; see Clauw et al., 2003 and Krieger et al., 2005 for an extended discussion). Equally, a middle-aged man who visits his general physician for a health check-up may be feeling well but is diagnosed with high blood pressure; he arrives as a healthy person and leaves as a patient (Seale and Pattison, 1994: 16).

Since the absence of health is perhaps easier to grasp than health itself it is no surprise that we find it easier to collect data on disease and illness. Further, we find it easier in principle to “measure” disease, since we can observe and record numbers of people with a particular cancer or heart disease while, for example, illness, as a subjective experience may need recording in other ways, as we see later. We call the study of disease in populations *epidemiology*, and a substantial body of material in this book could be labeled “geographical epidemiology:” the study of how disease is distributed in geographical space. Epidemiologists focus on *mortality* (death) and its causes, or on *morbidity* (sickness, which can include both disease and illness). Almost always we find it sensible to calculate mortality or morbidity rates, since this allows for comparisons between populations. We also usually compute *age-standardized rates*, thus controlling for the age structure of a population; knowing that the crude (not age-adjusted) death rate in one place is twice as high as elsewhere carries little information if we also know that there are many more older people living there. Adjustment for age structure yields so-called *Standardized Mortality Ratios*, allowing for comparisons between places that have contrasting age compositions (see Box 1.1).

Box 1.1 Standardized mortality ratios

Frequently, we wish to make comparisons of death rates between different places, but we need to allow for the fact that one area (such as a retirement community) might have an older population than another. Since older people are more likely to die than younger people we need to ask whether the pattern of deaths in one area is independent of its age composition. We therefore “standardize” mortality rates. Such standardization is usually done by agegroup where, for each areal unit, we predict or “expect” a particular number of deaths in different age categories, based on the distribution of the population by age in that area and the age-specific rates of death or disease in some wider (or “standard”) population. We then calculate the ratio of observed to expected deaths, multiplying by 100. A value of 100 indicates that the death rate in an area is the same as that over a wider region (perhaps the country as a whole), a value greater than 100 suggests mortality is elevated even allowing for population structure, and a value less than 100 suggests it is reduced. Formulae are available that allow us to assess the extent to which values in excess of 100 are significantly elevated.

This method is known as *indirect* standardization and is useful in making comparisons between areas. The same principles apply to morbidity data, in which case we speak of standardized incidence ratios. We may then map standardized mortality (or morbidity) rates across the study area, though this is not without problems, as we see in Chapter 3.

Some authors use *direct* standardization, essentially the reverse of indirect standardization. The age-specific death rates for an area of interest are applied to the numbers of people in age groups of a standard population, giving the number of deaths expected in the standard population if the death rates in the area had applied. An age-standardized death rate for the area of interest may then be calculated. See McConway (1994: 90–1) for further details, including a worked example of an indirectly standardized SMR.

Mortality data in the developed world come from death certificates, which also specify cause of death; this may be far from easy to establish, particularly among the elderly. Moreover, mortality is a drastic measure of ill-health! Many illnesses and diseases cause a burden to the sufferer, as well as impacts on health care systems, without leading to death. As a result, health researchers often collect morbidity data, via a number of possible routes. These can include one-off patient surveys, or data from hospital consultations or emergency room visits. We shall encounter studies based on these sources at various points during the course of this book. Such data permit the estimation of an *incidence rate*, the number of new cases occurring within a given time interval expressed as a proportion of the number of people at risk from the disease. Alternatively, we can estimate *prevalence*, the number of people with the disease or illness at any one point in time.

Without attempting here a comprehensive classification of disease, we need to draw a distinction between different broad categories. In particular, we need to distinguish between *chronic* and *acute* diseases or disease episodes. Chronic diseases are those such as heart disease and diabetes, which may be long-lasting and even life-long, while acute diseases are those such as myocardial infarction (heart attack), sudden stroke, or appendicitis: conditions that start abruptly, last perhaps for only a few days and then settle, though perhaps developing into chronic conditions or leading to death. Those suffering from a disease such as asthma may experience it in both a chronic and acute form, able to manage it themselves

on a long-term basis but perhaps requiring hospital admission if they have a sudden acute attack. *Infectious* diseases (such as measles, influenza, and tuberculosis) are those caused by organisms that can spread directly from one person to another.

If someone is restricted in some way from general physical or mental functioning, we can speak of *impairment*. For example, chronic respiratory disease may limit one's ability to negotiate stairs, while visual impairment varies from the quite mild (short-sightedness) to the most severe (blindness). Others whose impairment confines them to a wheelchair are disadvantaged by social attitudes or poorly designed environments and buildings as well as by the cause of their impairment. Some authors (for example, Gleeson, 1999; Thomas, 1999) prefer to make a formal distinction between "impairment" and "disability," arguing that the former refers to some defective or missing body part while the latter is a socially or culturally constructed form of exclusion. What this means is that at different periods in human history, or in different geographical settings, the same physical or mental impairments might be regarded quite differently by the wider societies. For example, Gleeson (1999) suggests that in feudal societies impairment was not uncommon, but that the treatment of such individuals as "disabled" only emerged with the rise of capitalism: "Within the complex, layered dependencies which constituted feudal village life, physically impaired people were not isolated as 'social dependants' – this abject identity was a construction of the capitalist social order" (Gleeson, 1999: 97). Even in contemporary Western society many of those who are impaired may be oppressed in just the same way as other minority groups whose faces (or bodies) do not "fit." Chouinard and Crooks (2003), for example, profile the hardships associated with being a "disabled" academic. Wilton (2004a) articulates how newly emerging flexible work environments impact differentially on disabled people engaged in paid work. Health geographers (for example, Driedger et al., 2004) have contributed to our understanding of how space and place shape the experiences of those experiencing impairment as a result of chronic illness, while at the same time reminding academics of their obligations to their research participants, ensuring that we are sensitive to, and empower, those participating in our research endeavors (Valentine, 2003).

