# Population Growth and Environmental Sustainability

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## Introduction

On the 15th of November 2022, the world population reportedly reached 8 billion people, a "milestone in human development"[1] that can be attributed largely to trends in two demographic processes: *mortality*, the total number of deaths in a population and *fertility*, the average number of births per woman over a lifetime. Available evidence (United Nations, 2022) shows that global mortality levels changed rapidly over the past three decades, with global life expectancy at birth – the average number of additional years a person could expect to live if the age-specific death rates for a given year prevailed for the rest of his or her life (Population Reference Bureau, 2011) – having increased from 64 years in 1990 to 71 years in 2021 and is expected to further increase to 77.2 years in 2050. Despite regional variations, these decreases in mortality levels are seen in both developed and developing regions and are attributed to widespread improvements and investments in public health, nutrition, sanitation, and advances in medical technologies (DESA, 2022).

By the same token, global total fertility rates (TFRs) – the average number of children that would be born to a woman by the time she ended childbearing if she were to pass through all her childbearing years conforming to the age-specific fertility rates of a given year (Population Reference Bureau, 2011:10) – have decreased notably from 3.3 children per woman in 1990 to 2.3 children per woman in 2021 (United Nations, 2022). It is noteworthy, however, that despite this fertility transition, TFRs in many developing regions of sub-Saharan Africa, Asia and the Pacific have remained persistently higher than the global average. Indeed, data from the United Nations (2022) shows that these are the only major world regions that, in 2021, had average TRFs above the replacement level (more than 2.1 children per woman). This is a level of fertility at which a population exactly replaces itself from one generation to the next, with no migration (Population Reference Bureau, 2011). If sustained, replacement level fertility leads to each new generation being less populous than the older, previous one in a given area.

Taken together, the trends in global mortality and fertility levels over the last three decades have led to unprecedented population growth and a huge expansion of the number of humans globally (Bongaarts, 2009: 2985). It has, indeed, been reported that the world population of 8 billion reached in November 2022 represents an increase of 2.7 billion people since 1990, an additional 1 billion people since 2010, and 2 billion since 1998 (United Nations, 2022). The United Nations further reports that much of this population growth is observed in developing regions, specifically sub-Saharan Africa, Central and South Asia and, to a lesser extent, in Latin America and the Caribbean as well as in North Africa and West Asia. Projections are that population growth in these world regions will continue to grow until at least 2050. Conversely, developed countries have generally sustained stable population growth rates since 1990 and these are projected to persist and to grow only slightly from 1.22 to 1.25 billion between 2005 and 2050.

Using a family perspective, this paper discusses the potential impact of this population growth on environmental sustainability. The paper also proposes plausible responses by governments and regional organisations. Particular focus is placed on family-oriented policies that can contribute to climate action, as well as on what families themselves can do to help the achievement of specific targets under relevant Sustainable Development Goals.

## Population growth and environmental sustainability

Environmental sustainability can be described as the ability to preserve and protect the natural environment over time through appropriate practices and policies that meet present needs without compromising the availability of resources in the future[2]. One of the classic theories that link population growth to environmental sustainability as described here is that of Thomas Malthus who argued, in his 1798 *"An Essay on the Principle of Population"* that because population grows at a geometric rate (i.e., 1, 2, 4, 16, 32, etc.) while food production increases at an arithmetic rate (i.e., 1, 2, 3, 4, etc.), population grows more rapidly than food supply. Eventually, Malthus argued, the population will exceed the capacity of agriculture to support the new population numbers and this will lead to a 'catastrophe'

[1] https://www.un.org/en/dayof8billion

[2] https://www.enel.com/company/stories/articles/2023/06/three-pillars-sustainability

characterised by widespread food shortage and hunger. Malthus theorised that in such situations, nature would play up through what he called 'positive checks'[3] - famines, earthquakes, floods, epidemics, wars, etc. – to bring population growth back to sustainable levels.

Proponents of the Malthusian theory often argue the apparent population growth across the world and the environmental challenges associated with the resultant overpopulation and resource depletion underscore the relevance of his theory in contemporary society. A common argument in this regard is that current and projected numbers of food-insecure and/or chronically malnourished people around the world (see for example, FAO et al, 2023; FSIN & Global Network Against Food Crises. 2024) suggest that population growth has outstripped food supply. Another argument is that food-related instability, wars and/or conflicts in areas such as the African Sahel as well as "pastoralist violence" in West and Central Africa can be linked to, among other things, competition over natural resources that emerged due to increasing population growth (Sova & Zembilci, 2023). The World Meteorological Organisation's projections (Cusick & E&E News, 2022) that climate-related shortages in water resources could affect two-thirds of the world's population by 2050 is another example that Malthusian proponents often cite in support of his theory. Others were also of the view that the recent Covid-19 had the visible hallmarks of a Malthusian positive check (see for example, Sengupta & Chaudhuri, 2020; Rankin, 2020; Daily Remedy, 2021).

