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Introduction: the framework of studying human population dynamics

HELEN MACBETH AND PAUL COLLINSON

Humans can be studied from a variety of academic perspectives. In some biological disciplines the focus may be on parts of individuals, perhaps even molecular parts, while in others humans are considered zoologically as an entire species, *Homo sapiens*, in the order *Primatii*. Some biologists are concerned with the physiologically functioning body of an individual, while others are interested in world-wide human diversity, distribution and population groupings. Among the social sciences, the focus is also frequently on the group, but here the emphasis tends to be upon the social and cultural factors which underpin the way such phenomena as societies, communities and ethnic groups are constructed, delimited and defined. There are also the behavioural sciences, which utilise both biological and social information in relation to the study of the group, the individual or elements in the behaviour of the individual. Recognition of the number of perspectives on these population variables emphasises the need to study material across the boundaries of traditional academic disciplines and several of these perspectives are introduced in this volume.

The twentieth century began with observers of the human condition integrating, in what we now recognise to be a confused way, their ideas on the biological and social nature of humans. During the century the fragmentation of all disciplines grew, something exemplified most particularly in the divergence between biological and social pursuits of knowledge. This in turn fuelled many bitter debates between some biologists and some social scientists who were insufficiently informed on the theories and use of language of their antagonists. During the last few decades, however, the recognition of the interaction of social and biological processes has resulted in an

increasing number of university courses which perhaps claim or aim at integrating disciplines; these are certainly multidisciplinary if not successfully interdisciplinary. At the beginning of a new century, we feel that 'integration' of older disciplines may not be an appropriate ambition, but that the need is for those involved in studying any aspect of human groups to be well acquainted with at least the fundamental ideas of other disciplinary approaches. While this volume is generally concerned with the demographic variables of fertility, mortality and migration, its principal aims are to provide an introduction to the different approaches to the study of how human populations change over time, and to emphasise how components of each perspective should be considered by those interested in any aspect of the processes of human population dynamics.

Disciplines which include the study of human groups are diverse, and because of the interaction of the subject matter, there can be intricate debates on nomenclature. However, the editors of this volume feel that a simplified introduction to some of them is required here. Demography is, in essence, the calculation of population numbers and population changes, and brings to bear many perspectives on the causes, patterns and consequences of fertility, mortality and migration. Since births, deaths and migration are central variables in the work of practitioners of the other disciplines which together form the 'Human Sciences', a full understanding of demography involves consideration of these other disciplinary approaches. One can start with anthropology, as the word means the study of humans. Within anthropology there are many sub-disciplines and these overlap in so many ways that one can only distinguish them in very general terms. The palaeoanthropologists study prehistoric humans, but hominid evolution is also a significant part of physical anthropology and is considered within the study of human population genetics. In practice, there is no difference today between physical and biological anthropology, although the reason that many departments changed their name to the latter was to emphasise a greater understanding of molecular diversity and to reduce the emphasis on measuring morphological characteristics, such as human skulls and physique. The labels ecological anthropology and medical anthropology might appear to be self-defining, and yet there lurks big disciplinary diversity

within each. Cultural anthropology and social anthropology are both titles for disciplines concerned with human cultural and social behaviour, structures, organisations and institutions. While both include a strong focus on the study of the interaction between different human groups, to enter into discussions of their differences is beyond the scope of this introduction. In general, however, under the title of cultural anthropology there is a wider span of sub-disciplines, and use of that title is more common in America than in Europe. The science of diverse cultural practices and materials can also be called ethnology, and ethnography is the descriptive writing about a population and its practices. The subject matter of sociology is similar to that of social and cultural anthropology, although the emphasis here is more upon the study of social problems and their origins. Historically, sociological research has also tended to be focused more on the populations of industrialised countries than on those of the less economically developed regions of the world, which were studied more commonly by cultural and social anthropologists. This boundary between the disciplines has become far less distinct in recent years. Whereas human geographers were traditionally concerned with spatial distribution, their discipline now includes a strong emphasis on the study of the interaction between human beings and the environment, in terms of both the impacts of human activity upon the environment and the way in which the environment influences human organisation and behaviour. Zoologists, especially primatologists, include humans in their studies, and population geneticists estimate distributions of gene frequencies within and between human groups. Although the main focus of ecologists may frequently be on the non-human environment, little of this is unaffected by human activity and vice versa. Many other disciplines consider human populations, for example history, economics and linguistics, but traditionally what has been insufficiently emphasised within each discipline is the need to cross academic boundaries into the terminology and material of other disciplines. This, we argue, is essential in relation to the understanding of human population dynamics.

