

1 *Urbanism, urbanisation, health and human biology: an introduction*

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'The city is a fact in nature, like a cave, a run of mackerel or an ant heap. But it is also a conscious work of art, and it holds within its communal framework many simpler and more personal forms of art. Mind *takes form* in the city; and in turn, urban forms condition the mind.'

Lewis Mumford, *The Culture of Cities* (1938)

The world is becoming an increasingly urban place. Current estimates indicate that one half of the world's population will be living in urban centers by the year 2005, largely the result of but two centuries of rapid urbanisation, and there are no apparent social forces that strongly oppose it.

Urbanism involves the concentrated inhabitation of human populations in relatively small areas, while urbanisation is the process of becoming urban and includes population growth by migration, natural increase and the changing scale of economic activity associated with this change. Both influence human biology and behavior in ways distinct from rural lifeways. Humans, like all other living things, are affected by their environment, whether that environment is completely unaltered by human activity or made entirely from it. Evolution and adaptation continue to operate in human populations through differentials in morbidity, mortality and reproduction. While humans use culture and behavior to modify their environments, culture is only an incomplete buffer to a range of environmental stressors, and can add new stressors to the environment to which human populations may adapt and evolve (Schell 1997a,b; Ulijaszek and Huss-Ashmore 1997). For example, in urban environments, culture may impose and concentrate psychosocial stress, time-budget stress and the stresses associated with industrialisation, including environmental pollution. Urban environments may be conceptualised as a complex of stressors, often different in nature and degree from rural environments, and created

by human culture. These environments may thus pose numerous diverse challenges to human adaptation and evolution (Cassel 1977; Eisenbud 1978; Hardoy and Satterthwaite 1997; Schell, Smith and Bilsborough 1993; Schwirian *et al.* 1995).

The evolutionary past of humans may not have adapted them for urban living. Urban environments probably differ in fundamental ways from the environments in which humans evolved since the morphological and physiological characteristics of hominids evolved over 5 million years or more and became established in the hominid line at least 50,000 years before cities arose. Virtually all of human evolution occurred in response to physical and social demands, many of which may be absent from current urban environments, and which in turn present new challenges and stressors that were never present in the evolutionary past. Exposure to pollutants in air, water and food has become routine, psychosocial stress is commonplace, and diet and activity patterns have altered.

It is not clear whether the match of paleolithic response patterns to modern urban stressors is an example of preadaptation or maladaptation. Indeed, the question is one that embraces a large body of work done in a variety of fields and is ideally answered by human biologists, focusing as they do on long-term adaptation, evolution and human biological variability. Whether the current state of human health and well-being in cities is an adaptive success or a failure, there can be little doubt that the change from pre-urban to urban living has had consequences for health, disease and human population biology generally.

The city as a human product

The most important characteristics of cities that pertain to health and biology are difficult to determine, and one of the intellectual challenges of analysing the effects of urbanism on human biology derives from the multiple dualities that characterise cities themselves. The quote from Mumford that begins this chapter refers to these dualities. In one duality, cities are built environments, expressing a concept of living space that is derived from human thought and culture, yet they are also cultural responses to features of the local physical environment and reflect the history of local land use and settlement. In one sense, cities are products of the interaction, at individual, household, neighborhood, group, and population level, between the expression of a mental groundplan held by those units of organisation, and the impression made by physical features of the environment.

In another duality, urban places are comprised of social and physical features. Many of the salient urban stressors are social ones; other stres-

sors being consequences of the physical construction of the city itself, such as its climate and atmosphere, as well as its lighting and acoustic characteristics. Since cities are built environments, the physical and social environments are interactive and ongoing products of the duality of human expression and impression. Although quite similar dualities may be said to exist to a degree in every human settlement form, and in any human product, cities with their vast size and numerous opportunities for interaction between the mental groundplan and the historically based physical environment, between social organisation and environmental features, may be extraordinary windows into an essential human complexity.

