

The impact of population momentum on future population growth

1. What is population momentum?

For any population, changes over time in its size and composition are driven by levels and trends of fertility, mortality and migration. Additionally, a fourth element, the age structure of the population, also has an important impact on population trends, including for trajectories of growth or decline.

Thanks to a phenomenon known as population momentum, a youthful population with constant levels of mortality and a net migration¹ of zero continues to grow even when fertility remains constant at the replacement level.² In this situation, a relatively youthful age structure promotes a more rapid growth, because the births being produced by the relatively large number of women of reproductive age outnumber the deaths occurring in the total population, even if the fertility of the average woman stands at the replacement level.

Population momentum can be conducive to positive or negative population growth. A relatively older age structure contributes to a slower rate of growth or, in more extreme cases, to population decline.³

2. Population momentum: A new variant in the 2017 Revision of the World Population Prospects

To illustrate the effect of a population's age structure on its future growth, the 2017 Revision of the *World Population Prospects*⁴ includes a new projection variant, called the "momentum variant". The share of future growth or decline that is attributable to population momentum can be determined by projecting the population forward while assuming that in each country: (a) mortality rates remain constant at levels observed in 2010-2015; (b) fertility instantly equals the replacement level associated with the mortality level of 2015-2020; and (c) net migration equals zero starting in 2015-2020.

The new momentum variant combines elements of three projection variants routinely included in previous revisions

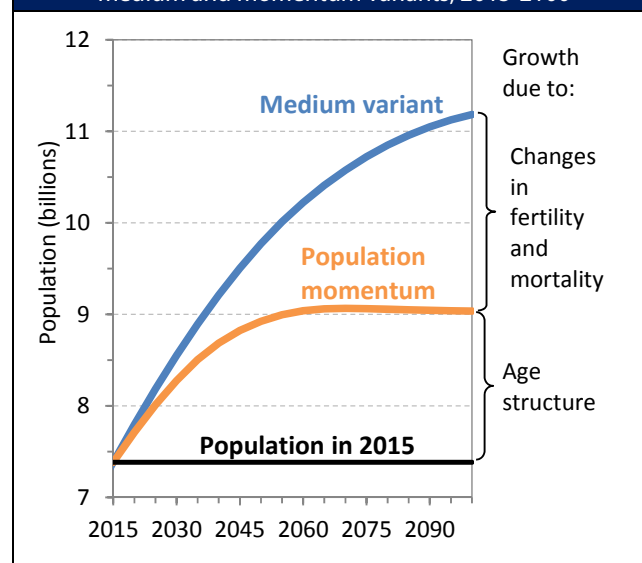
of the *World Population Prospects*: the instant-replacement-fertility variant, the constant-mortality variant and the zero-migration variant.

3. Contribution of population momentum to the future growth of the world's population

Under the assumptions of the momentum variant, the world's population would continue to increase in the coming years and decades, reaching 8.3 billion in 2030 and 8.9 billion in 2050. Thereafter, the global population would stabilize at around 9 billion. Compared to an estimate of around 7.4 billion for 2015, an additional 1.5 billion persons would thus be added to the world's population by 2050, even if fertility were to reach the replacement level instantly and if mortality were to remain constant at levels observed in 2010-2015.

As illustrated in figure 1, between 2015 and 2050, 65 per cent of projected growth worldwide will be attributable to the age structure of the global population in 2015, which

Figure 1. Projected size of the world's population, medium and momentum variants, 2015-2100



was relatively youthful. The impact of population momentum diminishes over time, however, as evidenced by the flattening of the momentum variant after around 2060. From 2015 until 2100, momentum due to the population age structure in 2015 is projected to account for 43 per cent of the total expected growth of the global population over that period.