Critics of Malthus, on the other hand, argue that while the global population has indeed grown dramatically since the 19th century, living standards have also improved, and famines have been less severe and/or manageable than in earlier centuries. Critics also assert that Malthus did not anticipate technological advancements that have allowed for the opening of new land for cultivation, the development of irrigation systems and associated increases in yields and crop varieties; the widespread introduction of pesticides and fertilisers; and innovations in farming techniques, such as the Green Revolution, which have enhanced agricultural production in more ways than Malthus had envisioned.

It can, however, be argued, that pro-Malthusians and his critics have at least one point of consensus: that his theory underscores the importance of sustainable development and responsible resource management to address the potential challenges of population growth. This has given rise to another contemporary view in relation to this subject, which is "it is more than just numbers". As Dovers & Bulter (2015:2) assert:

> The problem is bigger and more complex than just counting bodies. … There are many factors at play. Essentially, it is what is happening *within* those populations—their distribution (density, migration patterns and urbanisation), their composition (age, sex and income levels) and, most importantly, their consumption patterns—that are of equal, if not more importance, than just numbers

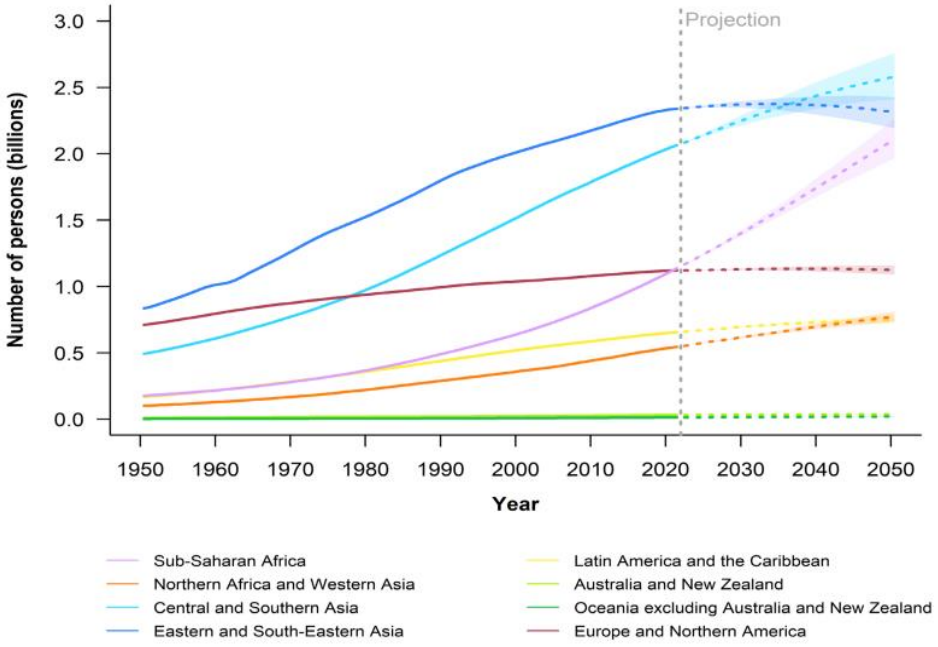
**Population distribution**

Population distribution, the patterns of settlement and dispersal of the population within a country or other area (Population Reference Bureau, 2011), has an impact on environmental sustainability by adding pressure to local environments (Dovers & Butler, 2015). For the purpose of this paper, it is noteworthy as stated earlier, and as shown in Figure 1 below, that the bulk of the world's population lives in developing regions. This suggests that due to mounting environmental challenges in these regions (Zhao et al, 2022), developing countries and their populations will be the most severely affected by accelerating climate change because their livelihoods are highly dependent on natural resources (e.g., felling of trees for fuel) as well as on agricultural and fisheries sectors. In addition, these countries typically have limited capacity to cope with climate variability and extremes due to poor infrastructure (OCED, 2003; Dovers & Butler, 2025). To this end, increases in droughts, floods, and other extreme

[3] Malthus also discussed 'Preventive Checks**':** measures taken by individuals and society to limit population growth voluntarily such as late marriages, abstinence, and moral restraint. These are beyond the scope of this paper and hence not discussed herein.

climate events in developing countries will likely deepen family poverty and food insecurity through interacting factors such as decreased food production and food purchasing power, as well as price shocks (OECD, 2003).