Measurement and the urban-rural contrast

Despite the complexity of cities, there have been analyses of urbanism by philosophers, social theorists, writers and scientists from ancient to current times (Plato; Rousseau 1755; Hobbes 1651; Mumford 1961). Most of these investigations were conducted by comparing urban to rural people or places. Such comparisons made by natural historians and early physical anthropologists of the eighteenth century contrasted two vastly different societies and environments. Topinard in his *Anthropologie* (1878) credits the demise of the human species in urban environments to the process of domestication, it being thought that domestication itself resulted in animals that were weaker than their feral cousins. J. J. Rousseau (1755), among other social philosophers, railed against the insidious and effeminating effects of urban life. Rousseau's noble savage was as far from urbanised as a human being could be. When the social philosophers and naturalists first made urban-rural comparisons as analyses of the human predicament, urban and rural places were more distinct than they are today, and there were far fewer cities and less variation among them. The urban-rural contrast depends on a view of such places as existing without profound variation, such that any contrast can serve to stand for all such contrasts. It may be that such comparisons began when cities were less complex and varied than now; however, in contemporary studies, results of comparisons between urban and rural places or peoples can often be foretold by the definitions used to create the comparison groups.

Much of our view of urban environments and their effects on human populations is based on past observations of human interactions with qualitatively different types of city environment than those which most people experience now in industrialised nations. Observations of city life have a long history in Western thought, and, for the most part, cities have been viewed as unhealthy places. The unhealthiness of cities became enshrined in Western thought by social philosophers of the eighteenth

century when large cities were characterised by poor quality and unhealthy housing, poor and contaminated food supplies, poor and often absent sanitation, very high mortality and very short human lifespans. When this traditional view is combined with modern scientific progressivism which has the aim of improving the lot of humankind, the result is an approach to the topic of health in cities which is negative in perception. Such negative bias can produce unobjective research on contemporary cities and their effects on human biology.

Research employing the urban-rural contrast may combine all cities into one negative stereotype. However, cities vary enormously depending on the local and regional contexts of their development. Variation among cities may be conceptualised not in terms of different qualities but of differences in the quantities of urban qualities. Greater understanding of urbanism requires the measurement of these characteristics as quantitatively and precisely as possible. Some basic measures of urbanism are possible, including those relating to the physical environment such as climate, temperature, altitude and pollutant levels. A number of basic social factors are also amenable to measurement, including population size, density, and social and economic gradients. The measurement of diet and energy expenditure patterns may be equally difficult in cities as in rural populations. Factors which are difficult to measure include psychosocial stress and information density. Recent developments in the non-invasive sampling and measurement of endocrine products has made the study of psychosocial stress and reproductive function more objectively based.

Many of the variables under consideration are neither exclusively social nor physical in nature. Because cities combine social and physical features, the categorisation of variables into one or the other is meaningful only for the simplest characteristics, or as a starting point for further investigation. To cite but two examples, pollutants are largely products of human activity. Their production depends on the social organisation of resources and work, yet they are measured as parts of the physical environment. Human physical energy expenditure patterns also depend on the physical and social landscape that cities present. Social, physical and biological factors are interwoven in urban environments, and a biocultural approach is needed that emphasises these links, rather than an approach from either purely social or biological disciplines.

Measurement of urban features is important because measurement itself is a quality of science. A dichotomy is a crude scale of measurement, but it reduces a continuum of difference into but two values distinguished usually by an arbitrary criterion. In the history of science, a new quality is measured imprecisely at first, but as more is learned from its crude measurement, more precise metrics are devised. In the history of study of

urban environments, investigators have begun with a crude metric, the urban-rural contrast, but are now able to advance the study of urban human biology by employing more precise measuring tools. The dichotomous urban-rural contrast obfuscates the factors that influence human biology in populations which vary in degree and type of urbanisation, since the contrast involves a comparison of many factors combined, and can only detect the sum result of all such factors acting on any biological outcome of interest. When there is no difference between the urban and rural place in some biological outcome, such as growth, it means little. There could be many powerful factors in each environment that affect growth, but they may counterbalance one another. The urban environment may contain numerous factors that pertain to human biology, but they cannot be detected with the simple urban-rural contrast. Furthermore, since the sum difference depends on which individual factors are present in the contrast, each urban-rural comparison contrasts different constituent factors which makes generalisation across different studies meaningless. The opportunities for the accumulation of knowledge by the aggregation of results from different urban-rural contrast studies is thus very limited. Measurement of urban qualities should allow analysis and modeling of the urban biocultural system, and should permit identification of individual environmental factors that may influence biological outcomes, and, if measured properly, allow for comparison across studies.

