POPULATION CONNECTION

The Connections Between Population and Climate Change Info Brief

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Climate change is one of humanity's most critical challenges. The warming of the planet threatens food security, freshwater supply, and human health. The effects of climate change, including sea level rise, droughts, floods, and extreme weather, will be more severe if actions are not taken to dramatically reduce emissions of greenhouse gases into the atmosphere [1]. While the link between human action and the planet's recent warming remains an almost unanimous scientific consensus [2], the links between population growth and climate change deserve further exploration.

With 2 billion people to be added to our human ranks by 2050 and an additional 1 billion more by 2100 [3], demographic trends and variables play an important role in understanding and confronting the world's climate crisis. Population growth, along with increasing consumption, tends to increase emissions of climate-changing greenhouse gases. Rapid population growth worsens the impacts of climate change by straining resources and exposing more people to climate-related risks—especially in low-resource regions [4].

Photo by Taylor Wilcox on Unsplash

Including population dynamics in climate change-related education and advocacy can help clarify why access to reproductive health care, family planning options, girls' education, and gender equity should be included in climate interventions. Increased investment in health and education, along with improvements in infrastructure and land use, would strengthen climate resilience and build adaptive capacity for people around the world [5].

EARTH'S TEMPERATURE IS RISING

Earth's warmest years on record were from 2015 to 2019, capping off a long-term warming trend [6]. The Intergovernmental Panel on Climate Change (IPCC) estimates that human emissions of greenhouse gases, including carbon dioxide (CO_2), methane, and nitrous oxide, have raised the global average temperature

Downtown Cairo is projected to reach 121 million in 2030. Adobe Photos

by close to 1°C (nearly 2°F) above pre-industrial levels [7].

To limit the risks posed by climate change, countries around the world agreed to hold the average temperature increase well below 2°C, aiming for a 1.5°C threshold [8]. If current warming trends continue, the earth's average temperature increase is likely to reach 1.5°C between 2030 and 2052 [1]. Global warming above this level would significantly increase the risk and frequency of extreme weather events and damage to many of the planet's terrestrial and marine ecosystems.

Holding the temperature rise to 1.5°C involves fundamentally changing the processes that produce the most greenhouse gas emissions, importantly burning fossil fuels for energy, industry, and transportation. A global transition to use energy more efficiently, generating it from renewable sources (such as solar and wind), and electrifying transportation would reduce emissions from coal, oil, and natural gas. This is especially relevant for high polluting areas such as the United States, Europe, and China [7]. Stopping forest loss, planting new forests, and managing land to conserve soil carbon are additional important steps to limit warming for both the industrial and developing countries.

Rainforest being cleared in the Amazon. Adobe Photos

> **Global warming at or above 1.5°C will significantly increase the risk and frequency of extreme weather events.**