**Figure 1: World Population estimates and projections by region, 1950-2050**




*Source: Amended from United Nations (2022)*

***Migration patterns***

Between and within regions another notable trend has been noted in the pattern of migration, a demographic process defined as the geographic movement of people across a specified boundary to establish a new permanent or semi-permanent residence (Rowland, 2003). Available evidence (IOM, 2022) shows that while 96.5 per cent of people in the world live in their own societies, the number of international migrants has increased from 2.8 per cent in 1995 to 3.6 per cent in 2020. Contrary to historical patterns where migrants typically moved internally or within the same region, economic disparities and rising inequalities between different world regions have seen migrants from developing countries increasingly moving to more developed countries in search of better socio-economic (United Nations, 2021; Kaczmarska & Ono, 2022).

While, for the most part, migration is a planned family decision, conflicts in many parts of the world often lead to unplanned migration, with the United Nations High Commissioner for Refugees reporting that 108.4 million people were forcibly displaced at the end of 2022, up from 80 million at the end of 2019 (UNHCR, 2023). These people, many of whom are unable to return home include refugees, asylum seekers, those displaced outside their country, and the internally displaced. One of the most commonly used strategies to enhance the well-being of displaced people is refugee camps. However, despite their best intentions these camps and other refugee-affected areas are typically sites of environmental problems such as deforestation, soil erosion, depletion and pollution of water resources and other forms of environmental pollution due to, for example, lack of sewerage systems (UNHCR, 2001)[4]. In addition to the negative implications on overall health and nutrition outcomes, these environmental issues can also heighten the risk of mental health problems among family members of

[4] In a different vein, which is beyond the scope of this paper, climate change can also, at least indirectly, drive conflict. https://unfccc.int/news/conflict-and-climate#:~:text=And%20while%20conflict%20exacerbates%20the,desertification%20to%20rising%20sea%20levels

refugees and other displaced persons who essentially lost their homes, families, neighbourhoods, and lifestyle routines abruptly and typically under traumatic circumstances (McAteer, 2022).

The last three decades have also witnessed an emerging trend of internal and international environmental migrants who leave their areas of origin due to frequent and/or increasingly intense weather-related events that impact livelihoods and human security such as floods, droughts and storms and changes in precipitation and temperature patterns (IOM, 2007; IPCC, 2014). An emerging body of scholarship is showing that, from a family perspective, the disruption of existing social ties caused by environmental migration has potentially adverse consequences for the migrants as well as their family members who remain in the places of origin and this is mainly because environmental migrants are on average older, shoulder more household responsibilities, and are more often engaged in high-risk agricultural livelihoods than other types of migrants (Torres &, Casey, 2017; Carrico, 2023)

***Urbanisation***

To the extent that migration is almost always associated with the desire to access better economic, educational, and social opportunities in urban areas (Mokomane, 2023), much of the current global migration has led to rapid expansion in urbanisation, with 3.5 billion people currently living in urban areas across the world (Trask, 2022). A wide body of evidence has consistently shown the extent to which rapid urbanisation puts socioeconomic pressure on urban areas' resources and how this is often reflected in socioeconomic ills such as high levels of unemployment, underemployment, poverty, homelessness, crime etc. In terms of environmental sustainability, issues such as pressure on freshwater supplies, sewage systems, and industrial and other forms of pollution in urban areas are widely documented and associated with increased risk of infectious diseases and deteriorating health, including mental health, among urban families and their members (Boadi et al, 2005; Srivastava, 2009; Trask, 2022).

To the extent that urban populations are expected to increase by 1.5 billion over the next 20 years and are projected to rise to 66 per cent by 2050 (United Nations, 2018; Trask, 2022), the linkage between migration, urbanisation, climate change and family wellbeing needs to remain a priority issue in the discourse of sustainable development.

**Population composition**

Population composition or structure – the distribution of different social groups across a population – also has relevance or environmental sustainability. For this paper, the age structure is important to highlight given that youth (15-24 years) and older people (60 years and above) are the largest cohorts in history (Dovers & Butler, 2015). Regarding young people, the Human Rights Council (2022) has described climate change as the "most significant intergenerational injustice of our time" largely because while they are inherently less responsible for climate change than their adult contemporaries, young people disproportionately bear the impacts of climate change, with a child born in 2020 "twice as likely to experience wildfires, 2.6 times more prone to droughts, 2.8 times more exposed to river floods, and a … 6.8 times more susceptible to heat waves than someone born in 1960" (Kumar, 2023). In addition to physical and psychological effects, climate change also impacts other critical youth development and well-being areas such as their health and access to education, food, recreation, etc. (Gasparri et al, 2021). At the same time, youth are widely recognised as valuable contributors to climate action. As Kumar (2023:1) succinctly asserts:

> With young people accounting for 16 per cent of the global population, they are becoming a driving force in advocating for a low-carbon and climate-resilient future. Their growing involvement in climate change initiatives showcases their transformative power of advocacy and action. Notably, youth-led movements … have succeeded in placing climate change at the heart of global policy discussions. Additionally, [their] initiatives have significantly contributed to shaping crucial policies such as the Global Biodiversity Framework. Moreover, young people are also bringing about tangible changes at the grassroots level.

