Introduction

Historical background

Until recently it was a commonly held view that improvements in health were the result of scientific medicine. This view was based on experience of the modern management of sickness by dedicated health workers able to draw on an ever-growing range of diagnostics, medicines and surgical interventions. The demise of epidemics and infectious disease (until the manifestation of AIDS – acquired immunodeficiency syndrome), the dramatic decline in maternal and infant mortality rates and the progressive increase in the proportion of the population living into old age coincided in Britain with the development of the NHS (National Health Service, established in 1948). Thereafter, good quality medical care was available to most people when they needed it at no immediate cost. Clearly there have been advances in scientific medicine with enormous benefit to humankind, but have they alone or even mainly been responsible for the dramatic improvements in mortality rates evident in developed countries in the last 150 years? What lessons can we learn from how these improvements have been brought about?

Public health has been defined as *'the science and art of preventing disease, prolonging life and promoting health through the organised efforts of society'* [1]. In Europe and North America four distinct phases of activity in relation to public health over the last two hundred years can be identified. The first phase began in the industrialised cities of Northern Europe in response to the appalling toll of death and disease among working class people who were living in abject poverty. Large numbers of people had been displaced from the land by landlords seeking to take advantage of the agricultural revolution. They had been attracted to growing cities as a result of the industrial revolution and produced massive changes in population patterns and the physical environment in which people lived [2].

The first Medical Officer of Health in the UK, William Duncan, was appointed in Liverpool. Duncan surveyed housing conditions in the 1830s and discovered that one third of the population was living in the cellars of back-to-back houses with

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earth floors, no ventilation or sanitation and as many as 16 people to a room. It was no surprise to him that fevers were rampant. The response to similar situations in large industrial towns was the development of a public health movement based on the activities of medical officers of health, sanitary inspectors and supported by legislation.

The public health movement, with its emphasis on environmental change, was eclipsed in the 1870s by an approach at the level of the individual, ushered in by the development of the 'germ theory' of disease and the possibilities offered by immunisation and vaccination. Action to improve the health of the population moved on first to preventive services targeted at individuals, such as immunisation and family planning, and later to a range of other initiatives including the development of community and school nursing services. The introduction of school meals was part of a package of measures to address the poor nutrition among working-class people, which had been brought to public notice by the poor physical condition of recruits to the army during the Boer War at the turn of the twentieth century.

This second phase also marked the increasing involvement of the state in medical and social welfare through the provision of hospital and clinic services. It was in turn superseded by the therapeutic era dating from the 1930s with the advent of insulin and sulphonamides. Until that time there was little that was effective in doctors' therapeutic arsenals. The beginning of this era coincided with the apparent demise of infectious diseases on the one hand and the development of ideas about the welfare state in many developed countries on the other. Historically it marked a weakening of departments of public health and a shift of power and resources to hospital-based services.

By the early 1970s, the therapeutic era was itself being challenged by those, such as Ivan Illich (1926–2002), who viewed the activities of the medical profession as part of the problem rather than the solution. A catholic priest, he came to view the medical establishment as a major threat to health and produced the most radical critique of industrialised medicine so far [3]. His argument is simply summarised. Death, pain and sickness are part of human experience and all cultures have developed means to help people cope with them. Modern medicine has destroyed these cultural and individual capacities, through its misguided attempts to deplete death, pain and sickness. Such 'social and cultural iatrogenesis' has shaped the way that people decipher reality. People are conditioned to 'get' things rather than 'do' them. 'Well-being' has become a passive state rather than an activity.

The most influential body of work belonged to Thomas McKeown (1911–88). He demonstrated that dramatic increases in the British population could only be accounted for by a reduction in death rates, especially in childhood. He estimated that 80 to 90% of the total reduction in death rates from the beginning of the eighteenth century to the present day had been caused by a reduction in those

deaths due to infection – especially tuberculosis (TB), chest infections and water- and food-borne diarrhoeal disease [4].