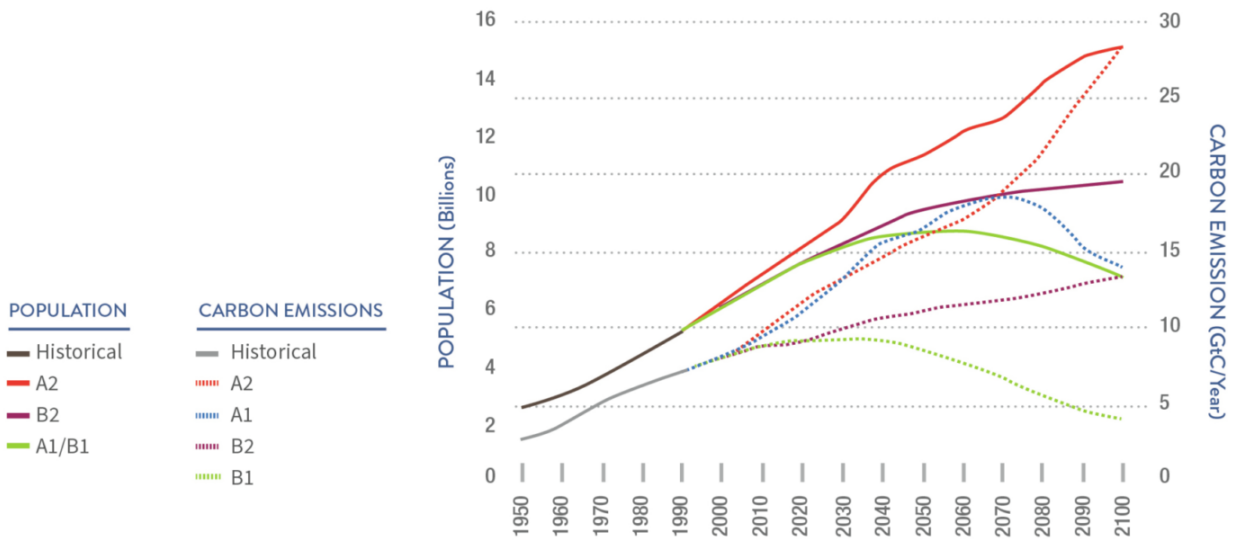
POPULATION AND EMISSIONS LINKS

There has been a reluctance to integrate discussions of population into climate education and advocacy. Yet climate change is tightly linked to population growth. As the U.K.-based charity Population Matters summarizes: "Every additional person increases carbon emissions—the rich far more than the poor—and increases the number of climate change victims—the poor far more than the rich" [9]. At the national level, there is a clear relationship between income and per capita CO_2 emissions, with average emissions for people living in industrialized countries and key oil producing nations topping the charts [10]. High-consuming lifestyles and production practices in the highest income countries result in much higher emissions rates than in middle and low-income countries, where the majority of the world's population lives [11].

For example, the United States represents just over 4% of the global population but accounts for 17% of the world's energy use [3, 12]. Per person carbon emissions are among the highest in the world. People living in the United States, Australia, and Canada, have carbon footprints close to 200 times larger than people in some of the poorest and fastest-growing countries in sub-Saharan Africa—such as Chad, Niger, and the Central African Republic [10]. In the middle of the spectrum are the middle-income economies, home to 75% of the world's population [13]. In these places, industrialization will increase standards of living and consumption patterns over the coming decades [14]. Without changes to how economies tend to grow, carbon emissions will rise.

As there is no panacea for combating climate change, a wide variety of options needs to be exercised. An integrated approach includes educating girls and empowering women to make their own decisions about reproduction [15].

FIGURE 1.
POPULATION CHANGES AND CARBON EMISSIONS UNDER IPCC SRES SCENARIOS



Source: Intergovernmental Panel on Climate Change (IPCC); Special Report on Emissions Scenarios (SRES). Figure is based on the output of the climate model MESSAGE by the International Institute for Applied System Analysis (IASA). Created by Population Action International (PAI), 2012.

Research examining the effects of different population projections on future economic growth and energy use shows that slowing population growth can significantly reduce future greenhouse gas emissions [4]. Incorporating various population projections into climate models shows that higher population growth results in higher emissions. For example, one study found that if the global population were to peak in mid-century and then shrink to 7.1 billion by 2100, carbon emissions could be as much as 41% lower than if the population continued to grow to 15 billion (Figure 1) [16]. This means that slowing population growth through rights-based

innovations in reproductive health could contribute over a quarter of the emissions reductions needed by 2050 to avoid the most dangerous effects of climate change [4, 8, 16].

Even in scenarios of low population growth, however, carbon-intensive economic growth and technological choices can result in high emissions. Nevertheless, a growing body of research indicates that slowing global population growth through rights-based measures, such as by increasing access to voluntary family planning services, can play a key role in mitigating climate change [4, 5, 11, 16-18].

