to promote accountability to global bodies, such as the UN, and to be debated in global journals and conferences. How would the index look if the direction of accountability shifted to people in countries: the users (and non-users) of health care? This would require political courage to face health-system flaws, investment in national health measurement, and commitment to using data to improve health systems. Although domestic funding is the necessary base, global actors should be prepared to shift resources towards helping countries produce national data that are most useful to local actors working to build high-quality health systems. Without nationally meaningful measures and governments’ accountability to their population, UHC may become an empty signifier: a non-threatening tool for enhancing a country’s global status rather than maintaining and improving health for all its citizens.

MEK reports personal fees from Rabin Martin and Merck and Company, outside the area of work commented on here. JEA and PA declare no competing interests.

Copyright © 2020 The Author(s). Published by Elsevier Ltd. This is an Open Access article under the CC BY-NC-ND 4.0 license.

Why sub-Saharan Africa might exceed its projected population size by 2100

In The Lancet, Christopher Murray and colleagues1 at the Institute for Health Metrics and Evaluation (IHME) report their new models of future global, regional, and national population scenarios as a function of fertility, migration, and mortality rates for 195 countries and territories from 2017 to 2100. The authors developed statistical models for completed cohort fertility at age 50 years, which they deemed more stable over time than the period measure of total fertility rate. Using their model framework, Murray and colleagues developed a reference scenario and four alternative scenarios based on the pace of change in educational attainment and contraceptive met need: the slower, faster, and fastest alternate scenarios and the UN Sustainable Development Goal (SDG) pace alternate scenario (a scenario that assumes all countries meet SDG targets for educational attainment and contraceptive met need). Forecast uncertainty intervals (UIs) for all scenarios incorporated uncertainty propagated from past data inputs, model estimation, and forecast data distributions.

Murray and colleagues conclude that progress in female educational attainment and access to contraception are contributing to declining fertility rates, and hence the world population might peak just after mid-century (forecasted at 9.73 billion people [95% UI 8.84–10.9] in 2064 for the reference scenario) and substantially decline by 2100 (8.79 billion [6.83–11.8]). This prediction differs from forecasts of continuing growth from the UN Population Division (UNPD). The SDG pace scenario produces the smallest increase in population (forecasted population of 6.29 billion [95% UI 4.82–8.73] in 2100), whereas the slower met need and education scenario produces the largest increase (forecasted population of 13.6 billion [95% UI 10.7–17.7] in 2100).

The new models highlight two distinct future trajectories of countries and global regions that are concerning. The first are countries (eg, Bulgaria, Japan, and Thailand) and regions (eg, central Europe, eastern Europe, east Asia, and Asia Pacific) whose population...
sizes are forecasted to decline substantially by 2100, in some instances by more than 50%. The second are countries largely in sub-Saharan Africa (eg, Chad, Mali, Niger, Nigeria, and South Sudan) whose populations are forecasted to continue to grow even up to and after 2100. These countries, according to the IHME projections, will witness a doubling, tripling, or even more than an eight-times increase in their current population sizes by 2100. These two groups of countries are separated economically and geographically, with the first group being largely outside of sub-Saharan Africa.

Murray and colleagues focus much of their discussion on the consequences of these population shifts in the regions that were forecasted to have significant reductions in their size by 2100 and what policy options (eg, incentivising higher fertility, restricting access to reproductive health services, increasing retirement age, or promoting immigration) are available to address these demographic changes. Although this is understandable given the lack of attention to issues of population decline, it nonetheless is crucial to appreciate the implications of the projections for countries with rapid population growth.

Of the seven regions identified in the study, only two are forecasted to have larger populations in 2100 than they had in 2017: north Africa and the Middle East’s population is forecasted to increase by 63%, while sub-Saharan Africa’s population is forecasted to triple during that period. The study projects a population for sub-Saharan Africa by 2100 of 3.07 billion (95% UI 2.4–3.84), lower than the UNPD projection of 3.78 billion, but still problematic. Given that the authors’ models do not expect sub-Saharan Africa’s population to peak before 2100, the ultimate size of the region’s population will be higher. Whereas sub-Saharan Africa accounted for just 13% of the global population in 2017, it is forecasted to account for 35% of the global population by 2100.

A tripling of the population in sub-Saharan Africa over the next 80 years indicates a need to triple all existing resources and infrastructure (health, education, housing, energy, and so on) over that period just to maintain existing inadequate levels of basic services and amenities. Combined with an annual shortfall of 52–64% in financing for infrastructure needs in Africa (estimated at US$130 billion to 170 billion), the challenge of this most optimistic demographic trajectory for sub-Saharan Africa is daunting.

