

Ageing and demographic change: The questions researchers are asking

The age structure of the global population has been changing radically for a long time. When the Second World War ended, the process began accelerating, with developed countries leading the way. Statistically speaking, the changes are characterised by longer average life expectancy at birth, a marked rise in the percentage of older people in the total population, and a selective increase in life expectancy for people over 60. While declining birth rates are one of the main reasons why older people are making up a bigger share of the total population, they do not explain why people are living longer. The causes of this are not yet fully understood, but they are clearly multifactorial (e.g. improved hygiene, eradication of disease, better nutrition and higher quality medical care throughout a person's lifetime). Child mortality, in particular, has fallen dramatically. Many other causes of early death have also been eliminated. As a result of these positive developments, we are now experiencing a rise in the number of older people in the total population. We are also starting to see another, very welcome trend emerge: people are staying fitter for longer. However, this does not change the fact that we can expect more and more people to begin suffering from the biological effects of ageing, and related diseases such as cancer, Alzheimer's and multiple organ dysfunction syndrome.

The most fundamental questions that need to be answered are why organisms age at all and how old human beings can get. Existing research seems to indicate that lifespans are limited by a combination of factors, most of which occur in the post-reproductive stage of life. The processes involve a continual decline in the maximal functions of organs, their reserve capacities, their ability to adapt to adverse circumstances and their ability to compensate for defects. These changes vary in intensity across different species. Animals and humans can both adapt individually to these general impairments and reach a certain maximum age without becoming objectively ill. Empirically speaking, the maximum age for humans is about 110 years – a figure that appears to have remained unchanged since accurate records began. However, correlations between genetic factors and favourable living conditions are currently largely speculative.

For most people alive today, longer life expectancy comes at a cost: the older we get, the more likely we are to develop chronic diseases. The most common conditions are cardiovascular problems with atherosclerosis, diabetes, chronic changes in the joints that cause persistent pain and limit movement, and neurodegeneration caused by, e.g. Alzheimer's. What is more, many patients over 65 suffer from multimorbidity. This is where, for example, one or more of the above conditions occurs with another chronic disease such as cancer, breathing problems, liver conditions, or mental illness and instability. Improvements in medical care mean that more of these patients are living longer.

This shows that **the most pressing issue for age researchers** is not about finding ways of raising life expectancies per se, but about **extending the amount of time people remain in good health (health span)**. Today it is generally assumed that a detailed understanding of the biological mechanisms of ageing is crucial to developing prevention and treatment strategies that will extend people's health spans well into old age. If we could reach a stage where our health span made up a greater share of our overall lifespan, society would reap numerous benefits. Developing prevention and intervention strategies that promote **healthy ageing** is therefore an extremely relevant research undertaking of enormous importance to society. The Healthy Ageing Leibniz Research Alliance is dedicated to fulfilling this task.

To ensure we are successful in our endeavours, we will take account of the following basic assumptions:

- (i) If we are to develop and test new approaches to therapy and prevention in geriatric medicine, we must have a sound knowledge of the molecular mechanisms of ageing. Components of these molecular mechanisms could themselves be targets for new therapies. They could also be markers (readouts) for evaluating the effectiveness of preventive approaches that focus on lifestyle and nutrition.
- (ii) An ageing population poses problems for society and the economy. If strategies designed to promote healthy ageing are to be successful, we need to achieve a broad social consensus on how to address the problems of ageing. Problem-oriented age research therefore cannot limit itself to the field of biomedicine. Rather, in view of the social and economic consequences of ongoing shifts in the age structure of the population, researchers must collaborate across an immense variety of disciplines.

There is no question that ageing processes are partially caused by social factors and can have significant social consequences. Socioeconomic status, the surrounding environment, and living conditions all have a major impact on the health and life expectancy of people as they age. British health researchers Wilkinson and Pickett, for instance, showed that socially disadvantaged people are much more likely to suffer from certain illnesses and grow up in unhealthy conditions that have a significant negative impact on their life expectancy. Living in precarious socioeconomic conditions can cause people to adopt unhealthy lifestyles. This might include eating a diet that is overly fatty and not sufficiently varied, not getting enough exercise, and drinking and smoking. These kinds of lifestyles are, in turn, likely to lead to diseases that shorten life expectancy and reduce quality of life. Poor living and environmental conditions (noise pollution, pollutants) in disadvantaged neighbourhoods also have serious consequences for people's health. Those who live like this can also experience psychosocial problems (stress, depression) and experience isolation due to a lack of social contact. These factors can aggravate the biological processes involved in diseases and ageing. Lastly, our mental state is also important. A person's physical health can be affected by whether or not he or she is free to live an independent, satisfying life.

The social consequences of ageing are equally clear. Improving the health and quality of life of people as they age will, among other things, reduce the cost of providing health and long-term care. Healthy ageing can also benefit society by, for instance, increasing the number of older citizens fit enough to take part in some form of civic engagement.

We therefore believe that the only way to make healthy ageing a reality is to adopt an interdisciplinary approach that strategically pools diverse areas of scientific and scholarly expertise.

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