We saw earlier how illness may trigger a visit to a general physician or other health professional engaged in "primary" care. The diagnosis may call for a referral to other, more specialized health professionals, usually in a hospital-based setting (the "secondary" sector), or even for very specialized care (perhaps complex surgery) in the "tertiary" sector. But this possible sequence of care is very much a traditional western model. *Complementary* (or alternative) medicine has grown rapidly in some western countries, however, and some health care will be delivered by practitioners such as osteopaths, acupuncturists, and homeopaths; for some of these groups, treating the person rather than the disease takes priority. Geographers are beginning to map how the use of such complementary medicine varies from place to place, and why (Verheij et al., 1999; Wiles and Rosenberg, 2001). In the non-western world, "*traditional*" medicine is the norm. Like complementary medicine, this emphasizes the links between mind and body in a holistic approach to illness and disease. Among a variety of such perspectives is Ayurvedic medicine, practiced among Hindus in India for over 2000 years. In common with other traditional forms, this emphasizes the necessary balance between three primary "humors," with therapies involving changes in lifestyle and diet, use of herbal remedies, and meditation (Seale and Pattison, 1994: 18–21). The integration of traditional and western health care among Aboriginal peoples of the world has also been studied (Hunter et al., 2006).

Geographical concepts

We want to begin this brief exploration of some geographical concepts by considering *location*. We shall take location to mean a fixed point or geographic area on the earth's surface, somewhere that can be pinpointed by using a pair of locational coordinates. These coordinates are often latitude and longitude; for example, 51.17°N, 30.15°E refers to a location about 51 degrees north of the equator and 30 degrees east of the Greenwich meridian, while the location 23.16°N, 77.24°E is closer to the equator and further east. At a more local or regional scale it is more conventional to use a coordinate-referencing scheme specified by a national mapping agency. For example, the Ordnance Survey in Britain uses a pair of coordinates (or "grid reference") known as "eastings" and "northings." The grid reference (348211, 458826) thus identifies a unique location in Britain, and has a precision of 1 metre. Of course, few of us use such locational identifiers in our daily lives; instead, we refer to a location using an address. Such an address, when containing a postal code of some sort (known as a postcode in the UK and Canada, or a zip code in the USA, for example), turns out to be extremely valuable to a geographer, since there may be computer-based "look-up" tables that link such postal codes to the coordinates described earlier. The uses to which this may be put are considered in Chapter 3.

What we mean by a "location" does, of course, depend on whether we are looking at health or disease in the world as a whole, or perhaps within a region. For example, if we wished to look at the way disease might be spread via air travel it would be useful to define a set of locations as the set of major cities connected via air networks. But at a regional level it would make little sense to treat Beijing or Paris as a single "point" location.

Locations, then, are points or areas on the earth's surface; they do not seem to *mean* very much. However, your own home, which has an address (a location), may mean a great deal to you. A favorite theatre, or sports stadium, or woodland, or town, all identifiable locations, may well mean something to you. And if we tell you that the locations 23.16°N, 77.24°E and 51.17°N, 30.15°E, referred to above, identify Bhopal and Chernobyl, respectively, then both were etched forever on our collective consciousness as the sites of devastating industrial explosions in 1984 and 1986. Once named or labeled, these locations become *places*. Locations become places when they are charged with meaning. Until the explosions, these places were, for many of us, simply dots on a map – locations – though for those living there they had always been places. We consider the Bhopal explosion further in Chapter 7.

Places, like locations, can refer to very small areas, or be of quite vast extent. Your grandfather's favorite chair, positioned to observe daily life outside the living room window, may mean a great deal to him and contribute significantly to his mental well-being; for him, it is a place. For others, particular buildings will be of enormous importance. Some stories appearing in the media, to which we referred earlier, focus on the possible closure of hospitals, and while some will object to a consequent reduction in access to health care, for others it is the symbolic quality of the institution or building that matters as much. For others still, small neighborhoods are foci of meaning, and proposals or action to alter their character, for example by locating a noxious facility in their midst, will provoke opposition among those who fear it carries a health risk. More broadly, people develop attachments to places that may be cities or regions, as well as to nation states.

Places may be good or bad for health – indeed, this is a major theme running through this book. In some cases, as in the opposition to a noxious facility, the public perception

of risk may be as important as any measurable impact on morbidity. As we shall see in Chapter 4, those places which are impoverished in terms of access to health-promoting resources, such as leisure and recreation facilities, will not be associated with good health to the extent that resource-rich neighborhoods are. Moreover, what happens in one place may have negative, even drastic, consequences for those living both nearby and at a considerable distance. Such “externality effects” are illustrated by the impact on health of those living downwind of a major chemical installation or in “Cancer Alley”, the 87-mile section of the Mississippi River between Baton Rouge and New Orleans, the location of what is arguably the largest concentration of petrochemical industries in the world (Rosner and Markowitz, 2002), or, more dramatically and over much greater distances, by the Chernobyl explosion. Conversely, other places and landscapes are considered to be beneficial to health; they are *therapeutic landscapes* (see Box 1.2). For ordinary, “lay” people free of any disease, however, there will be other, much more anonymous places where we feel close to nature, where we feel secure, and with which we identify; in short, where we feel “well.”

Box 1.2 Therapeutic landscapes

“Therapeutic landscapes are places that have achieved lasting reputations for providing physical, mental, and spiritual healing” (Kearns and Gesler, 1998: 8). According to Wil Gesler, the geographer who first developed the concept, these reputations might be built on the qualities of the physical environment, such as a source of water or a distinctive piece of topography. Or, they may rest on the qualities of buildings, such as temples. But such therapeutic properties are socially or culturally constructed. People might seek out such places in order to be “cured” of a chronic disease, perhaps, or to hope for an improvement in well-being.