The diminution of differences between urban and rural populations

In industrialised nations now, the difference between urban and rural communities has lessened substantially. Three hundred years ago and more, occupational specialisation could distinguish the two circumstances. Farming has been the hallmark of rural life for the majority of the world's populations since the onset of cities, and with few exceptions is not practiced extensively by urban populations. Urban-rural contrasts of the eighteenth century compared communities with farming economies to urban ones based on trade and banking. In the nineteenth century the influence of urban manufacturing was added to the contrast. Today, urban and rural places do not necessarily differ much qualitatively. One way in which difference has been reduced is by the spread of contemporary communications systems, which provide rural and urban people with the same information conveyed through national newspapers, radio, magazines and television. Through these means, urban and rural populations receive similar forms of passive entertainment that can both influence social mores and suggest patterns of appropriate behavior and values.

Radio and television news provides virtually the same information about national and international events to both rural and urban populations. Advertising may be more regional than news broadcasts, but frequently urban and rural populations receive the same message extolling the benefits of the same goods and services.

One of the clearest indicators of cultural difference is diet. In many parts of the world, urban and rural populations have very similar diets. However, until recently this was not so. Early urban populations relied on imports from rural food-producing areas, and the process resulted in differences in the quality and types of food available to urban residents. Urban importation of food led to the development of one arm of public health service: the regulation of the national food supply. This now-traditional arena of public health regulation developed during the late nineteenth and early twentieth centuries when some foods were heavily adulterated (milk was diluted and then supplemented with chalk to restore bulk), and refrigeration was primitive. McKeown (1976) credits a change in dietary quality with the rise of population growth in industrialised countries, although public health regulation does not play a large part in his theory. However, regulation of food production was very important in the creation of safe urban food supplies; regulation of dairy herds and milk purity was one of the first areas of regulation achieved in the United States (Rosen 1958).

Currently, food quality is assured by the existence of standardised food products, which are important to rural populations as well as urban ones. The commoditisation of agriculture and the generation of standard food products and national systems of food distribution have contributed to this homogenisation of urban and rural diets. In many parts of the world, most rural and urban residents can now eat similar foods, within economic, social and cultural constraints. Few rural residents now grow their own food and most shop for produce, as well as packaged items from stores. The stores obtain their produce, meats and fish from distant areas without much regard to what is grown locally. Many of these stores are local representatives of national companies that serve both rural and urban areas. When urban and rural residents dine outside the home, they may eat at a local restaurant that is one of a national chain of restaurants. In the United States, a MacDonald's hamburger is the same whether purchased in a rural or urban community. In general, differences are not in the presence or absence of features but in how common and how concentrated urban factors are. In industrialised countries, studies of urban populations are thus relevant to rural ones because factors are largely the same in both and they differ more in quantity than in quality. Once quantification and measurement of specific urban qualities is employed,

the roles of individual factors may be distinguished and compared among urban populations and across urban and rural ones as well.

Urban populations

Because urban society contains people from many different cultures that share the same city but act relatively independently of one another, urban populations do not experience the same urban features. Ethnic and cultural distinctions may represent differences in behavior, local physical environment, diet, activity pattern, buffering and exposure to risk factors for poor health, as well as possible genetic differences in phenotypic responses to stressors and disease exposure.

Urban places have migrant populations. In earlier times, such populations might be reasonably homogeneous, and be of the same or similar ethnicity to the majority urban population. However, in more recent times and with improved and cheaper transport, migrants can come from all parts of the world. For example, in England in the 1500s, urban migrants came predominantly from rural areas, and if from overseas, from other parts of Europe. In 1440, the migrant population, based on a tax survey, was 1% of the total population of the country (Coleman and Salt 1992) and perhaps 14% of the urban population. Of these migrants, over 80% came from Northern Europe, France, Ireland and Scotland (Thrupp 1957). In current urban populations, the vast majority of these migrants have vanished into the general population and cannot be discerned as distinct ethnic identities (Coleman and Salt 1992). Migrants from outside of Europe since that time, and before the 1939–45 war, are limited largely to about 10,000 Africans imported as slaves to become servants in London in the eighteenth century (Shyllon 1977). After 1945, the increasingly easy availability of cheap long-distance travel helped new patterns of international migration which, by the 1980s had resulted in an overwhelmingly urban non-European-origin population in Britain of some 2.6 million, comprising migrants from the Indian subcontinent, Africa, the Caribbean and Asia (Coleman and Salt 1992), and representing about 5% of the urban British population, which is 92% of the total British population (Department of Economic and Social Statistics 1992). By contrast, Malaysia, which is currently undergoing the sort of rapid urbanisation that Britain underwent in the eighteenth and nineteenth centuries, had 37% of its total population living in urban places in 1980. Of this, the majority were of Chinese ethnicity, followed by Malay, then Indian (Figure 1.1), the Chinese showing a decline in the proportion of their population as urban dwellers, and the Malays showing a doubling in urban population (Swee-Hock 1988). Across the period 1947–80, the proportion of the total population as urban

