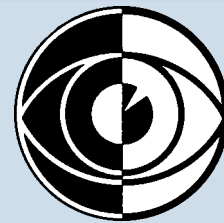


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AGEING: A GLOBAL PERSPECTIVE

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A Life Time of Ageing

Ageing can be defined as the life-long process of progressive change in biological, psychological and social structures of a person. For statistical purposes, 'ageing' is commonly referred to specific age groups, for example, those aged 60 years and above. However, the ageing process begins even before we are born, and continues throughout life.

Although some associate 'ageing' with mental decline and physical impairment, this is a misconception, as the majority of older people enjoy good health and lead active lives. While the functional capacity of biological systems (e.g., muscular strength, cardiovascular performance, etc.) declines after peaking in early adulthood, health and activity in older age are largely

determined by the exposures and actions of an individual during the whole life span. Thus, individuals are able to influence how they age by adapting to ageing-associated changes and by adopting healthier life styles.

An Ageing World

One of the major public health achievements this century has been the sharp decline in premature mortality from many communicable and non-communicable diseases. This is largely due to improvements in sanitation, housing, and nutrition as well as to medical innovations, including vaccinations and the discovery of antibiotics. Consequently life expectancy has risen, and is expected to continue to rise, in virtually all populations throughout the world (Fig. 1), leading to a steep increase in the number of people reaching older age.

The sharp increases in life expectancy have been followed by substantial falls in fertility world-wide in developed and developing countries (Fig. 2), mainly due to availability of modern contraceptive methods. In India, for example, total fertility rates (TFR) – that is, the total number of children a woman is expected to have at the end of her reproductive years – have decreased from 5.9 in 1970 to 3.1 in 1998.¹



'The majority of older people enjoy good health.'

Photo: Murray McGavin

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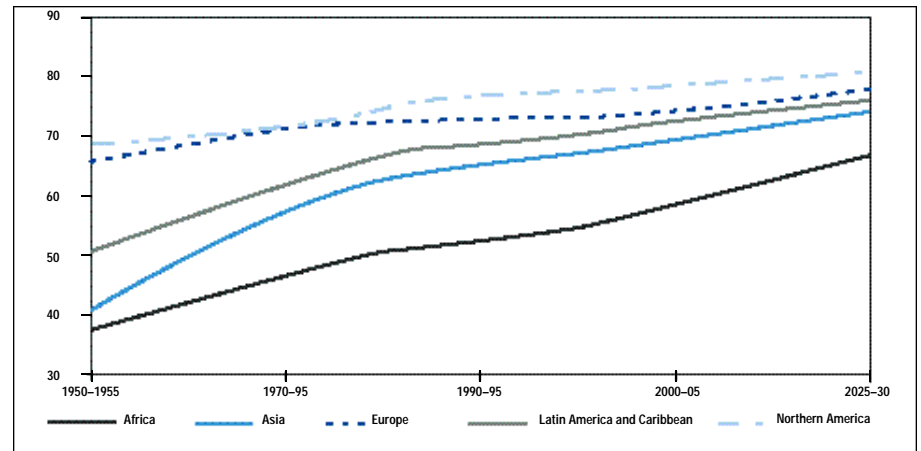
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This decline is even more pronounced in China, where the 'one-child-per-family' policy was officially introduced in 1979. Total fertility rates fell from 5.5 in 1970 to the current 1.8, which is below the 2.1 replacement level.¹ By 2020 differences in TFR between countries will have virtually

be compressed to an unprecedentedly short period of time in developing countries. While it has taken France 115 years for the proportion of older people to more than double from 7 to 14%, it will take China only 27 years to achieve the same between 2000 and 2027.¹ Figures 3a and 3b

Figure 1: Life Expectancy at Birth



Source: UN World Population Prospects, 1996 Revision

disappeared – a powerful determinant of population ageing, as the number of children and young people 'joining' the population gradually decreases.