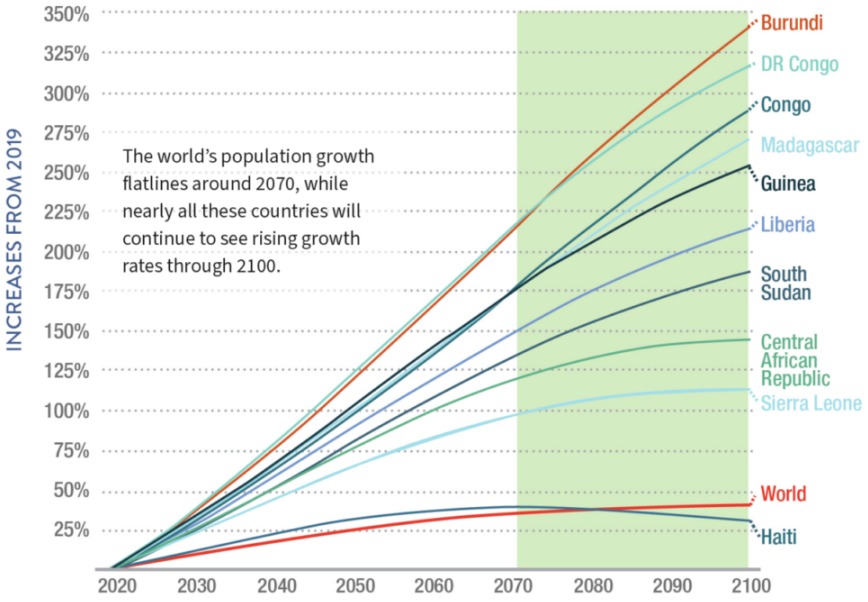
POPULATION AND CLIMATE VULNERABILITY

Despite contributing very little to overall emissions, people living in some of the world's most impoverished regions are in position to bear the brunt of climate change's most disastrous impacts. High rates of poverty and social inequality leave many low-income populations vulnerable to the weather extremes, water stresses, and food production challenges associated with a warming climate [19]. This vulnerability can be affected by factors like urbanization, geography, land use, infrastructure, and access to capital [20]. Adding both climate change impacts and rapid population growth to regions already dealing with poverty and gender inequalities presents a humanitarian problem that will only continue to worsen if left unaddressed.

Rapid population growth poses challenges for the environment and for economic development. Population pressures undermine food security, poverty alleviation, natural resource conservation, and human health. High fertility rates result from high levels of unplanned pregnancies and a significant unmet need for family planning services. In low-income regions alone, 214 million women want to avoid pregnancy but are not using any form of modern contraception [21].

The UN's medium variant projection [3] shows that the global population could grow to 8.5 billion in 2030, 9.7 billion in 2050, and 10.9 billion in 2100. The fastest growth occurs among the 47 Least Developed Countries (LDCs).

FIGURE 2.
PROJECTED POPULATION INCREASE FROM 2019-2100 IN THE 10 MOST CLIMATE CHANGE-THREATENED COUNTRIES



Source: Elijah Wolfson for TIME (2019). You can download the data here and recreate the chart: https://time.com/5621885/climate-change-population-growth/

Under the UN Framework Convention on Climate Change, LDC governments can assess their vulnerability to climate change with the intention of identifying needs and appropriate actions in National Adaptation Programmes of Action [22]. The vast majority of these plans recognize rapid population growth as a key factor worsening climate vulnerability [22, 23].

The links between population growth and climate vulnerability are visible around the world. In Pakistan, population pressures have led to land clearing, which exacerbates flooding at the same time that more people have been crowded into flood-prone areas [24, 25]. In Malawi, where 95 percent of agriculture is rainfed, severe droughts and floods reduce agricultural yields [26]. Climate change is expected to deliver more rainfall in extreme events there, with increased flooding interspersed with droughts.

Nine out of the ten most climate vulnerable countries are in sub-Saharan Africa (Figure 2), which is expected to double in population by 2050—accounting for half the world's population growth [27]. People in Somalia, Burundi, and the Democratic Republic of the Congo are among those facing frequent droughts, severe floods, extreme heat, and soil erosion, amidst rapidly growing populations.

An extreme example can be found in sub-Saharan Africa's Sahel region (Figure 3), where 100 to 200 million people will likely lack sustainable food supplies in the next 30 to 40 years. The Sahel population has grown from 31 million in 1950 to 100 million in 2013. Projections show it reaching over 300 million by 2050 and 600 million by 2100 [28].

FIGURE 3.
SAHEL REGION, AFRICA [26]