Gesler’s own early examples include: the sanctuaries first established in classical Greece (at Epidaurus, for example: see Gesler, 1993); spa towns (such as Bath in England: Gesler, 1998) based on the perceived healing qualities of local springs; or sites of deep religious significance (such as Lourdes for Catholics and other Christians: Gesler, 1996). Different people “see” these sites in different ways and at different times; for example, some claim genuine healing powers for spa waters, while for others a spa town may be simply a brief stop on a vacation. Even those who are inspired by a piece of landscape, but do not necessarily gain therapeutically from it, may notice an improvement in their mental health. Further, depending on the circumstances and our mood, even rather ordinary or everyday landscapes may contribute to well-being. For example, Milligan and her colleagues (2004) found the concept of value in interpreting the use of allotments (community gardens) by older adults. Wilson (2003) has sought to extend the concept to an understanding of health and identity among First Nations peoples in northern Ontario. As she points out, the relationship between health and place for such people is an intimate one. Moreover, therapeutic landscapes are not necessarily physically located; rather, the way of life of the Anishinabek peoples she studied their use of the land for hunting and fishing and its direct contribution to health (nutrition) is connected spiritually as well as materially to the land. Other researchers, such as Wilton and DeVerteuil (2006) take a critical look at the concept of therapeutic landscapes, arguing that in some circumstances we need to recognize the differential power relations that shape health behaviors in particular settings.

For further details, examples, and overviews, see Curtis (2004: Chapter 2) and Williams (2007).

Attachment to places for some may mean separation for others. As Cornwell (whose work we examine more fully in the next chapter) notes, “where there is belonging, there is also not belonging, and where there is inclusion, there is also exclusion” (Cornwell, 1984: 53). Those “attached” to a place may object if others wish to attach themselves to it, especially if they are a different color. At the extreme, this can have severe “health” consequences for those on the receiving end of violence directed towards the “other,” those whose faces are “out of place.” What this means is that places, and how we identify with them, are not simply a matter of subjective experience; “rather, such feelings and meanings are shaped in large part by the social, cultural and economic circumstances in which individuals find themselves” (Rose, 1995). This indicates that there is a danger in romanticizing the notion of a sense of place. As Mohan (1998: 120) observes, “sense of place has most often and most strongly been associated with economic adversity – for instance, the instinctive collectivism of communities suffering the excesses of capitalist industrialization, such as mining settlements.” Is, he asks, “the implication really that one should celebrate such conditions?” For plenty of people places are health-damaging (often in the sense of being a locus of unemployment) rather than health-promoting, and typically those with adequate resources are more likely to find themselves in the latter.

As we shall see later, geographers may choose to study health in a particular place, or they may want to make comparisons between places and study health events and outcomes in a set of places. If the latter is important they will frequently want to consider and measure the *distance* that separates places. How far are people from those facilities delivering health care? How far are people from a possible source of pollution, such as a smelter? Over what distances do diseases spread? We have already seen that locations can be pinpointed in an absolute sense; but, as these examples make clear, we will often need to look at where places are located in relation to other places (“relative location”). Distance, then, is something which relates one place (or location) to another. It is perhaps *the* fundamental concept in geography. How is it measured? An obvious and important measure is the physical distance separating one location from another on the earth’s surface. If measuring the distance from Chernobyl to Kiruna in northern Sweden we shall need to take into account the earth’s curvature to do this; however, if looking at distances between the home locations of those stricken in a city by an infectious disease we could safely ignore this curvature and measure straight-line (“Euclidean”) distance. It is worth pointing out that there are other concepts of distance that may be significant in a health context. We can think of spatial separation in terms of travel time, for example, or travel cost, or people’s estimates of such separation (“cognitive distance”), or the social distance that separates them (in terms of class, income or lifestyle, perhaps) from their neighbors. Measuring distances between areal units (such as health regions, counties, or catchment areas, for example) creates special problems. Sometimes we can measure straight-line distances between the centers of such zones; often we are only interested in whether one zone is adjacent, or connected, to another zone and in this case simple contiguity or adjacency serves as a measure of distance.

We have already made oblique reference to it, but we want now to introduce formally the concept of spatial *scale*. This, too, is quite fundamental to what follows, since while health is a property of the individual we can aggregate health events for those living in a neighborhood, city, region, or country, in order to estimate disease rates for a set of such units. We might then choose to study disease incidence in a city, or make comparisons between rates for all countries in Europe, for example. We may find that factors that explain

variations in disease incidence at one scale may be quite unimportant at another. For instance, international variations may be a function of how much expenditure on health care is committed by governments, or even by differences in diagnostic or recording methods, while variations from place to place within a small region may be explicable by an environmental factor. Equally, the kinds of events that impact upon our health may operate at different scales. Local contamination of a groundwater source may have consequences for those living in a quite restricted area, while (as noted already) a catastrophic nuclear explosion may have an impact across continents. On a very different scale the quality of social relations within the home will have impacts on the health of its occupants. We shall see in what follows, therefore, that geographers span a wide range of spatial scales in studying health and disease.

Although geographers concern themselves fundamentally with spatial concepts we should not neglect to mention the importance of *time*. This is because while locations remain fixed over time (if we ignore the continental drift that takes place over geological time!) places do not. Those which are inhabited may gain or lose population, with possible health impacts. Chernobyl has been a place for as long as humans have inhabited it, though one could argue that for most of us it carried little or no significance until 1986. And time-scale matters as much as spatial scale; we may choose to study the health consequences of catastrophic, extreme events such as earthquakes or the tidal waves or *tsunami* that devastate Pacific coasts, most dramatically in late 2004 (Wickrama and Kaspar, 2007), or major floods, such as that which devastated New Orleans in 2005. Alternatively, we may concern ourselves more with the impacts of longer-term changes, such as global environmental change (discussed in Chapter 9). Climate affects health over different time-scales; daily hospital admissions for asthma may be elevated by climate events such as thunderstorms the day before, while seasonal change brings marked mood swings in some people (“seasonal affective disorder”).

Places may be good or bad for health at different times and over different time-scales. We may, for example, be exposed to particular sources of environmental contamination at different periods of our lives, depending perhaps upon where we live and the work we do. Our “life courses” will have a major bearing on our health, and we cannot neglect the influence of our migration histories on health outcomes; indeed, Chapter 6 is devoted to this theme. Further, our health is affected by what happens to us as we move around during our daily lives, perhaps being exposed to air pollution from motor vehicles as we commute to work, to a risk of accidents in some occupations, or maybe to overt or verbal violence in domestic settings. We shall consider one way of conceptualizing the role of time in the next chapter (see pp. ••–••).