Taxonomists attempt to divide all species into constituent 'populations', and the human species is no different in this regard. However, this endeavour is far more difficult when applied to humans than

to other species. From a biologist's point of view, when considering isolated and divergent breeding groups of the same or very similar non-human species (on the Galapagos Islands, for example), one even can describe the geographic boundaries of that breeding population. Where the boundaries cannot be identified, for example with more migratory or mobile species, the clear delimitation of a 'breeding population' may be impossible. If there is no barrier to mating, some miscegenation should be expected, blurring any boundaries based on biological characteristics. As has been suggested from the observation of several closely related species, a barrier to successful mating can arise through behavioural differences. When applying these concepts to humans, the complexity of the problem is greatly compounded.

Although human beings world-wide belong to one species and theoretically reproduction is biologically possible between any fertile male and any fertile female, there clearly are barriers that prevent all possible matings actually taking place. Firstly, there are geographic barriers, one of which is simply distance: people who do not meet cannot mate. However, humans are an increasingly migratory species and all such barriers are crossed by some individuals sooner or later. The shorter and longer movements of individuals and groups across geographic space have given rise, over evolutionary time, to clinal distributions of gene frequencies, making the division of humans into genetically discrete populations impossible. So, in studying human populations from a biological perspective, it is clear that we cannot be limited by the biologists' concept of the breeding, or 'Mendelian', population (for a definition see the Glossary).

As well as physical barriers, humans have layers of social ideas about appropriate marriage and mating partners. In terms of the ways human groups are constituted, these represent more important barriers than those rooted in simple geography, since they are strongly related to other concepts of group identity and vary widely between different cultures and societies. As well as the social and political significance of such social constraints on marriage patterns, they also affect future patterns of gene frequencies.

Demographers and other enumerators refer to a population as all those within any boundaries, which are usually divisions between administrative regions and need not have any effect whatsoever on

mating patterns, past or present. In contrast, practitioners from some social science disciplines are not so interested in establishing any 'objective' definition of a population. Far more important for them is to establish the ways in which human groups define themselves and those around them, usually involving reference to the interaction of complex social, cultural and/or ethnic characteristics. Social anthropologists and sociologists have identified the ways in which groups generate boundaries between one another, boundaries which, although highly porous, represent the basis of the collective identities of those who are, or choose to be, located within them. The facets of social identity applied to this 'boundary formation process' are highly varied, and may include, among many others, a common language, specific sets of symbols and rituals, laws of prescription and proscription, and other rules of behaviour, even modes of dress or cuisine. Commonly, a combination of many such aspects of social life is used. Such ideas are relatively easy to understand when applied to national identities: nation states deliberately exploit collective symbols of nationhood, such as national anthems, flags, parades, etc., in order to generate a sense of belonging among their citizens. This process, some might argue, is now being applied at a supranational level by the European Union. However, it is also present in the emotional adherence to associations and groupings of much smaller scale.

Whether demographically, geographically, genetically, socially or politically, one can perceive, even if not precisely delineate, levels of populations within populations. Harrison and Boyce (1972) describe the patterns within populations as 'structures' with biological and cultural characteristics. Such structures can be as all-inclusive as the whole human species or as small-scale as the nuclear family. Between these two extremes the word 'structure' seems particularly appropriate, as one can perceive a hierarchical pattern from the perspective of any discipline: geographically, it might be shown from home to town or village to country to continent, etc.; socially, from household to community to 'ethnic' or language group, etc.; administratively, from parish to district or province to nation state to federation of states, etc. Because of the existence of these structures, as smaller associations cluster within larger groupings and these in turn can be seen

to be more or less united under some other umbrella, one must be clear about the level or scale that one is considering in any discussion (Clarke 1972). To give an example, a move of residence from Paris to Rome might be called a migration between two nation states, while viewed from a different perspective it is residential mobility within the European Union. Similarly, at one level it is possible to estimate the gene frequencies of those dwelling in the Indian subcontinent, while at another level the gene frequencies of different castes may be compared. In the discussion of culture, demography or gene frequencies, one must identify the specific group or be aware that one may be generalising about a larger association of communities.