Most strikingly, with the exception of vaccination against smallpox (which was associated with nearly 2% of the decline in the death rate from 1848 to 1971), immunisation and therapy had an insignificant effect on mortality from infectious diseases until well into the twentieth century. Most of the reduction in mortality from TB, bronchitis, pneumonia, influenza, whooping cough and food- and water-borne diseases had already occurred before effective immunisation and treatment became available. McKeown placed particular emphasis on raised nutritional standards as a consequence of rising living standards. This thesis was challenged in turn by those who stress the importance of public health measures [5].

The birth of a new public health movement dated from the 1970s [6]. This approach brought together environmental change and personal preventive measures with appropriate therapeutic interventions, especially for older and disabled people. Educational approaches to health promotion have proved disappointingly ineffective. Contemporary health problems are therefore seen as being societal rather than solely individual in their origins, thereby avoiding the trap of 'blaming the victim'.

The intriguing truth is that the role of knowledge as a determinant of health is as yet ill defined (Chapter 1). Scientific advances in our understanding of how to improve health are embodied in the evolving panoply of medical interventions – new drugs, vaccines, diagnostics, etc. These new insights are, in turn, assimilated more informally by health professionals and the general public. How to harness new knowledge more effectively, for example, through the exploitation of new information technologies and marketing techniques, is a topic of growing interest to students of public health [7].

In any event, what are needed to address society's health problems are rational health-promoting public policies with a sound basis in epidemiology: the study of the distribution and determinants of disease in human populations. That is where this book begins.

Health care's contribution in context

Health professionals have long lived with the ambiguities of their portrayal in literature and the media: on the one hand as compassionate modern miracle-workers, on the other as self-interested charlatans. The implications of McKeown and Illich's work were largely ignored by clinicians. However, powerful counter-arguments have been mounted in their defence.

Attempts have been made to estimate the actual contribution of medical care to life extension or quality of life [8]. Estimating the increased life expectancy

attributable to the treatment of a particular condition involves a three-step procedure:

- calculating increases in life expectancy resulting from a decline in disease-specific death rates
- estimating increases in life expectancy when therapy is provided under optimal conditions (using the results of clinical trials, using life tables), and
- estimating how much of the decline in death rates can be attributed to medical care provided in routine practice.

Bunker credits five of the thirty years' increase in life expectancy since 1900, and half the seven years of increase since 1950 to clinical services (preventive as well as therapeutic). In other words, compared with the large improvements in life expectancy gained from advancing public health in the first half of the century, the contribution of medical care was relatively small. It is now a more significant determinant of life expectancy. The continuing inequalities in health by social class point to further potential for improvement. The net effect of social class on the life expectancy of the whole population is three years, of which about a third can be charged against the use of tobacco and possibly a third against poorer access to medical care. Bunker estimates that the population would gain up to $2^1/_2$ years of life expectancy if everyone assumed the lifestyle of the fittest.

There are thus three main approaches to improving the health of the population as a whole and national policy must take into account their strengths and limitations. Firstly, investment in medical care can be increased and its quality improved (chapter 16). This may make the most predictable contribution to reducing death and suffering but, as we have seen, its impact is limited. Secondly, health promotion and changing lifestyles to prevent disease has obvious potential (chapter 4). However, the impact of educational programmes is less predictable. Thirdly, the redistribution of wealth and resources addresses the material determinants of health inequalities (chapter 14). Though tackling fundamental causes, this approach is of still more uncertain benefit.

Domains of public health

Public health in the NHS has undergone dramatic changes in recent years. All health professionals require some generalist understanding in this field. Rather fewer will need more advanced skills in support of aspects of their jobs (health visitors, general practitioners, commissioning managers, for example). This group also includes non-medical professions such as environmental health and allied agencies such as charities and voluntary groups. A small number of individuals specialise in public health but this group is expanding. Directors of public health increasingly hail from non-medical backgrounds.