While places may change over time in observable, measurable ways, it is important to note, too, that our *experience* of, or *beliefs* about, them may change too. The marshlands of south-east England and other parts of Britain were considered very unhealthy 200 years ago, because of the risk of malaria (literally, “bad air;” see Dobson, 1997) while south-east England now carries a reputation as one of the healthier parts of the country. Moreover, our experience of time changes through our lives. This, too, may affect our psychological well-being. But this experience of place also changes over very short time-scales; for example, we might feel entirely safe walking through a park during the day, yet quite threatened at night-time. The location remains the same, but the “place” changes character dramatically during 24 hours. One’s fear of crime can have a very real impact on health

and well-being. Further, our access to health services changes over time. We may live next door to a health center, but if it is closed for the weekend we may well have to travel much further for immediate attention, while if it closes permanently because of health service restructuring there will be longer-term impacts on access to services.

Places may also be thought of as social settings or social environments; we are literally surrounded, or “enviored” by other people and features of the landscape. However, we also think of *environment* in the sense of the physical world and how it impacts upon us. Climate affects health, in both a direct and indirect sense, as we shall see in Chapter 9, while in earlier chapters we look at the impacts of environmental degradation, both of air and water, on health. Even the local geology can have health impacts. For example, goitre (an enlarged thyroid, resulting in severe swelling of the neck) in areas such as south-central Sri Lanka is thought to be due in part to low levels of iodine in water and soils (Dissanayake and Chandrajith, 1996).

The physical environment figures prominently in a branch of the geography of health known as *disease ecology*. Here, the argument is that one cannot understand the distribution of a disease, particularly an infectious or parasitic disease, without knowing about its relationship to local and regional ecologies – the interactions between topography, climate, water, soils, plants, and animals. Various examples of an ecological approach figure in this book, of which malaria is a good example, since we require data on particular configurations of rainfall and temperature, as well as knowledge of animal (mosquito) and human behaviors, to predict its spatial distribution. Yet the environment has impacts on health in much more subtle ways. A case can be made for suggesting that loss of biodiversity, and the despoiling of landscapes, has a negative impact on well-being. Those who derive mental health from the enjoyment of particular landscapes may well find that others’ modification of such landscapes in an environmentally insensitive way causes genuine, albeit hard-to-measure, ill-health. Modern public health sees the environment as social and psychological, not merely as physical. In this sense, then, “environment” and “place” converge to provide a spatial context for health that transcends the individual’s own behavior and health outcomes.

Geographies of Health: Five Case Studies

Having set out some key ideas and concepts, we want to add some color by illustrating some work that we take to be representative of the rich variety of the geographies of health.

Asthma in New York

Consider, first, a study of the geographical epidemiology of asthma among children in New York City (Corburn et al., 2006). Asthma is a chronic disease characterized by a narrowing of the airways that results in mild to severe wheezing and/or loss of breath, causing death in its most severe form. It is a relatively common disease among children, particularly in the developed world (prevalence is around 10%). In New York City, one in six children are thought to show symptoms of asthma and the condition is the major cause of school

absenteeism, hospitalization, and visits to emergency rooms. Corburn and his colleagues sought in this study both to *describe* how patterns of asthma hospitalization vary across the city, and to *explain* or interpret such patterns in terms of the social and environmental characteristics of neighborhoods within the city.

The authors had data for 2016 census tracts in New York City. Such data included: asthma hospitalization rates (between 1997 and 2000); median household income; the percentage of the population classified as Latino and African-American; and the percentage of housing classified as dilapidated (all data from the 2000 census). The authors also included data on the density of air polluting facilities as well as truck routes, again for each of the census tracts.

Asthma “hotspots” in this study were defined as contiguous (adjacent) census tracts where the hospitalization rate was significantly greater than expected, given the population of children. To define such hotspots the authors used a “spatial scan statistic”, a method of identifying clusters that has become widely adopted; we describe the method in Chapter 3 (pp. ••–••). These hotspots can then be mapped; in so doing, we observe four such clusters, with particularly high rates in central and east Harlem (see Figure 1.1). The hospitalization rate here is 18.4 per 1000 children, about three times the rate elsewhere in the city. Residents in hotspots are five times as likely to be living in public housing compared with those outside hotspots, and three times as likely to be in dilapidated housing. The relations between asthma rates and other variables were examined using correlation coefficients (see Box 1.3). For example, within census tracts in east/central Harlem there is a strong negative correlation [minus sign](-0.81) between asthma rates and median household income, and a strong positive correlation (0.73) with dilapidated housing, but a lower correlation (0.12) with the density of truck routes.

This study is a good example of scientific investigation in health geography. It begins by assembling a set of numeric data, both on the health problem and the variables (covariates) hypothesized to be related to that problem. It maps the health data, but goes beyond simple mapping by identifying areas with elevated disease rates, using statistical methods of spatial data analysis. The research then examines the environmental and social characteristics of those areas with higher than expected rates (hotspots), using simple correlation analysis to see whether hospitalization rates are associated with particular socio-economic variables and markers of outdoor air pollution. Last, like many similar studies, it has in mind potential applications to public (health) policy; specifically, the aspiration is to use geographical intelligence as a basis for directing limited public health resources at particular neighborhoods. Rather than distribute scarce resources (people and money) across New York City, are we not better off targeting those neighborhoods most at risk, and hence most in need?

This study makes a contribution to our understanding of asthma epidemiology. But, like any piece of research, there are limitations. First, it is frequently the case that we have to rely on data that are already available, unless we have the means to collect our own. Second, hospitalization data represent only the most extreme cases of asthma. There will be a sizeable proportion of the child population who self-medicate, or are managed by a family doctor (physician). Next, given this study was undertaken in the USA, we also have to take into account that there is not universal access to health care. So we have to assume – perhaps heroically that the data we have are an unbiased subset of overall asthma incidence.