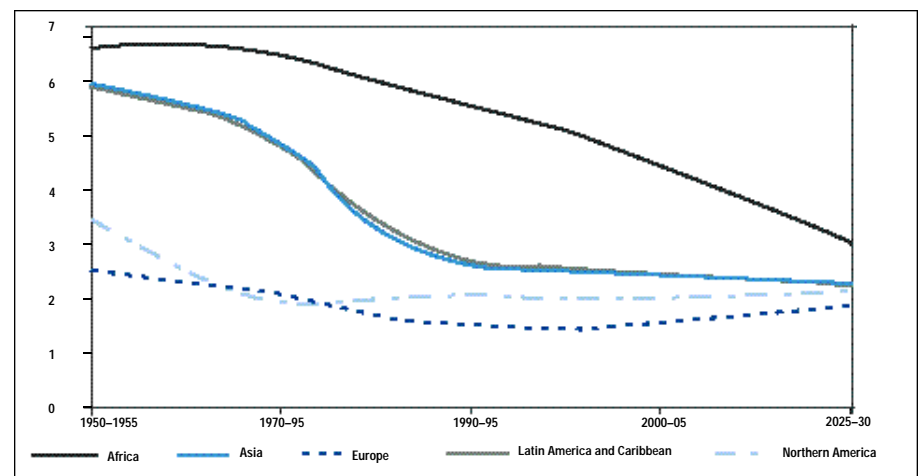
This demographic transition from a pattern of high mortality/high fertility to that of low mortality/low fertility, is commonly referred to as 'population ageing', and will

illustrate this shift in age structure for the world population from 1995 to 2025.

Implications of Rapid Ageing

There are currently about 580 million older people (60 years and above) in the world, with 355 million in developing countries.

Figure 2: Total Fertility Rates



Source: UN World Population Prospects, 1996 Revision

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Bilateral mature cataracts (dilated pupils) in Central Asia.

Photo: M Farrahmand

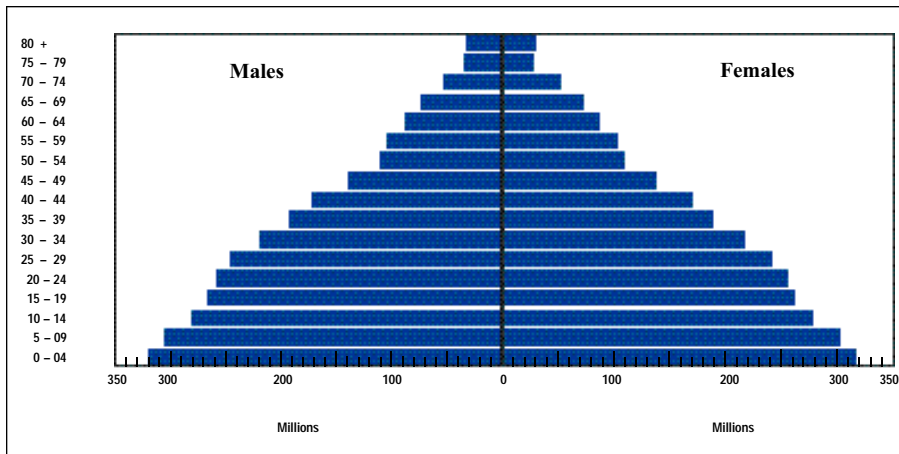


Figure 3a: World Total, 1995

By 2020 the figures will reach 1,000 million, and over 700 million, respectively.¹

With this rapid growth in the proportion of older people, more people will enter the age of higher risk of developing non-communicable diseases (NCDs). This in turn may result in disability. In fact, NCDs including cardiovascular diseases, diabetes and cancer are predicted to be the main contributors to the burden of disease in developing countries by 2020,² and will be responsible for over three quarters of all deaths. At the same time, communicable diseases – although declining – will not have disappeared in those regions,² thus leading to the so-called ‘double burden’.