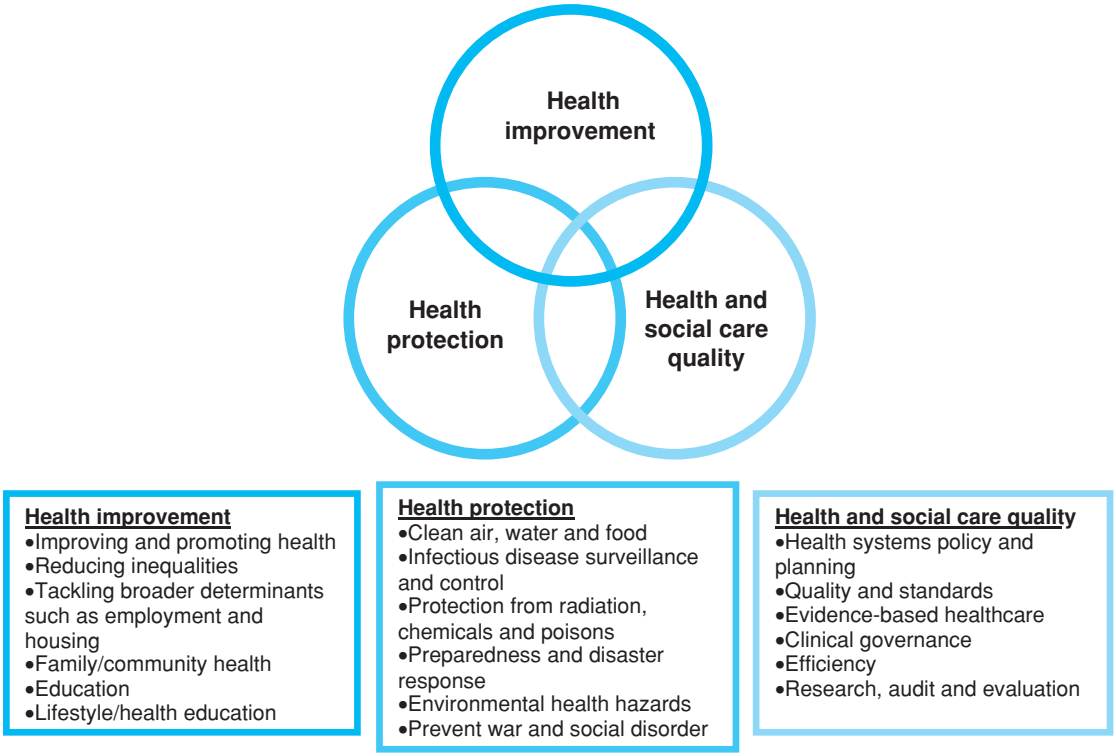

Fig. 1 Three domains of public health.

Nowadays public health is seen as having three domains: health improvement, health protection and health and social care quality (Figure 1). All these domains are covered within this book. Each has its own chapter and examples from all three are used to demonstrate how the skills underpinning public health are put into practice. The disciplines that underpin public health include medicine and other clinical areas, epidemiology, demography, statistics, economics, sociology, psychology, ethics, policy and management. Public health specialists typically work with many other disciplines whose activities impact on the population's health. These might, for example, include health service managers, environmental health officers or local political representatives.

The science of public health is concerned with using these disciplines to make a diagnosis of a population's, rather than an individual's, health problems, establishing the causes and effects of those problems, and determining effective interventions. The art of public health is to create and use opportunities to implement effective solutions to population health and health-care problems. This book intends to capture both the art and the science.

Throughout their careers health-care and allied professionals are presented with opportunities to help prevent disease and promote health. Doctors and

Table 1. Parallels between activities of health professionals and public health workers

Individual	Population
Examination of a patient	Community health surveys
Drawing up diagnostic possibilities	Assessing health-care needs: setting priorities
Treatment of a patient	Preventive programmes, service organisation
Continuing observation	Continuing monitoring and surveillance
Evaluation of treatment	Evaluation of programmes/services