Older persons, on the other hand, are uniquely vulnerable to the health impacts of climate change due to a variety of factors neatly summarised by Cooper (2022: 10) as follows:

- Complex medical conditions impacting physical, sensory, and cognitive abilities to care for oneself and respond to climate disasters
- Dependence on caregivers and effective medical delivery systems, which can be fragmented during climate disasters
- Normal ageing processes that create less muscle and body tone, which can limit agility and mobility
- Cognitive impairments that compromise the ability to assess risks, plan responses, and execute protective behaviours
- Dependence on medications and life-sustaining equipment that may be unavailable or require effective supplies that may not be readily available at temporary shelters
- "Social determinants of health" like limited economic security, social security or social proception that can exacerbate the impact of climate-induced disasters and are considered "threat multipliers"

**Population consumption patterns**

In terms of consumption patterns, it is often argued that unsustainable patterns of consumption and production, rather than population growth, are the main barriers to environmental sustainability (Dovers & Butler, 2015). Overall, as a 2009 study (Satterthwaite, 2009) showed, developing countries with the fastest population growth and far more people tend to have the slowest increases in carbon emissions. Almost 15 years later, this pattern still holds with Ritchie (2023) showing that despite being home to just under half of the world's population, developed countries emit more than 80 per cent of the world's carbon emissions. Conversely, lower-middle and low-income countries emit less than 20 per cent while the poorest countries emit less than 1 per cent. Despite this, there are predictions (see, for example, Bhattacharya et al, 2023) that factors underlying population distributions in developing countries will lead to these countries emitting more than half the annual global total of greenhouse gas emissions as early as 2030. There are also assertions (see, for example, Meng et al, 2023) of a narrowing gap in developed and developing country emissions. To this end, it can be argued that the family and households, as final links in the consumption of products and services in both developing and developed countries (Sun & Lu, 2023) are critical intervention points for reducing household carbon emissions, boosting sustainable development and enhancing positive family related demographic and other aspects such as increases in life expectancy (Mahalik et al, 2022), improved child wellbeing (UNICEF, 2021), family planning behaviours (Chandler, 2019) and family formation decisions (Szczuka, 2022; Holmes et al, 2023; Nater, 2023).

## Conclusion and recommendations

It is evident from the foregoing that population growth and current demographic trends are "here to stay". Their linkages with environmental sustainability, albeit not always clear, will also persist as climate change effects continue, and hence cannot be ignored. What then can be done? According to *Tvaronavičienė (2021:2),* strategies to mitigate climate change can generally be narrowed down to two major areas:(i) removing greenhouse gases from the atmosphere, and (ii) preparing societies for the effects of climate change. From a family perspective, it should not be either or: there is a need for the development and effective implementation of family-oriented policies and programmes aimed at achieving both and ensuring that no one is "left behind" and all within the framework of SDG 13 (climate action). Below are some (non-exhaustive) recommendations in this regard.

1. Develop or increase coverage of family-oriented social protection mechanisms to ensure food security at all times in those world regions vulnerable to climate change effects. ***SDG 1 (No poverty); SDG 2 (Zero hunger)***
2. Adopt a family system approach in addressing the needs and circumstances of migrants in concentrated areas as well as environmental migrants. Without limiting the capacity of the host communities, Interventions in this regard need to be culturally sensitive and context-specific and, for the most part, should aim to build social cohesion through, *inter alia*, availing basic services and facilities (appropriate family housing, safe water, sanitation, primary and mental

health services); economic equality and inclusion, parenting and interfamily support; and recreational and arts facilities for migrant families members across the life-course (Hamari et al, 2022; Mangrio et al, 2022) – ***SDG, 3 (good health and well-being), SDG 6 (Clean water and sanitation) SDG, 11 (Sustainable cities and communities)***

***3.*** "An inclusive, intergenerational response is the only way to address the climate crisis that will define the lives of every person of every age over the next century". In line with this statement by HelpAge (2021), it is critical to continue engaging youth to draw from their creativity, innovation and relatively advanced technology skills to pursue the climate action agenda not only internationally but also at regional, national, local and community levels. Similarly, the engagement of older persons in the agenda can contribute valuable indigenous knowledge and experience for mitigation and/or adapting to some area-specific climate events. Ensuring that older people are informed about current and emergent climate crises, their consequences, and mitigation and adaptation strategies also upholds their rights, agency and dignity. ***SDG 3 (good health and well-being).***

4. Develop and effectively implement policies, standards and incentives to ensure that families, at the household level, adopt consumption behaviours that support and contribute to environmental sustainability. ***SDG 7 (Affordable and clean energy), SDG 12 (Responsible consumption and production)***

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