**Authors**

José Manuel Aburto a,b

Ginevra Floridi c

Ella Fegitz b,d

a Department of Sociology & Leverhulme Centre for Demographic Science, University of Oxford.

b Interdisciplinary Centre on Population Dynamics, University of Southern Denmark.

c Department of Global Health & Social Medicine, King’s College London.

d Department for the Study of Culture, University of Southern Denmark.

**Implications of the (changing) relationship between life expectancy and lifespan inequality**

Synopsys: [50 words] Life expectancy is the most widely employed measure of longevity, but it’s WRONG! Aburto, Fegitz, and Floridi tell you why.

**Main text [1000 words]**

Improvements in life expectancy at birth have long been a fundamental goal of most countries, and the past century has witnessed exceptional progress in reducing mortality (Riley, 2001). However, this widely employed metric is unable to reveal the distribution of these improvements. Thus, a crucial question with social and public health implications for demographers and policy makers is weather these improvements are equally shared among individuals. The concept of lifespan inequality can shed light on this variation and on how it may contribute to existing socio-economic inequalities.

**Life expectancy and lifespan inequality**

Life expectancy is a measure of the mean level of mortality. Simply put, it expresses the average number of years a newborn is expected to live given the mortality conditions at a point in time. Because it is an average, life expectancy does not show differences in length of life among people; however, these can be substantial (Tuljapurkar, 2010). Differences in lifespans are usually captured by a metric of variation or inequality in ages at death, and they are usually referred to by demographers as *lifespan inequality.*

Lifespan inequality at the individual level tells us how unpredictable the timing of death is. In other words, how long a newborn in contemporary Mexico - currently an exceptionally violent country - will live is considerably more difficult to predict than it is for a baby born in contemporary Sweden, because lifespan inequality in Mexico is much higher than it is in Sweden (Aburto & Beltrán-Sánchez, 2019). At the societal level, lifespan inequality indicates how improvements in longevity are unevenly shared, and it has been described as the most fundamental of all inequalities (van Raalte, Sasson, & Martikainen, 2018). This is of utmost importance because resources to improve health in a country are limited, and their allocation becomes more difficult as deaths are more spread over different ages. A recent article shows that changes in both life expectancy and lifespan inequality can be expressed as rates of progress in saving lives, i.e. rates in reducing mortality (Aburto, Villavicencio, Basellini, Kjærgaard, & Vaupel, 2020). How strong the relationship between increasing life expectancy and decreasing lifespan inequality is depends on where the progress is placed. The more lives saved at the youngest ages, the stronger the relationship is, especially when life expectancy is less than 70 years.

For most countries, lifespan inequality has decreased as life expectancy at birth increased. This dual advance is a major achievement in modern societies in giving better chances of survival to a larger number of people and has triggered scientific interest among demographers. Numerous studies have identified how higher levels of life expectancy usually correspond to lower levels of lifespan inequality (e.g. Edwards and Tuljapurkar (2005), Smits and Monden (2009), Vaupel, Zhang, and van Raalte (2011), Solís and García-Guerrero (2019)). Demographers, however, have begun to pay more attention on how this relation changes over time and what are the determinants and the effects of these changes.

**Societal implications of increased lifespan inequality**

If both long lives and equal lifespans matter, we can think of the best possible scenario as one where people not only live longer, but also face progressively less uncertainty around when they will die. Research has shown that this has not always been the case as – in certain countries, during specific periods - lifespan inequality has been shown to stall or even increase despite improvements in life expectancy. Central and Eastern European countries, for example, experienced increased lifespan inequality in periods when life expectancy at birth was stagnating or slowly increasing, largely due to the combination of improvements in mortality at very young ages and deterioration in mortality at older ages (Aburto & van Raalte, 2018). Similarly, among males in Venezuela, life expectancy increased together with lifespan inequality as a results of continued improvements in infant mortality and the unprecedented rise in mortality from violent causes (García & Aburto, 2019).

The weakening or reversal of the negative relationship between lifespan inequality and life expectancy means that, while people live longer on average, individuals also face greater uncertainty around when they will die. Differences in lifespan inequality are critical because, in making important life decisions, people are influenced by the mortality experience of those around them. Higher uncertainty around one’s expected lifespan, will affect whether and when to invest in education, migrate or buy a house, retire or continue working, and so on. Studies have shown that, within a society, such increased uncertainty is likely to be concentrated among those from disadvantaged socio-economic groups (Brønnum-Hansen, 2017; Permanyer, Spijker, Blanes, & Renteria, 2018; Sasson, 2016; van Raalte et al., 2018), and among older people when looking at their remaining lifespan (Engelman, Canudas-Romo, & Agree, 2010). This may have important consequences for the perpetuation of social inequality. For instance, faced with greater uncertainty about their own lifespan, individuals from disadvantaged socio-economic backgrounds risk making unfavorable financial decisions and this could further reduce their financial resources later in life. Moreover, greater lifespan inequality for disadvantaged groups may generate uncertainty around the timing of transfers, inheritances and bequests they are able to make to their children and grandchildren. This is important in a world where increasingly more generations are living together.

**The significance of including lifespan inequality in policy and research**

As recently shown, while the relationship between life expectancy and lifespan inequality is generally negative across time and space, lifespans do not necessarily become more equal whenever life expectancy increases (Aburto et al., 2020). In fact, the relationship depends on the ages at which mortality is reduced. This tells us that increasing the average age at death alone is not enough for guaranteeing a more equitable distribution of the length of life. An important message of this research is that policies and interventions can affect this relationship by reducing mortality at the ages that matter the most. In terms of policy interventions, one important question to ask is how different types of healthcare investments, such as preventive as opposed to end-of-life care, may relate to inequality in lifespans. Another important question is how the strength of the relationship between life expectancy and lifespan inequality varies across societies and periods characterized by different levels of social inequality. These are promising avenues for future research linking demographic phenomena to the broader societal context in which they take place.

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