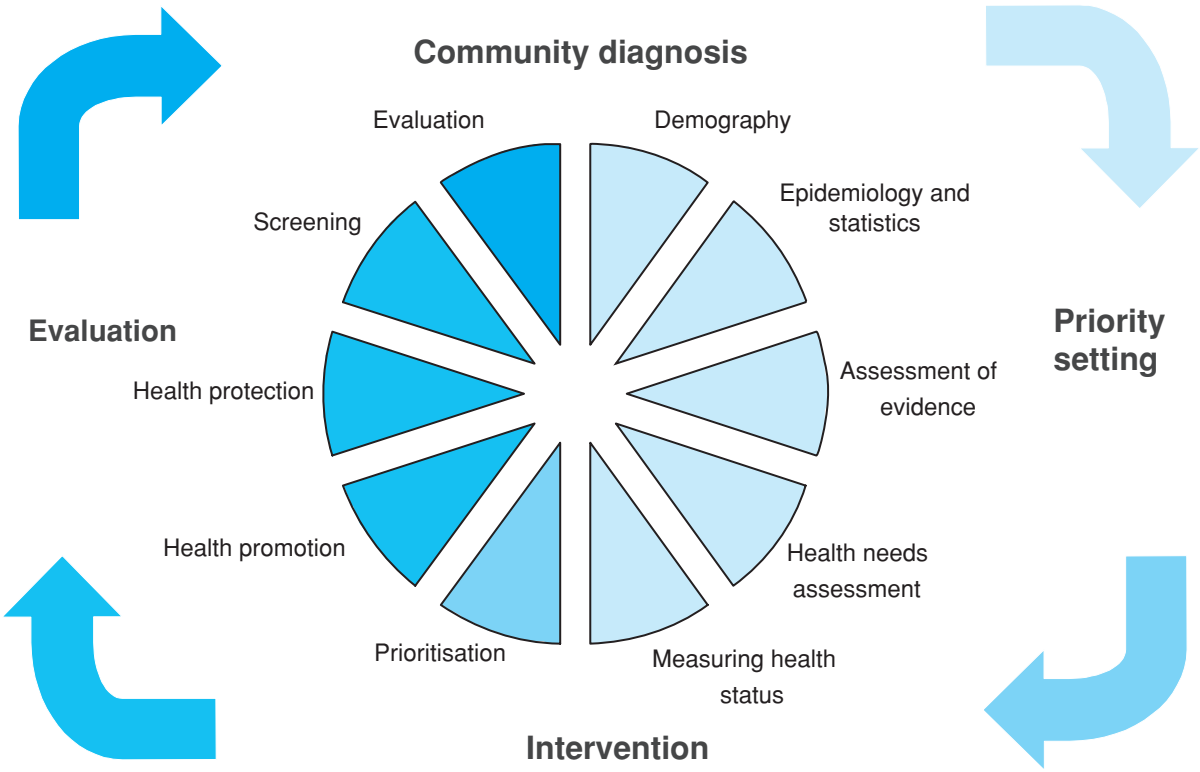

Fig. 2 Public health toolkit.

nurses need to look beyond their individual patients to improve the health of the population. Later in their careers, many will be involved in health-service management. Health professionals with a clear understanding of their role within the wider context of health and social care can influence the planning and organisation of services. They can help to ensure that the development of health services really benefits patients. This book seeks to develop for its readers a 'public health perspective' asking such questions as:

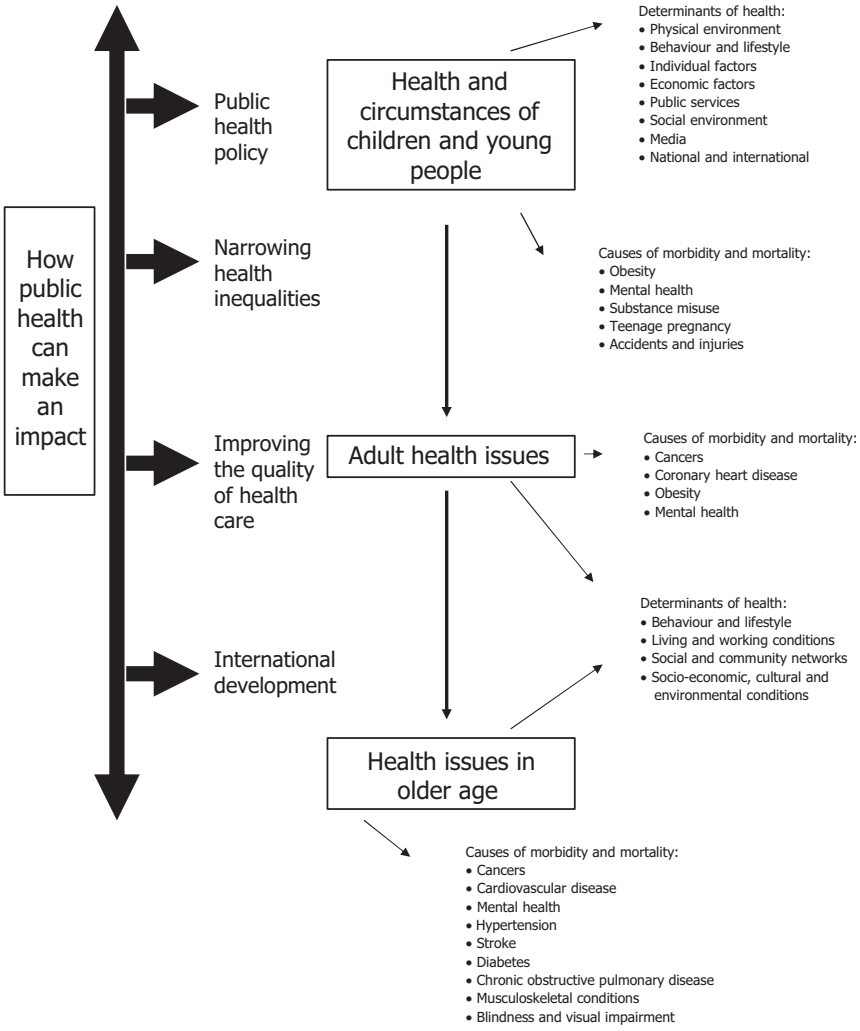

Fig. 3 The challenges of public health – using a life-course model.

- What are the basic causes of this disease and can it be prevented?
- What are the most cost-effective approaches to its clinical management?
- Can health and other services be better organised to deliver the best models of practice such as health-care delivery?
- What strategies could be adopted at a population level to ameliorate the burden of this disease?

As we have seen, population approaches to health improvement can be portrayed as in opposition to clinical care. This dichotomy is overstated and, in many respects, clinical and epidemiological skills serve complementary functions. There are parallels between the activities of health professionals caring for individuals and public health workers tending populations (Table 1).

Structure of this book

Following this introductory chapter, the book falls into two main sections. Public health practice should be about change. The first section of the book takes readers round a four-stage cycle (see Figure 2). This begins with the assessment of a population's health needs and how priorities are agreed. Interventions are defined and evaluated for their impact on those same needs. At the centre of this cycle can be seen the toolkit of public health skills a practitioner needs to acquire. These are added to at each stage of the cycle. The foremost of these disciplines is epidemiology, the subject of a companion book in this series.

The second half of the book will consider the main challenges that public health practitioners are facing. We use a life-course approach to this, considering first the challenges of child public health before moving on to the health of adults and older people. Next, we consider the impact of working in public health on the narrowing of health inequalities, policy development, improving the quality of health care and on international development. Figure 3 demonstrates how these public health challenges are connected. The final chapter examines future challenges.

We begin by examining the factors shaping the growth of populations: the science of demography.

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Part 1

The public health toolkit

1

Demography

Key points

- Demography is the scientific study of human populations.
- It is important to understand the structure of a population in order to plan health and public health interventions; population structures can be represented as population pyramids.
- Population growth or decline depends upon fertility, mortality and migration.
- The concept of demographic, epidemiological and health transitions helps explain dramatic shifts in population structure and patterns of disease that have taken place in most countries.
- The measurement of demographic statistics is difficult and modelling is used to provide comparable data across the world.

Introduction

Demography is the scientific study of human populations. It involves analysis of three observable phenomena: changes in population size, the composition of the population and the distribution of populations in space. Demographers study five processes: fertility, mortality, marriage, migration and social mobility. These processes determine populations' size, composition and distribution. Basic understanding of demography is essential for public health practitioners because the health of communities and individuals depends on the dynamic relationship between the numbers of people, the space which they occupy and the skills they have acquired. The main sources of demographic information vary between countries and they are well developed in the western hemisphere.

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