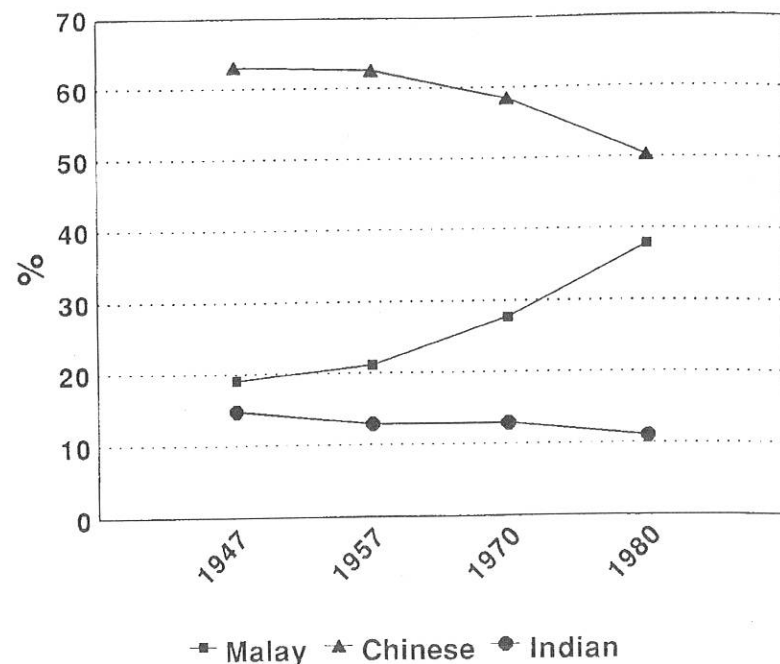


Figure 1.1 Distribution of the urban population of Malaysia by ethnicity, 1947–1980.

Source: From Swee-Hock (1988)

has doubled, as has the proportion of Malays that are urban dwellers. This urban mix shows considerable economic differentiation, although it is difficult to ascribe social differentiation across these categories except with respect to access to resources, control of business, trade and bureaucratic structures. Cultural differentiation on the basis of religion shows that, with the exception of Malays, these are not homogeneous groups. While 99% of Malays are Muslim, 83% of Indians are Hindu, and 56% and 38% of Chinese are Buddhist and Confucian, respectively; 7% and 5% of Indians are Christian and Muslim, respectively, while 3% of Chinese are Christian. Thus, the ethnic variation of cities can change with time, and although there may be some dominant cultural groups in cities, there are also substantial minorities often living side-by-side with other groups, whose health experience is different from their neighbours by virtue of occupying a different niche.

While it might be expected that ethnic identity might persist across generations, there is evidence to suggest that ethnic intermarriage frequency in urban centers may be influenced by residential distance, and educational similarity (Peach and Mitchell 1988). Thus, within any urban

context, populations are constantly being defined in ethnic terms and becoming assimilated to varying degrees with the dominant cultural norms of the country and city. However, the dominant cultural norms of the city may also change, and the menu of human possibilities within the city is increased.