The study relies on aggregated, rather than individual or household, data. As the authors acknowledge, there is plenty of evidence linking asthma to more direct markers of indoor

Legend

Asthma Hospitalization Rates*

- 6–12
- 13–18
- 19–24
- >24

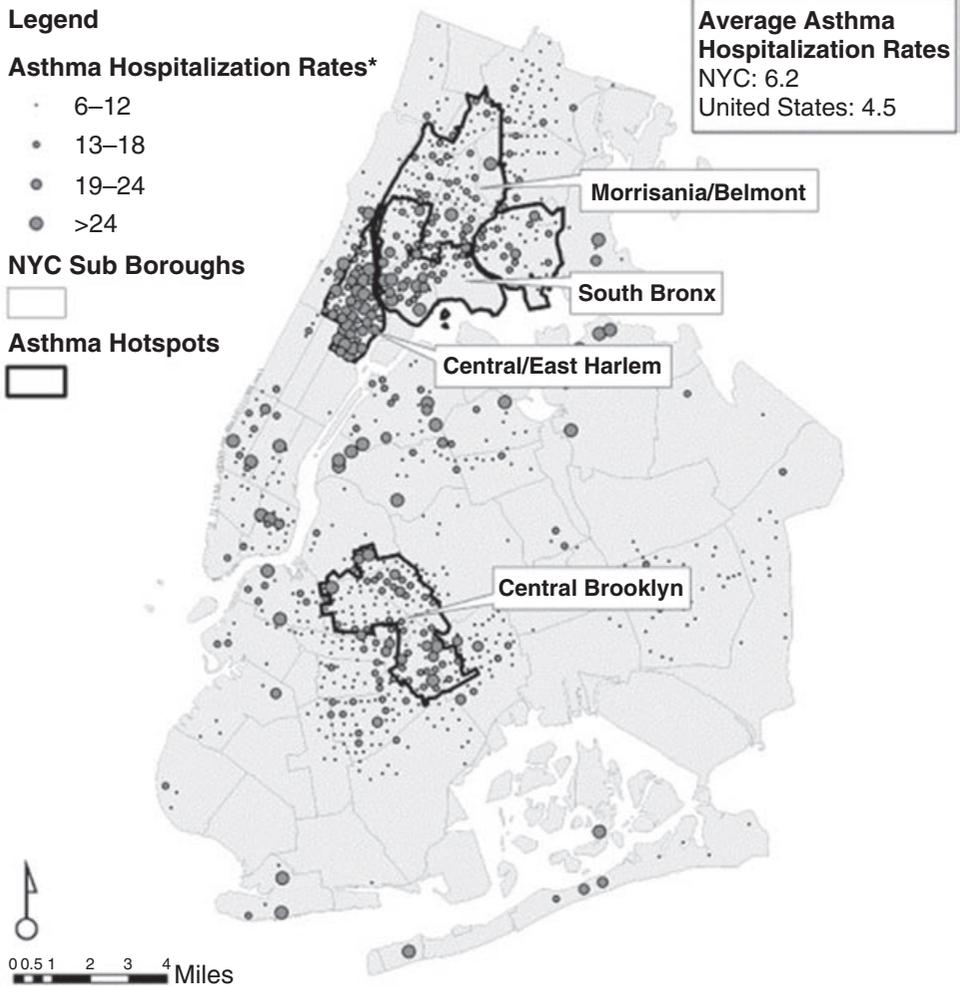
NYC Sub Boroughs



Asthma Hotspots



Average Asthma Hospitalization Rates
NYC: 6.2
United States: 4.5



*** Hospitalizations per 1000 persons under the age of 14**

Sources: New York State Department of Health (1996–2000), Statewide Planning and Research Cooperative as cited in infoshare (<http://www.infoshare.org>).

Figure 1.1 Neighborhood asthma hotspots in New York City

Source: Corburn, J., Osleeb, J. and Porter, M. (2006) Urban asthma and the neighborhood environment in New York City, *Health & Place*, 12, 167–79; reproduced with kind permission of Elsevier Science.

Box 1.3 Correlation and regression analysis

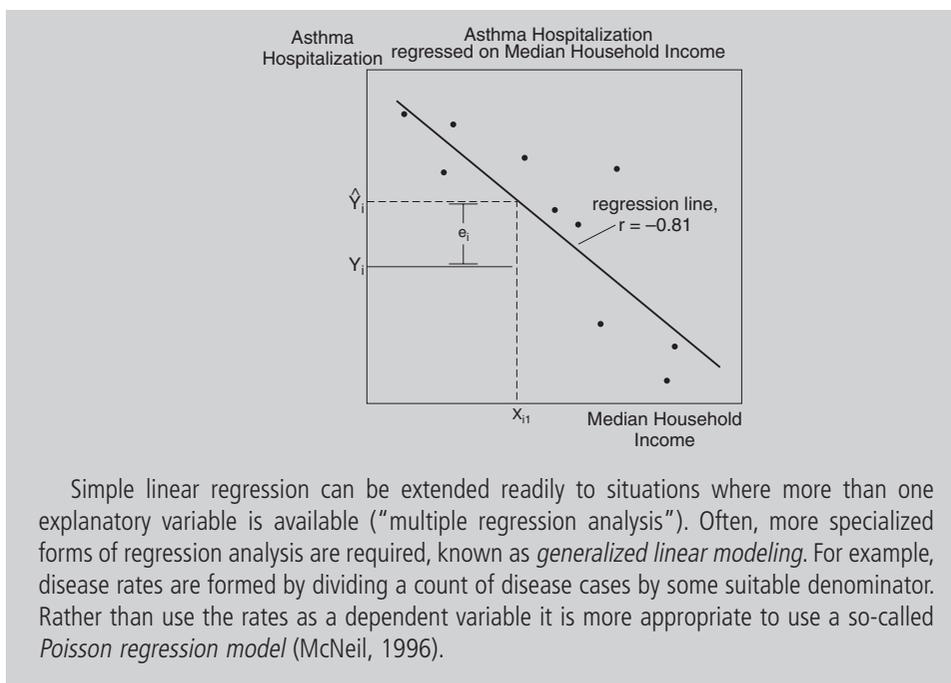
Correlation analysis looks at the association (correlation) between a pair of variables. Following Corburn and colleagues' example, we have a table or data matrix of variables, as follows. For example, X_{21} represents the known median household income in census tract 2.