However, social boundaries exist at every level and many individuals operate in many different spheres at once. Moreover, social boundaries usually exhibit a 'segmentary' characteristic, at times drawing groups together, at other times being a means of separation, thereby creating complex 'patterns' forged by geographic, historic and cultural factors. In this way, establishing a set of 'objective' analytical criteria by which one can understand the various ways human populations are constructed becomes highly problematic. 'Communities', 'social groups', 'ethnic groups', 'societies' or even 'nations' utilise essentially very similar processes of self-construction and definition, and often alter their nature and form greatly over time or in different contexts. Today's ethnic group may well become tomorrow's nation state, and vice versa. It is clear that separating one group from another, or even defining the point at which one group ends and another begins, is an extremely complex process, and one which renders the very concept of 'population' – at least when used in its biological sense – virtually meaningless. The most important point for our purposes is that social boundaries, by their very fluidity, are by no means immutable. The most important point to stress in this cross-disciplinary volume is that all boundaries can be crossed and in this way neither demographic processes nor genetic inheritance become encapsulated within any population, however delimited. Whatever disciplinary lens is applied to the problem – be it demography, human geography, human biology, cultural anthropology or even town planning – any student of human population dynamics must always take into account what people themselves perceive their own

'population' to be. (For an ethnographic illustration of the complexity of these processes see Kunstadter, Chapter 9.)

It seems clear that from the angle of any of the disciplines mentioned above, partly flexible structures can be perceived in the ways in which humans associate. However, while the continuity of some features may well be highly significant in the self-definition of some associations, in their academic description it is not uncommon that insufficient attention has been given to the changes that take place in all societies, cultures, environments and gene frequencies. The patterns of the structures themselves are labile and interdependent. Furthermore, the complexity and mutability of human groupings can be perceived from each of the disciplinary perspectives and thus the actuality is an even more intricate web of interdependent and changing dimensions that defy any of the traditional attempts at taxonomy. In our view an introduction to these different perspectives is a basic step in the study of human populations, a recognition which stimulated this book.

The structure of this volume

The contributors were chosen because of their expertise in different disciplines and each chapter provides a different academic approach to the study of humanity. Furthermore, as the components of all population structures tend to change over time, the mechanisms of change are also discussed. While the benefits of multidisciplinary study have already been defended in this introduction, the challenge for all cross-disciplinary volumes is to achieve a level of coherence through the chapters. In this volume, the vehicles of population dynamics, fertility, mortality and migration provide that thread of continuity, as they are developed within the different perspectives.

The first of the disciplinary approaches to be introduced is that of demography, the study of population numbers and how these change. Hinde's presentation of demographic analysis (Chapter 2) starts from first principles, as the processes and specialist terms are explained with exceptional clarity. He includes a definition of population which, for demographers, can be based on any observable characteristic. After

showing how fertility, mortality and migration are the mechanisms for numerical change this chapter focuses on the first two, fertility and mortality, and the theoretical approach to how they are analysed and recorded in a 'closed population' (p. 20). Debates about population growth are in the public arena these days, but frequently with little precision. This introduction to the analytical methods of demographers is, therefore, prerequisite to the study of human population dynamics. Many of the terms and concepts explained by Hinde reappear in subsequent chapters.

In Chapter 3, Clarke demonstrates the overlap between demography and geography in regard to an interest in population numbers and increase. His chapter starts with some statistics about world population growth over the second half of the twentieth century, but he explains the relevance of disaggregating the figures, showing how most of the world's population growth has occurred in the less developed countries (LDCs). He identifies diversity between LDCs, which he links to economic conditions. As a geographer, however, he introduces the relevance of spatial distributions and the changing situation between the continents. So, whereas Hinde had kept his theoretical discussions to closed populations, Clarke is very much concerned with the effects of migration. Of particular relevance to his argument is rural depopulation and the growth of cities and mega-cities, many of which have grown up within easy reach of the seas to benefit economically from maritime communication and rich coastal plains. The concentration of so much of the world's population in coastal regions makes them vulnerable to climate change. His chapter ends with projections about urban growth and its impact on the human condition.