Urban society is also characterised by gradients of socioeconomic status which may be linked, if only loosely, to ethnic and cultural variation. Within the same city, there may be groups distinguished by socioeconomic characteristics such as income, education and occupation. Differences in these characteristics can greatly affect their risk to health. Such risks arise from occupational disease and disability (Syme and Berkman 1976), the physical and social environment of their neighbourhoods (Smart *et al.* 1994; Ennett *et al.* 1997; Crum *et al.* 1996), as well as diet and activity patterns (Marmot 1997; Kooiker and Christiansen 1995; Lip *et al.* 1996; Cox 1994). Socioeconomic characteristics pertain directly to economic power that can be mustered to avoid risks to health, buffer exposure to such risks and attend to adverse consequences from experiences of those risk factors (Thouez 1984; D'Arcy and Siddique 1985). For example, socioeconomic status may be closely related to pollutant exposure (Schell and Czerwinski 1998), dietary buffering of pollutant effects (Czerwinski this volume), and differences in health care utilisation (Breen and Figueroa 1996). Furthermore, gradation in socioeconomic status within cities may be steep, with the richest and poorest members of a nation living in virtually the same political space but with little overlap in physical space or physical contact, with some important exceptions (DiFerdinando, and Parker, both in this volume).

Stratification by socioeconomic characteristics also may be subtle, and the qualitative division of populations into richer and poorer sectors may hide important distinctions by which environmental exposure might be mediated. One example of this is housing. In developing countries, the urban poor may live in a range of housing types (Table 1.1), including settlements, shanty towns, tenements and public housing projects. The pattern of tenure and thus the hold that a family has on this local household environment varies, from legal ownership, rental, illegal possession or none at all. The stressors that populations living in these different types of housing experience will thus also vary enormously, and include, for many, the psychosocial stress of simply maintaining the limited tenure they have. Furthermore, the provision of basic amenities like sanitation and water will also vary with the tenure status of the settlements in general.

There may also be great variation in health across different low socioeconomic status urban populations. For example, in Karachi, Pakistan, health differentials between middle-class and slum areas are enor-

Table 1.1. *General typology of low-income settlements*

Type	Land acquisition	Tenure	Land and physical characteristics/ propensity for upgrading
(1) Irregular settlements (1a) Squatters	invasion of public or private land	<i>de facto</i> or <i>de jure</i> 'ownership'	Periphery where security of tenure then up-grading is likely. Otherwise static shantytown structures with little consolidation
(1b) Illegal sub-divisions	sale of private land	owners, although titles may be imperfect	Periphery. In various phases of consolidation and upgrading through 'self-help'
(2a) Shanty towns	Sale of customary land squatter or, more usually, renters	rental	Mostly down town and around city centre/small plots. Structures with few public amenities and little prospect of their provision. Little likelihood of self-help improvements because: (a) no security of tenure; (b) difficulty of creating an investment cash surplus for improvement (because of rental outgoings); (c) very small plot sizes
(2b) 'Street sleepers'	may have regular sleeping places	none	Down town/inner city. Minimal shelter, removed daily. Often associated with workplace

Table 1.1 (cont.)

Type	Land acquisition	Tenure	Land and physical characteristics/ propensity for upgrading
(3) Tenements	converted large houses or purpose-built tenements	rental	Mostly down town. An increasing proportion of new rental accommodation is located in older irregular settlements (1a, 1b). Single room per family and share services
(4) Public housing projects			
(4a) Complete units	Government purchase and sales	owner or rental	High density, good amenity, but relatively expensive.
(4b) Incomplete units -site and services -'core' units	Government purchase and sale (sometimes interrelated agencies sponsorship)	Owner	Periphery. Basic services mostly installed but house construction varies. Self-help and mutual aid to improve external house structure

Source: WHO Environmental Health Division, unpublished data from Harpham, Lusty and Vaughan (1988).

mous, such that differences in infant mortality rates are on average over three times greater in the latter (Table 1.2). However, infant mortality rate differences between different slum areas are also large, with infant mortality rate varying 1.6 fold between slums with the highest and lowest infant mortality rates. These differences reflect variation in environmental quality based on the history of the slum, its legal status and infrastructure, and housing type and tenure, to a degree that crude social or economic indicators cannot discern. Furthermore, infant mortality within each slum varies enormously according to religion. In both slums where religion has been related to infant mortality rate, Hindus have about twice the death rate of Muslims, while in one slum where Christians live, they have infant mortality rates similar to those of Muslims. Religion is here a marker of cultural, but also economic, differences within settlements that are taken to be homogeneous with respect to infrastructure. Clearly, these religious groups are living in overlapping urban microenvironments, but with very

Table 1.2. *Intra-urban and intra-slum differentials in infant mortality rates in Karachi, Pakistan, 1985*

Area	Infant mortality rate	Deaths of under-fives as % of all deaths
Orangi ^a	110	51
Chanesar Goth ^a	95	50
Muslim	77	
Hindu	146	
Grax ^a	152	55
Christian	123	
Muslim	139	
Hindu	286	
Karimabad ^b	32	18

^a A *katchi abadi* (slum).