Census tract	Y (asthma hospitalization)	X_1 (Median household income)	X_2 (Dilapidated housing)
1	Y_1	X_{11}	X_{12}
2	Y_2	X_{21}	X_{22}

Each observation, a census tract in the New York City example, may be represented as a point on a graph (the set of points forming a "scatterplot"), as the diagram suggests. We may then compute a correlation coefficient which represents the degree of association between the two variables. As noted in the text, the correlation between Y (asthma) and X_1 (income) is negative; simply put, in those census tracts with higher income, the asthma hospitalization rate is lower. The correlation between Y and X_2 is positive; census tracts with higher proportions of dilapidated housing tend to have higher asthma rates. A correlation coefficient varies from [minus sign]–1.0 (perfect negative correlation), through 0 (no correlation) to [positive sign] +1.0 (perfect positive correlation).

Regression analysis (not used by Corburn and his colleagues) is a widely used statistical method that seeks to use one or more explanatory variables (sometimes called "independent" variables or "covariates") to account for variation in a response variable ("dependent" variable). It seeks to draw a line through the scatterplot that passes as close to the points as possible. The slope of this line (the regression coefficient) shows how Y varies with X; specifically, how a unit change in X produces a unit increase in Y. This might be positive (as X increases, Y increases too) or negative (as X increases, Y decreases). The extent to which the data points cluster round the regression line is measured by the correlation coefficient described above. The square of the correlation coefficient represents the proportion of the variation in Y that is "explained" by X.

The regression line has two parameters, its slope and intercept (the value of Y that is predicted when X is zero). For any observed value of X we can consider two accompanying values of Y: the observed value (Y_i), and that predicted by the regression model (\hat{Y}_i). As the graph makes clear, some data points are poorly predicted by the regression line; that is, the observed and predicted values of Y are very different. The difference between the observed Y value and its predicted value is called a regression "residual" (e_i). Observations lying above the regression line are positive residuals (observed minus expected Y is greater than zero), while those below the line are negative residuals.



air quality, whether exposure to environmental tobacco smoke or to allergens associated with mold, dust, and dampness. We often encounter studies that do not, or cannot, collect direct measures of exposure; instead, they rely on surrogate information. Here, for example, data on the condition of public housing were used as a marker for the likely presence of factors that trigger asthma. Many classical epidemiological studies collect individual, rather than aggregated (sometimes called "ecological") data; in that situation we have the ability to assess directly what factors distinguish individuals with the disease ("cases") from those without ("controls"). In Chapter 3 we shall discuss a method that allows us to look both at individual effects *and* at neighborhood-level factors.

Area effects on smoking in disadvantaged communities in Glasgow

Smoking is a primary risk factor for chronic diseases such as lung cancer, diabetes and cardiovascular disease. Health geographers are interested in how smoking behaviors and their determinants vary from area to area. Stead et al. (2001) have conducted fieldwork in disadvantaged communities in Glasgow, Scotland, to explore possible geographical influences on smoking patterns. As we see in Chapter 4, there is increasing evidence that residence in a disadvantaged area can have effects on ill-health, independent of individual characteristics such as income, education or employment. There are several reasons for this – not least of which is the fact that disadvantaged communities have fewer amenities that are beneficial to health, such as good housing, access to shops with healthy foods, leisure and recreation facilities, and employment opportunities. Further, living in a disadvantaged

area also tends to bring increased exposure to stresses produced by higher crime rates, violence and general incivilities. All of this is underscored by the feelings of social exclusion that often accompany living in a disadvantaged community. Data indicate that while, nationally, smoking rates in Canada, the USA and the UK are decreasing, levels of smoking among lower income groups remain constant, as do the amounts of tobacco consumed. The literature indicates several explanations for this pattern of tobacco use: economic insecurity; education; isolation and stress; poorer psychological health; and deliberate targeting of low income groups by the tobacco industry. Stead and colleagues are interested “particularly in the ways in which smoking might be fostered (and smoking cessation hindered) by residence in communities excluded economically, culturally and physically from mainstream society” (Stead et al., 2001: 334). But instead of collecting quantitative data the authors collect qualitative data from focus groups (described in Chapter 3), comprising individuals living in disadvantaged communities. In their respondents’ own words (and preserving the distinctive dialect):

Ah’d take my kids an’ get away if ah could. Because o’ the drugs an that kind o’ thing (male respondent, 18–24 years).

Lost a job, and you’re unemployed, and you’re just sitting there – it’s [smoking] some-thin’ tae do (male, 18–24 years).

Other themes emerging from the focus group discussions include pro-smoking community norms, limited experience of environments that encourage cessation, and cumulative barriers to successful cessation. Again as their data suggest:

Ma Maw used to buy me fags so ah woudnae smoke a’ hers (female, 18–24 years).

When we were at school there were plenty o’ jobs, then Maggie [reference to a former Prime Minister of Britain, Margaret Thatcher] come along and took all the steel works away . . . We would all like to stop [smoking] but we know we cannae. No incentive. No will power (male, 25–44 years).

It is ma only pleasure. Aye, an’ it is hard [to stop] (female, 25–44 years).

The final set of themes that emerge relate to isolation from wider social norms and the role that smoking in these communities plays in fostering social participation and belonging:

I think when people ask you where you come from and you say Possilpark, they think you are going to stab them . . . they think you are a pure criminal, or you’re scum or a junkie or something (female, 19–24 years).

You [can] always tap money for a packet of fags (female, 25–44 years).

Stead and colleagues conclude that in these disadvantaged communities “smoking appears to act not only as a means of coping with stress and exclusion but also as a means of expressing identification and belonging. The collective aspects of smoking – sharing, lending and borrowing cigarettes – provide a means of giving and receiving support, and

arguably help bind people together” (Stead et al., 2001: 341). Their research illustrates not only the role of place on health (and unhealthy behaviors), but also the relevance of the beliefs of ordinary people living in particular places. The aim is to understand a health issue from the standpoint of those directly involved, out of which may emerge more effective health promotion strategies. By not opting for a large-scale survey of numerous families, but rather for in-depth discussions with a small sample, their view is that this method is likely to be productive in uncovering the psychosocial factors involved in shaping health in these particular neighborhoods.