A key conclusion of this analysis is that, given the current youthful global age distribution, a substantial growth in human numbers over the remainder of the twenty-first century is nearly inevitable.⁵

4. Diversity across countries

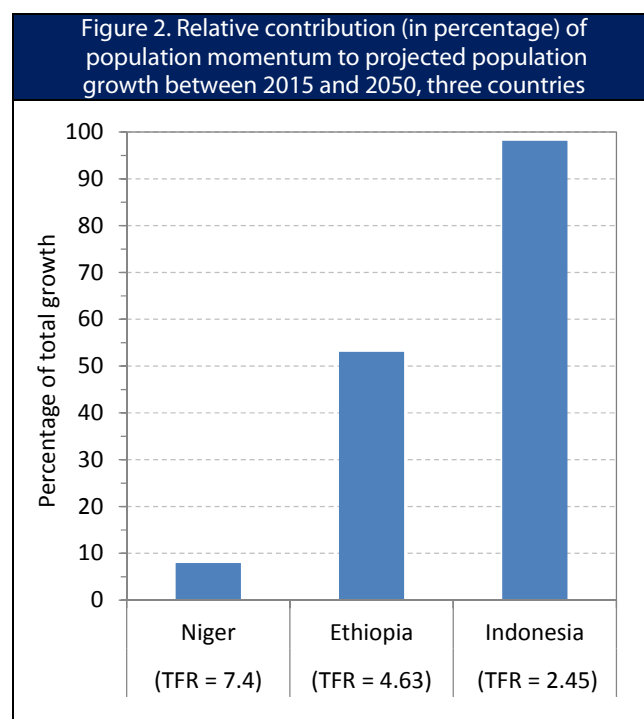
The relative impact of population momentum on future population growth varies by country, especially in comparison to the impact of current and future levels of fertility. Figure 2 shows that in countries with high fertility levels in recent years, such as Niger, the share of projected growth between 2015 and 2050 that will be due to the age structure in 2015 is relatively small, because most of the projected growth will be driven by the fertility level.

In countries where fertility has started to decline and has fallen below 5 births per woman, such as Ethiopia, population momentum will account for a larger share of population growth, as fertility is expected to drop to the replacement level within a few decades. Finally, in countries such as Indonesia, where current fertility is close to the replacement level, most of the projected growth between 2015 and 2050 will be a consequence of the age structure in 2015.

In countries where fertility has been below the replacement level for several decades, the population in the reproductive age range is relatively small. In this situation, population momentum will have a negative effect on

future growth. In Japan, for example, the size of the population is expected to decrease for several decades even if fertility returns immediately and permanently to the replacement level of 2.1 births per woman.

In summary, the momentum variant of the population projections published by the United Nations highlights that, irrespective of trends in the global fertility level over the next few decades, much of the population growth anticipated during this period is inscribed already in the current youthful age structure of the global population.



Note: TFR=Total fertility rate (live births per woman). Estimates of the TFR presented here refer to the period 2010-2015.

NOTES

- ¹ Net migration is defined as the balance of migrant inflows minus outflows.
- ² When fertility is at the replacement level, each generation of parents exactly replaces itself with an equivalent number of children who survive to adulthood, ensuring a long-term growth rate of zero. Given a normal sex ratio at birth (around 105 male newborns per 100 female newborns) and relatively low levels of mortality among children and young adults, replacement-level fertility is close to 2.1 live births per woman (it is higher in a population with an elevated sex ratio at birth or relatively high levels of mortality at younger ages).
- ³ For a more detailed explanation of population momentum, please refer to the following technical paper published by the Population Division: Andreev, K., Kantorová, V., and Bongaarts, J. (2013). Demographic components of future population growth. Technical Paper No. 2013/3. New York: United Nations.
- ⁴ See <https://esa.un.org/unpd/wpp/>.
- ⁵ Exceptional circumstances that could potentially counter the impact of population momentum, resulting in zero or negative growth of the global population over the next few decades, include a natural or manmade disaster leading to a catastrophic increase in the global death rate, or the implementation of draconian and efficacious policy measures to suppress the global birth rate.