^b Middle-class area.

Source: Agha Khan University students, 1986 (unpublished), Harpham, Lusty and Vaughan (1988).

different health outcomes, because of cultural, social and economic differences at the household level. Such differences also exist among ethnically distinct populations in cities around the world, and human biologists need to identify the variables that create these micro-environmental differences that lead to important differences in health outcome.

The Society for the Study of Human Biology Symposium on Urbanism, Human Biology and Health, held on 10–11 April 1997 at the Department of Biological Anthropology, University of Cambridge, and Corpus Christi College, Cambridge considered ways in which human biology could focus in new ways on urban issues, given the increasingly urban nature of human populations. The great strength of this meeting was the multidisciplinary perspective taken by the speakers, who included epidemiologists, anthropologists, nutritionists as well as human biologists. Fundamental to understanding urban human biology is the historical and geographical nature of urban places. In this volume, the authors of the first two chapters, McMichael and Clark, consider separately the interrelated nature of historical and geographical perspectives of urbanism. McMichael describes the commonalities of economic type across urban centers and the ways in which it has changed across history. Before the nineteenth century, many large cities were built on trade economies, but many also grew as suppliers of energy and centers of manufacturing. This transition involved tremendous migration from the countryside, and marked increases in urban population size and density. There was a concomitant increase in infec-

tious disease, undernutrition and general deterioration of human health and well-being. However, by the late nineteenth and early twentieth centuries, government legislation had played a crucial role in improving conditions of sanitation, housing, labour and food supply.

The health and biology of urban residents is directly influenced by urban factors such as transportation, violence, climate and activity. Furthermore, the effect of cities extends far beyond their municipal boundaries, and McMichael describes the way in which cities today, fed as they are with food and energy from very distant places, impress ecological footprints on non-urban people and lands. In his chapter, Clark describes the extensive and remarkable diversity in urban forms and distributions around the globe in the present day. He clearly shows why terms such as 'developed' and 'developing' are at best classificatory devices only, and do not explain variation in the distribution and type of urbanism across the world. Indeed, variation in distributions of urban centers is the result of the interplay of history, culture and resources. Today, tremendous variation exists among nations in the growth of urban populations, the proportion of urban residents and the spread of urban lifestyles. It is thus impossible to identify urbanism as a single, simple characteristic which has meaning in human biology.

In chapter 2, Huss-Ashmore and Behrman address the issue of diversity and character of urban places, using as study material the human populations of trailer parks. These defy classification in common categories of urban places, and by employing an ethnographic approach, the authors are able to show the complexity of the interrelationships among ideology, physical environment and human health and biology of populations living in these places. This serves as a useful model for the investigation of urban places using an adaptability framework.

The recent rise of infectious diseases in urban places of the industrialised world is addressed by DiFerdinando (chapter 5), who describes changes in the frequencies and distributions of two infections, tuberculosis (TB) and human immunodeficiency virus (HIV). Both diseases have been associated throughout their histories with urban populations, but during the emergence of HIV and the re-emergence of TB, each was originally associated with different social segments of urban populations. An important change occurred when interaction between the two segments increased. Urban populations inhabit overlapping microenvironments, and such overlap has changed the risk factors for these diseases, and changed the notion of their causes. One hundred years ago many urban residents were exposed to TB, and the presence of illness depended on variation in susceptibility rather than exposure. People defended themselves against infection and the disease was caused by susceptibility. Now, in HIV

affected populations, TB is 'caused' by exposure to the infective agent since HIV increases susceptibility greatly.

The future of the species is dependent on our reproductive ecology, and Ellison considers how reproduction may be affected by features of urban life. Past ecological transitions, from foraging to agriculture, and from agriculture to industrialisation, are shown to have altered reproductive ecology dramatically. Both transitions involved changes in residential patterns that are part of urbanisation. The post-industrial city also can have an impact, and Ellison describes several mechanisms and pathways, termed "proximate determinants," by which urban factors can influence parameters of reproductive function, specifically ovarian function. Among these factors are urban patterns of maturation and aging, anxiety, dietary composition, exposure to pollutants, as well as levels of energy expenditure and energy balance.