The changing political economy of sex in South Africa

AIDS (Acquired Immune Deficiency Syndrome) results from infection by the Human Immunodeficiency Virus (HIV) and has been an epidemic almost unparalleled in human history, such that over 33 million people were living with HIV/AIDS across the globe in 2007, and 2.1 million deaths from AIDS were recorded that year. Yet this global figure masks huge variations from place to place, with the vast majority of those infected living in sub-Saharan Africa. Recent estimates (from *avert.org*, an international AIDS charity) indicate that the prevalence rate of HIV infection among women in their late twenties in South Africa is 33.3%, while for men aged 30–39 years it is 23.3%; in other words, over a third of women under the age of 30 are thought to be infected, and almost a quarter of men in their thirties. What factors explain these high rates, and how have both the rates and the causal factors changed in the years since the end of apartheid? These are questions posed by Hunter (2007). Hunter’s explanations lie in three sets of factors: “rising unemployment and social inequalities, dramatically reduced marital rates, and the extensive geographical movement of women as well as men in contemporary South Africa” (Hunter, 2007: 690). He points to very high HIV rates in informal settlements, characterized by a population that is black African, young, unmarried, and lacking in secure employment. These informal settlements are “spaces of poverty and sex exchanges” (Hunter, 2007: 696).

Unpacking the three explanatory factors further, Hunter suggests that the number of economically active (potentially employable) women searching for work increased by 2 million between 1995 and 1999; those women who did find jobs were “pushed into poorly remunerated and highly unstable informal work; consequently, women’s median income fell sharply in the post-apartheid period” (Hunter, 2007: 694). Social inequalities have increased markedly. Second, far fewer women are marrying and relationships are more unstable. In 1970 about half of all Africans over the age of 15 years were married, but this had dropped to 30% in 2001; marriage is now, Hunter argues, seen as a middle-class institution. Third, evidence suggests that rural women are moving more frequently than men. Hunter rejects earlier arguments that suggested African women are left in their rural homes and are infected by male migrant partners returning from the cities wherein they are employed. Instead, the informal nature of work “can propel women into the sexual economy, a scenario ultimately driven in some instances by World Bank/IMF sponsored structural adjustment programmes” (Hunter, 2007: 691).

Hunter’s theoretical arguments are supported by empirical research during a lengthy period of fieldwork in KwaZulu-Natal, where he spent five years living in an informal settlement (Hunter, 2007: 690). How, then, do the three structural factors help explain increasing

rates of HIV infection? Hunter suggests that there is an informal sexual economy and complex sexual networks within the settlements. It is not that prostitution is “rife” in these informal settlements. But, he suggests, it is not uncommon “to hear stories of women having material relationships – ‘one for money, one for food, and one for clothes’ – but also common to hear about love letters and signs of affection” (Hunter, 2007: 697). Condom use may well be higher in “commodified” relationships (prostitution) but lower when there is an element of perceived (but possibly misplaced) trust between partners. The latter can drive infection rates.

This is an example of research undertaken by a geographer on one of the most serious and intractable public health issues, HIV/AIDS, that has continued into the twenty-first century. The author sees the pandemic as a symptom of structural inequalities, such inequalities having roots in the apartheid, but also post-apartheid, era. Hunter’s research is in a particular spatial setting – part of rural South Africa – and comprises detailed empirical observation that endorses his theoretical arguments. We will elaborate on this kind of theoretical explanation in the next chapter, illustrating it with other examples.

The personal significance of home

Our fourth example involves the recognition of the multiple contexts within which our daily lives are played out, contexts that are nonetheless constrained by societal structures that shape our access to resources or “capital:” material, cultural, social. The example (Angus et al., 2005) draws on a sample of individuals receiving long-term home care. Specifically, these researchers examine “the ways that recipients of long-term home care are positioned and active within altered and shifting relational patterns that enter into the construction, dismantling and reconstruction of their experiences of home” (Angus et al., 2005: 162). In so doing, they draw upon the concept of “habitus.”

Habitus describes the durable pattern of dispositions, deeply inculcated and reflective of the social position of the individual or the material conditions to which that individual is accustomed. “Dispositions are corporeal in that they are embodied and converted into motor schemas and bodily automatisms that materialize in practice as postures, gestures and movements” – a sort of social biomechanics, if you will – “and as aesthetic performances or tastes” (for food, clothing, culture; Bourdieu 1977 as cited in Angus et al., 2005).

Practices do not stem directly and wholly from habitus; they depend on contexts or fields and those fields are in turn shaped by the individual’s access to material, cultural and social capital. While it is usually the case that our practices are pre-reflexive, when new factors/variables/aspects enter our life world (e.g., chronic illness and the need for long term home care), those practices necessarily change (because our access to capital – material, cultural, social – has changed): “the corporeal sedimentation of habitus into mannerisms, tasks and skilled movements seems to rely on the continued facility of the body to reproduce patterns of dispositions associated with a particular social position” (Angus et al., 2005: 166).

The data for this research stem from a larger research program in Ontario, Canada called the Hitting Home project, designed to investigate issues related to society, culture and health. Several data collection techniques were employed, including in-depth interviews, field notes, videotapes, and (non-participant) observation. The sample consisted

of 16 detailed case studies of individuals (both adults and children) receiving long-term home care in urban, rural, and remote parts of the province. These data were applied to the following problem: if, as Bourdieu posits, social fields are imbued with practices influenced by habitus and constrained by different forms of capital, then a transposition of those practices will naturally take place when fields (i.e. home and health care) “collide.” The result is improvisation.

Three primary themes emerged from analysis of the data. The first is *the politics of aesthetics*. This refers to the disruption between care recipients’ bodies and the objective conditions provided by the material spaces of the home. For instance, a previously well-appointed bedroom for a middle aged woman becomes shifted to a habitus of disability or dependency when a commode is introduced to that space. Alternatively, a child’s bedroom – previously unkempt and untidy with toys – takes on a very different habitus when the space is (necessarily) converted to a home hospital room with spaces allocated to necessary health care equipment, space where toys once took precedence.

The second primary theme that emerged from the data relates to the *maintenance of order and cleanliness*. Meanings of home shifted shape as more and more of their inhabitants had to rely on paid home care workers to keep up the order and maintenance of things, which may or may not (typically the latter) meet the participants’ expectations. This shift in habitus was a major source of frustration for some, as “the state of homes in these cases bore visible testimony to the physical deterioration of their occupants, demonstrating the co-vulnerability of home and body” (Angus et al., 2005).