Available evidence suggests that sub-Saharan Africa has generally exceeded previous UNPD’s projections. The UNPD’s 1998 revision projected sub-Saharan Africa’s population in 2050 at 1.52 billion; this projection was revised to 1.75 billion in 2008 and 2.12 billion in 2019. One key factor might be low age at first birth in sub-Saharan Africa, which reduces the intergenerational gap. At the same levels of fertility, mortality, net migration, contraceptive use, age structure, and size, a population in which all women start childbearing at age 20 years will be at least 20% larger in 100 years than another in which all women start childbearing at age 25 years, all other parameters remaining exactly the same.

Sub-Saharan Africa is the only region where the SDG scenario forecast was substantially lower than the lower bounds of the UI of the reference scenario in the new IHME projections. In most other regions, the UI of the reference scenario accommodated the four alternative scenarios, boosting our confidence in the reference scenario projections for these regions. However, for sub-Saharan Africa, the population sizes projected under the scenarios with the smallest (SDG pace scenario) and largest (slower met need and education pace scenario) increases in population lay well outside the UIs of the reference scenario, suggesting that their reference scenario forecast does not capture the range of possible future population changes in sub-Saharan Africa.

Perhaps the more optimistic assumption in Murray and colleagues’ study is the analysis of the economic consequences of the changing population trajectories in the different regions. It seems that it is assumed that the only predictor of gross domestic product is the size of the working-age population. Murray and colleagues did not ask how existing rates of population growth in countries such as Nigeria could affect their ability to sustain investments in human capital development. The projection that Nigeria will become the ninth largest economy with a life expectancy higher than 80 years clashes with the projection that, by 2100, Nigeria will have a population size that is 3.8 times larger than in 2017. For many sub-Saharan African countries, to simultaneously sustain the rates of population growth and improvements in social development indicated in the new models will be extremely difficult. The authors also ignore increases in life expectancy, which are known to increase population growth and are likely to have an effect on the projected size of sub-Saharan Africa’s population by 2100.
The Article reporting these new models is a complex paper that raises important issues on the implications of declining population sizes in many parts of the world and will probably reframe discourses on population issues to centre on the challenges associated with population decline. Sub-Saharan Africa should recognise its own unique population trajectory and should also, as a matter of urgency, engage in serious discussions at the highest level about how current and projected rates of population growth will affect development prospects in the region.

We declare no competing interests.

Copyright © 2020 The Author(s). Published by Elsevier Ltd. This is an Open Access article under the CC BY 4.0 license.

*Alex Ezeh, Frances Kissling, Peter Singer
ace86@drexel.edu

Dornsife School of Public Health, Drexel University, Philadelphia, PA 19104, USA (AE); The Center for Health, Ethics and Social Policy, Washington, DC, USA (FK); and University Center for Human Values, Princeton University, Princeton, NJ, USA (PS)

The future of migration, human populations, and global health in the Anthropocene

In The Lancet, Christopher Murray and colleagues' report forecasts of the global population in 2100 that are lower than previous estimates. The authors projected the global population to peak in 2064 at 9.73 billion (95% uncertainty interval 8.84–10.9) and decline to 8.79 billion (6.83–11.8) in 2100. The overall population growth and subsequent decline are based upon estimates of a lowering total fertility rate (TFR), which are driven largely by increasing female educational attainment and access to contraception. Meanwhile, migration is forecasted to determine the distribution of human populations by country. The authors are rightly cautious about predicting the impact of migration on population trends because of the paucity of good-quality data, a concern outlined in the 2018 report of the UCL-Lancet Commission on migration and health. Additionally, causes of forced displacement such as wars, natural disasters, and climate change, which are likely to worsen with time, are even less predictable because of the interaction between these factors and lack of existing data on their combined effects on population movement. Nevertheless, this new analysis has improved on previous attempts by using time-series models with sociodemographic, conflict, natural disasters, and growth data as covariates to better inform the impact of migration on projections.

A key finding of Murray and colleagues that warrants further consideration is the projected decrease in the working-age population for several countries such as Spain and Japan. The consequent human capital shortage and probable concurrent burgeoning of the older population might lead to declining life expectancy and quality of life and worsening inequality. To address the potential catastrophic impact of a shrinking working-age population, countries have several options. First, countries could consider incentives to increase TFR before a population decline. To date, attempts to reverse decreases in fertility rates achieved through huge gains in female education and access to contraception have not worked, with pronatalist policies often having limited and temporary effects. Second, countries could consider the explosion of new technologies, including artificial intelligence and robotics, as a path towards self-sufficiency in the context of declining human capital. Automation, such as in car manufacturing, shows that further robotisation of parts of the economy is inevitable.