It is projected that in countries with fertility rates below replacement level, the proportion of older people will exceed the proportion of the very young (aged up to 19 years) by 2050. This implies that in future one child may have to care for several elderly relatives, and the ‘younger old’ may be looking after the ‘older old’.

Given this population ageing, it is becoming increasingly critical to ensure that populations will grow older enjoying the

highest possible health status. In this respect it is encouraging to see increasing evidence from developed countries that people are maintaining better health in later life than ever before. It is now known that the health status of older people in the USA has been improving since the early 1980s.³ It is estimated that because of this, there are now 1.4 million fewer disabled people in that country than there would have been otherwise.

Ageing and Vision Worldwide

The number of blind people in the world today is about 45 million, and a further 135 million have severely impaired vision.¹ Most of them are older people, as visual impairment and blindness increases with age. This is mainly due to age-related disorders such as cataract, macular degeneration, and glaucoma, which together are responsible for about 60% of the world’s blindness.⁴

In most countries of Asia and Africa cataract alone accounts for over 40% of all blindness.¹ Diabetes and smoking, among

others, are thought to be risk factors for the development of cataract. With the predicted increase in the rates of diabetes and tobacco use in developing countries, the burden of blindness from cataract may soon reach even higher proportions.

The Response to Population Ageing

Rapid population ageing poses immense challenges to health and social services. Such challenges will be daunting to developing countries, which are still faced with infrastructural development problems and scarce resources. We have seen how advances in medical technology have offered solutions to specific ageing related problems – a situation which is likely to continue. However, these measures are often unaffordable to developing countries. For this reason, and considering the pace of global ageing, radical answers urgently need to be worked out by those societies.

In acknowledgement of this, WHO established in 1995 its ‘Ageing and Health’ Programme. This is a cross-sectional programme, which promotes health and a high level of functional capacity throughout the life span. It is in the process of establishing substantial collaborative work with acade-

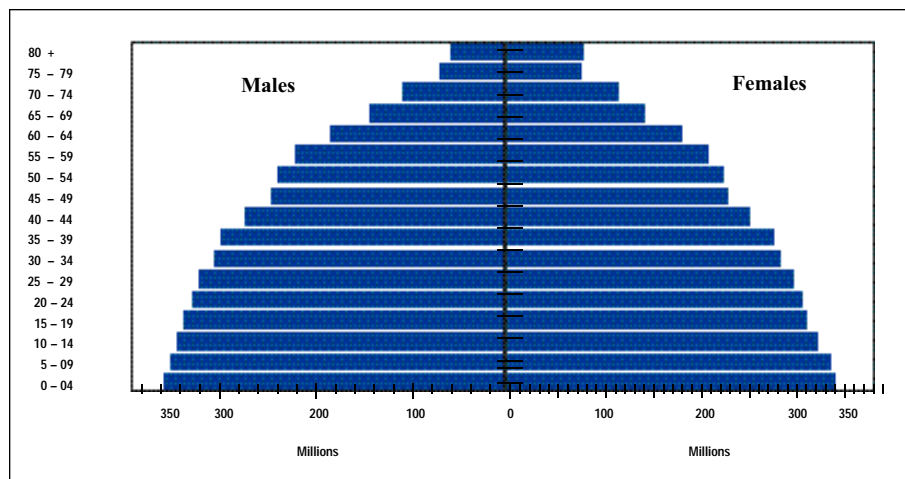


Figure 3b: World Total, 2025



Before cataract surgery

Photo: Murray McGavin

mic institutions and non-governmental organisations world-wide. Its main aim is to ensure the highest possible level of quality of life in older age, by investing in factors which are known to influence health throughout the life course. For those who experience loss of function in later life, efforts should be targeted at restoring and/or maximising functional capacity. It is a clear WHO priority to promote the availability of cost-effective rehabilitation

programmes.