The final theme relates to *transcending the limitations of the home*. In order for long-term care clients to access their communities, they were required to undertake improvisations. These included the acquisition of devices (especially those related to communication and connection with extra-local sites), the delegation of tasks to service providers as well as family caregivers, and occasional subversive disregard by providers for the institutional logic of health care (for example, being accompanied by a home health care worker on an errand in the community, which was strictly against the rules).

In short, Bourdieu’s concept of habitus essentially mediates the dichotomy of structure/agency. In the context of the study by Angus and colleagues, the improvisations of the research participants in the conditions and arrangements of their living spaces signified their own social repositioning: as chronically ill, dependent users of long-term home care.

Embodied spaces of health and medical information on the Internet

The volume of information, about health and well-being, available on the Internet has exploded in the past few years. At the time of writing a Google search of “online health information” reveals over 420 million sites! Among others, Hester Parr (2002a) has explored the ways in which these sites provide alternative forms of access to health care, as well as providing new communities and forms of belonging; communities that are not defined in geographical space but, rather, virtual space.

Of considerable interest to geographers and other social scientists is “whether a “real” social world is being supplanted or supplemented with multiple “virtual” social worlds through which the usual boundaries of human action, cohesion, embodiment, and knowledge are being expanded, broken down, and reconstituted” (Parr, 2002a: 74). Parr suggests

that we are encountering a new form of “spatialization,” a term used by the French historian Michel Foucault to denote alternative conceptions of space. While earlier, eighteenth century, “spatializations” (Parr, 2002a: 79) sought to look at (“gaze upon,” as Foucault would say) the body on the dissecting table, then into the three-dimensional body itself, before focusing on the institutions of health care (hospitals and clinics), Parr argues convincingly that the Internet may be thought of as a new form of spatialization “which facilitates a specialist medical gaze entering into the fabric of ‘lay’ everyday life (for those who are connected)” (Parr, 2002a: 79). The parenthetical comment is important, since although we live in an increasingly globalized world, not everyone is “connected.”

Web-sites providing health information or promoting good health therefore offer a new form of medical gaze; they allow the lay user to access knowledge, though of course questions can be asked about the quality of information imparted. As Parr notes, we can interpret such sites, particularly those produced by government agencies, in Foucauldian terms, as vehicles for “disciplining” the body; in effect, ensuring that people look after themselves, for their own and the common good. But these sites are not necessarily interactive, in the sense that they permit groups of users to ask questions or solicit advice. Here, “new geographies of medical knowledge/power, health, and technological embodiment are argued to be emergent” (Parr, 2002a: 76). In order to explore these geographies, Parr entered chat rooms used for communication (virtual travel) by people with multiple sclerosis (MS). Here, users share experiences, talk about their bodies, and gain both formal and informal advice and support online. Her data indicate that the “social isolation which many of those with MS feel in ‘real space’ is compensated for in virtual space” (Parr, 2002a: 88). Further, these uses may be “a form of resistance to medicalization and medical power where subjective, embodied experiences rather than conventional medical knowledges are privileged” (Parr, 2002a: 89).

Since Parr undertook her research, Web 2.0 social networking technologies (such as MySpace and Facebook, as well as virtual worlds such as Second Life) have developed that permit new forms of social connections and architectures to emerge, expand, and dissolve (see also Box 2.1 below). Exploring the geographical dimensions of multiple social networks, as well as their consequences for health, will prove a rich area of research in the years ahead. For example, such technologies can permit otherwise excluded groups, such as Aboriginal women (Hoffman-Goetz and Donelle, 2007), to operate in online neighborhoods and thereby access health-related social support that might not otherwise be available.

Concluding Remarks

We hope it is clear already from this first chapter that there are “geographies” of health. The five vignettes have been chosen to illustrate a variety of approaches to the subject, a set of different perspectives that can be brought to bear on the study of health and place. Some look to be more obviously geographical, in that they produce mappable patterns, whether of historical or more contemporary disease or illness. The geographical content of others may appear less obvious; nonetheless, location, and space and place figure prominently in all. In the next chapter we shall set out in more detail what these different

perspectives entail. We do this by laying out some of their characteristics and by describing some further case studies. In so doing, we hope to persuade the reader of the richness of approaches to the subject, as well as laying some groundwork for considering particular themes in subsequent chapters.

Further Reading

There are several relevant journals that anyone interested in geographies of health can usefully consult. Of these, we draw attention to: *Health and Place*; *Social Science and Medicine*; *Journal of Epidemiology and Community Health*; and *American Journal of Public Health*. All of these have good international coverage. In addition, other epidemiological and more “mainstream” health/medical and geographical journals carry relevant papers from time to time: the *British Medical Journal*, the *Lancet*, *Public Health*, *Journal of Public Health Medicine*, *New England Journal of Medicine*, *American Journal of Public Health* and the *American Journal of Epidemiology*.

As far as the present chapter is concerned, an excellent discussion of some of the conceptual issues underlying health research may be found in Aggleton (1990). Also very highly recommended is the series of books on Health and Disease produced by the UK Open University; the introductory chapters in Davey and Seale (1996) and Seale and Pattison (1994) are worth reading, while the volume edited by McConway (1994) provides a superb accompaniment to both the present and the following chapter.

Jones and Moon (1987) is the classic text on the geography of health; its first chapter covers some of the introductory material dealt with here, while the second chapter looks in detail at epidemiological principles and sources of data. Other key introductory texts and collections of essays are: Curtis (2004), Meade and Earickson (2000), Kearns and Gesler (1998), and Butler and Parr (1999).

If new to geography, you could usefully start with Haggett (2001). Good overviews of contemporary human geography are: Cloke et al. (1999); and Daniels et al. (2004).

For further, detailed, examination of concepts of distance and space see an earlier book by one of the authors: Gatrell (1983).

On “place” see: Cresswell (2004), or the integrated collection of essays in Massey and Jess (1995), especially Gillian Rose’s chapter. For a detailed study of the impact of the Chernobyl disaster see Gould (1990).