The next perspective is social, provided by the social anthropologist, Layton (Chapter 4), who starts with clear definitions of population, community and society. These definitions are essential for the development of his discussion about peasant communities. He includes information on past debates on the processes of social construction and social change. After interesting cross-disciplinary reference to the interaction between sociocultural developments and genes, his chapter concentrates on the relevance of different social rules, especially those of inheritance, to family size and population dynamics, particularly

in peasant communities. The interaction of social rules and other aspects of population dynamics are clearly exemplified in this chapter.

The description of the biologist's interpretation of the word 'population', given by Layton, seems at first to need no further explanation in by Bertranpetit and Calafell (Chapter 5) on the geneticists' perspective on population dynamics. Yet, as their discussion develops, it is clear that the understanding of human biological diversity has progressed to a far more complex level with the information accruing from the Human Genome Project. The processes by which the frequencies of genes change within a population have long been recognised as mutation, natural selection, genetic drift and migration. As natural selection and genetic drift are caused by differences in fertility and mortality, the relevance of these demographic variables is again exemplified. By linking the understanding of the processes of molecular and population change to the new wealth in human DNA information, which is available and still accumulating world-wide, a new comprehension of the evolutionary dynamics of populations, of their admixtures and subdivisions, of their founding origins and the rate of their growth, is now accessible. The chapter demonstrates the way in which molecular evidence can be used to throw light on the ancestral history of human groups, the results of such work further complicating the concept of population.

The next three chapters also introduce three different disciplinary perspectives, but the first has more emphasis on fertility, the second on mortality and the third on migration and social mobility. Smith, a historical demographer, begins Chapter 6 with a review of the *Essay on the Principle of Population* by Thomas Malthus (1803), who compared his contemporary European society with 'more uncivilised parts of the world' in regard to what he termed 'positive checks' on fertility. This chapter shows how academic analyses of fertility developed since Malthus, and the significance of nuptiality patterns and household formation. The relevance of social factors to the patterns is clear. While comparison is first drawn between western European societies and those east of a line from Trieste to St Petersburg, the chapter continues to discuss significant historical differences between examples in India and those in China. Reference is also made to China's modern one-child policy. Further comparison is made with African societies.

The concept of homeostasis in population size is raised here and is central to the discussions in the final chapter by Attenborough.

Rousham and Humphrey (Chapter 7) concentrate on child mortality and survival, using information from epidemiology and palaeopathology. The chapter starts with comparisons of the high child mortality in LDCs because of infectious disease, especially when combined with malnutrition, and the much lower child mortality in developed countries. Child mortality not only depends upon the interactions of genetic and non-genetic factors, but also affects demographic, social and genetic structures of populations, and the relevance of medical conditions, cultural practices and other world inequalities is shown. Among relevant cultural practices, gender discrimination is shown in the excess mortality of female children and infants, and it is argued that economic development does not necessarily eliminate practices of sex selection. The chapter goes on to report on what is known about the causes of child mortality in European populations before industrialisation. Improvements in England and Wales during the twentieth century are referred to as well as strategies to reduce child mortality in the LDCs.

In relation to how the study of DNA material can throw light on past migrations and subsequent social mobility, especially of females, the next chapter gives details of a research project in which various types of DNA were analysed. Jorde *et al.* (Chapter 8) provide a general introduction to the three successive waves of immigration into the Indian subcontinent which, they argue, have left identifiable markers in the genetic makeup of different groups within the region. While it is recognised that today the caste system is much more complex than outlined here, the authors introduce the basics of this social stratification, pointing out that there are also other elements in the social structure that may be described as 'tribal'. The proposition by Bertranpetit and Calafell (Chapter 5) that detailed DNA information can be used to throw light on past mobility is demonstrated in the evidence presented by Jorde *et al.* Again greater female mobility, this time through the caste system, is shown. The social practices, including hypergamy and concubinage, in the society of south India, with its complex subdivisions, have had an effect on the genetic structure of the population, and the DNA evidence is used to throw light on the