Contemporary urban environments in industrialised countries contain features that impact on human biology and health. The idea of health risk is developed in the chapter by Schell and Stark, who describe the current asthma epidemic in industrialised countries as a way of illustrating how a characteristic of urban populations can be studied by seeking the relationships between the disorder and aspects of the urban physiosocial environment. Although pollution is often included among the new environmental features of cities, rarely are animal allergens considered, even though they are pollutants in the strict sense. The use of an alternative approach, the identification of a factor in the environment and tracing its effects in the population, is shown by the authors to be useful in studying the effects of low level lead pollution on child development. The illustrations in this chapter emphasise the importance of the measurement of environmental features, and the moving away methodologically from urban-rural comparisons. In the chapter by Peters, the focus is on changing patterns of urban health in industrialised Asia. Contrasting social and economic differences in health experience and lifestyles, Peters paints a vivid picture of urban complexity whose impact on human biology is largely positive, in many ways still unmeasured, and difficult to predict into the future.

Urban poverty and nutrition are considered by Dowler, who describes the ways in which socioeconomic factors impact on dietary availability in Britain. Urban poverty is clearly shown to be associated with low intakes of all nutrients, including energy. Among poor households, the poorest ones have the lowest intakes of nutrients and the least diverse food base. This is in contrast to the example given by Johnston and Gordon-Larsen, who in their chapter on poverty, nutrition and obesity in the United States, show poor Philadelphia children to have higher body mass index and intakes of energy, protein and other nutrients relative to United States

norms. Johnston and Gordon-Larsen's use of a microlevel, biocultural approach shows that diet and nutrition of the urban poor do not generalise across the United Kingdom and the United States.

The subsequent chapter, by Czerwinski, also considers nutritional status and poverty, this time in relation to environmental toxicants. Many people are exposed to pollutants through the foods they eat, such that being well nourished can also mean having a higher pollutant burden. Using new data from the Albany Pregnancy Infancy Lead Study, the author shows that the urban poor experience greater exposure to toxicants such as lead, and their dietary patterns may expose them to more food-borne toxicants. Furthermore, dietary items that might moderate toxicant absorption may be less commonly consumed by the urban poor. Pollutants, as relatively new factors in urban environments, interact with one of the oldest, social stratification, to produce a greater health risk for the urban poor.

For centuries cities have been known for their crowding, noise, confusion, and general disorder. Pollard questions whether these features are genuinely stressful, and considers how to investigate their impact on human biology and health. Citing new work that employs non-invasive methods to measure endocrine and neurotransmitter correlates of psychosocial stress, Pollard shows that urban features in the areas of work, home, travel do indeed change neuroendocrine markers of stress. However, cultural and psychological constructs are important for understanding the stressfulness of urban features. On the one hand, the perception of stress turns out to be an inaccurate predictor of the neuroendocrine stress markers while the sense of control or its lack, over physical and social environmental features, has been identified as playing a prominent role in generating feelings of stress.

Ways in which physical activity is influenced by social, cultural, economic and geographical factors in urban settings are discussed in the chapter by Ulijaszek. Urban populations and the environments they inhabit are highly diverse, this being largely related to position in the economic status system, and reflected in energy expenditure levels. Cultural and demographic factors may have an underlying effect on the way in which the interplay between these factors varies in different urban centers. This chapter points to a relative shortage of information about the human energetics of urban populations in ecological contexts, and suggests that there is a great need to study urban complexity in relation to physical activity.

In chapter 14, Parker discusses the transmission of the human immunodeficiency virus by sexual contact, and the networks that exist in order to find such contact. Based on a study of HIV+ men in London,

Parker's observations show that sexual networks for potential HIV transmission in London cut across social class and across countries, notably the urban United States and Australia. The importance of the study of urban pathways is discussed in the final chapter by Ulijaszek and Schell, as one possible new way for the study of urban human biology. Other approaches include the use of epidemiological techniques with clearly defined urban variables within an adaptability framework, and the use of ethnography, and modernisation studies for the identification of new, urban characteristics that impact on human biology. Vital to the future of urban human biology is the reformulation of human ecology within an adaptability framework in which social and organisational constructs are regarded as components of the stress environment.

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