The United Nations is committed to the principle of 'active ageing'. For this reason, it has declared 1999 to be the International Year of Older Persons. The UN calls for a 'culture' of ageing, in which older persons are seen to contribute to development as well as benefiting from it; which promotes solidarity between the generations; and which encourages life-long development.

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☆ ☆ ☆

Review Article

The Epidemiology of Ageing and the Eye

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The probability of an adult dying doubles every six or seven years. At the moment the progression is somewhat slower for women than for men. The 'law' describing the 'nature of the function' relating to human mortality was first reported by Gompertz in 1825. More recent studies have shown that the Gompertz 'law' is valid only within limits, breaking down in the upper age range.

This implies the following. On the basis of the 'law' one would predict tentatively that there is a fixed human lifespan (a maximum length of life) of about 120 years. More recent analyses see this number only as a most probable one, with a longer longevity not being excluded.¹ Indeed, the latest statistics on the 'oldest old' show a clear deviation from the Gompertz prediction: although late mortality has not yet reached theoretical predictions, perhaps because even the oldest old have included smokers and others subject to noxious environmental effects. The former concept of a maximum lifespan may have to be replaced by one of 'maximum likelihood'.

Amongst developed countries – and the longest-lived by no means include the richest in the world – the rate constant is about twice as great as amongst less developed countries, which indicates that their life expectancy, a sort of average, is almost 20 years longer than is true of the less developed countries. From a biological point of view, at least two explanations of the marked differences between populations in

developed and less developed countries can be considered: either people in less developed countries age faster, or the biological variance amongst them is greater than is true of people in developed countries. Theoretical considerations and those of genetics support the second possibility.

Several other indicators seem to correlate with the age-related increase in mortality. The senescence of the skin is one example, and the incidence of cataract another. This emphasises that environmental factors need to be identified with precision if the aetiology of age-related conditions is to be understood. If the human genome is as uniform as most experts believe at present, then, for example, the much earlier age of onset of cataract in warm countries, as compared with temperate ones, is unlikely to be mainly genetic in nature.

But what are age-related conditions? The immediate answer is those which increase in incidence with age, but, in some instances, one can be more specific. In the case of cataract, a law similar to that of Gompertz has been observed,² and, as with mortality, the chance of cataract appearing in a cohort doubles every six or so years. Although apparently not true of glaucoma in general, a similar rule holds also for some of its associated findings, such as arcuate scotoma and an IOP > 20mm. The problem faced by the epidemiologist is that these facts are known principally for developed countries, but data for the least developed ones are lacking, and, therefore, urgently required.

Our ignorance as regards geographical variations is not confined to accurate age-related variations of the most common ophthalmological conditions. More fundamentally, it extends to a knowledge of anatomical detail and relevant biological



Presbyopia occurs earlier in warm climates

Photo: Murray McGavin

variables, which have been established with some reliability mainly for Caucasian eyes. This matter is most important for the understanding of the variation of some wide-spread conditions, and for their potential prevention or cure.

For example, some twenty years ago a tentative geographical link was established between the prevalence of angle-closure glaucoma and the thickness of the eye lens. Normal Bantu have lenses around 9% thinner than similar populations in Denmark, and also a much lower prevalence of angle-closure glaucoma.³ Now it would be unwise to look for a gene amongst the Bantu which would protect them from glaucoma, and be lacking amongst the Danes. A more likely explanation is that the Bantu have thinner lenses than the Danes. The lower prevalence of angle-closure glaucoma is then an accidental result of an evolutionary phenomenon of the Bantu, namely a thin lens. It may be mentioned in passing that, in a British study,⁴ patients with angle-closure glaucoma were found to have lenses thicker than those of normal controls: however, an additional measurement, the reduced height of the cornea was also shown to be important.

As regards lenses in Southern countries, there is much that is unknown. A great deal about age-related changes in (Caucasian) lenses is known. The most wide-spread of them, namely presbyopia, appears to be due to a number of causes.⁵ It tends to