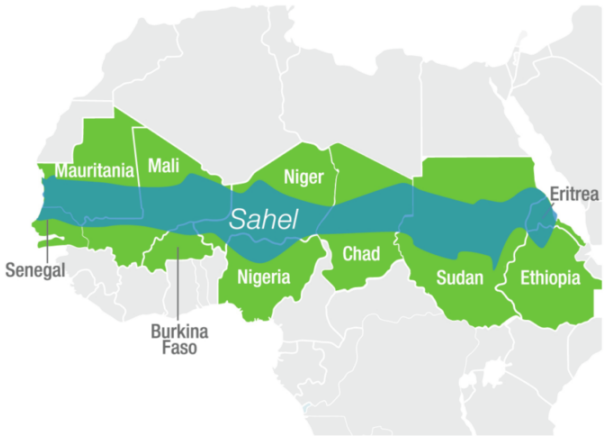
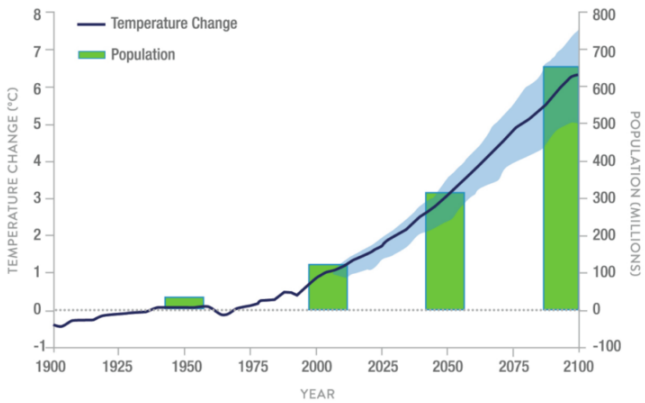


FIGURE 4.
TEMPERATURE AND POPULATION IN SAHEL



Source: OASIS Initiative, 2013 http://bixby.berkeley.edu/wp-content/uploads/2015/03/potts_2013_oasis_crisis_in_the_sahel.pdf

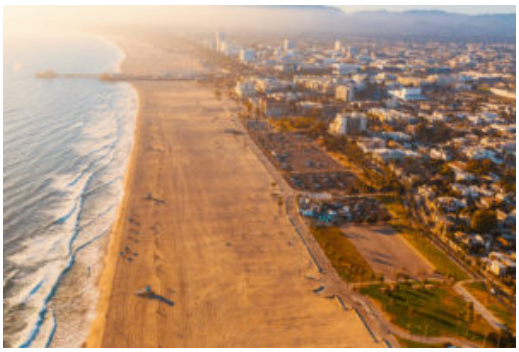
Temperatures in the Sahel are rising 1.5 times faster than the global average [29]. Scientists project a temperature increase of 3–5°C by 2050 and as much as 8°C by 2100 (Figure 4) [28]. As a result, increasingly frequent droughts and floods threaten to further impair food production in a region where over 80% of farmland is already degraded and growing populations are shrinking available pastureland [29].

With climate change increasing the variability of precipitation patterns around the globe, water management becomes more difficult [30]. Currently, almost 1.8 billion people across 17 countries—a quarter of the world's population—live in regions of extremely high water stress [31]. Of these countries, 11 are located in the Middle East and North Africa, where annual average population growth of 1.7% is higher than the global average of 1.1% [32]. Population pressures increase the threats posed by the decreasing availability of fresh water.

Dogonodoutchi, Niger. Adobe Photos

Water well in rural India. Adobe Photos

Water shortages pose a significant threat to India's 1.4 billion inhabitants. India encompasses nearly 18% of the global population but holds only 4% of the world's water resources [3, 33]. Agriculture in the densely populated country is heavily dependent on irrigation; however, rivers have been diverted and wells have been overdrawn to meet the food and water needs of the growing population. Groundwater depletion or contamination affect more than half of Indian districts [34]. As climate change alters the patterns of the monsoon rains and the frequency of droughts, tens of millions of people could be forced to migrate in search of fresh water [35-37].



Aerial view of Santa Monica Beach, LA, USA. Adobe Photos.

While a warmer world will experience more water scarcity in some regions, flooding is also a threat, both inland and along coastlines, which also face rising sea levels and increased storm surge. Many of the world's floodplains and coastlines are densely populated. Low-elevation coastal zones represent 2% of the world's land area but contain well over 10% of the world's population [38]. Of the world's 31 megacities, 21 are along a coastline, and migration to the coasts is increasing [39]. As coastal and riverine populations grow, more people are at risk [5]. The World Resources Institute projects that the number of people affected by flooding will double between 2010 and 2030 [40].

Flooding in Bangkok, Thailand. Adobe Photos

UNMET NEED FOR FAMILY PLANNING

Described as one of the four demographic "megatrends" by the UN Department of Economic and Social Affairs, population growth is seen as a potential inhibitor to meeting the UN's Sustainable Development Goals for 2030 [41]. These goals aim to end poverty and hunger, ensure access to clean water, achieve global gender equality, stop biodiversity loss and ecosystem destruction, and combat climate change. Rapid population growth stifles development by increasing hunger rates [42, 43], resource use, greenhouse gas emissions, and species extinction [44].

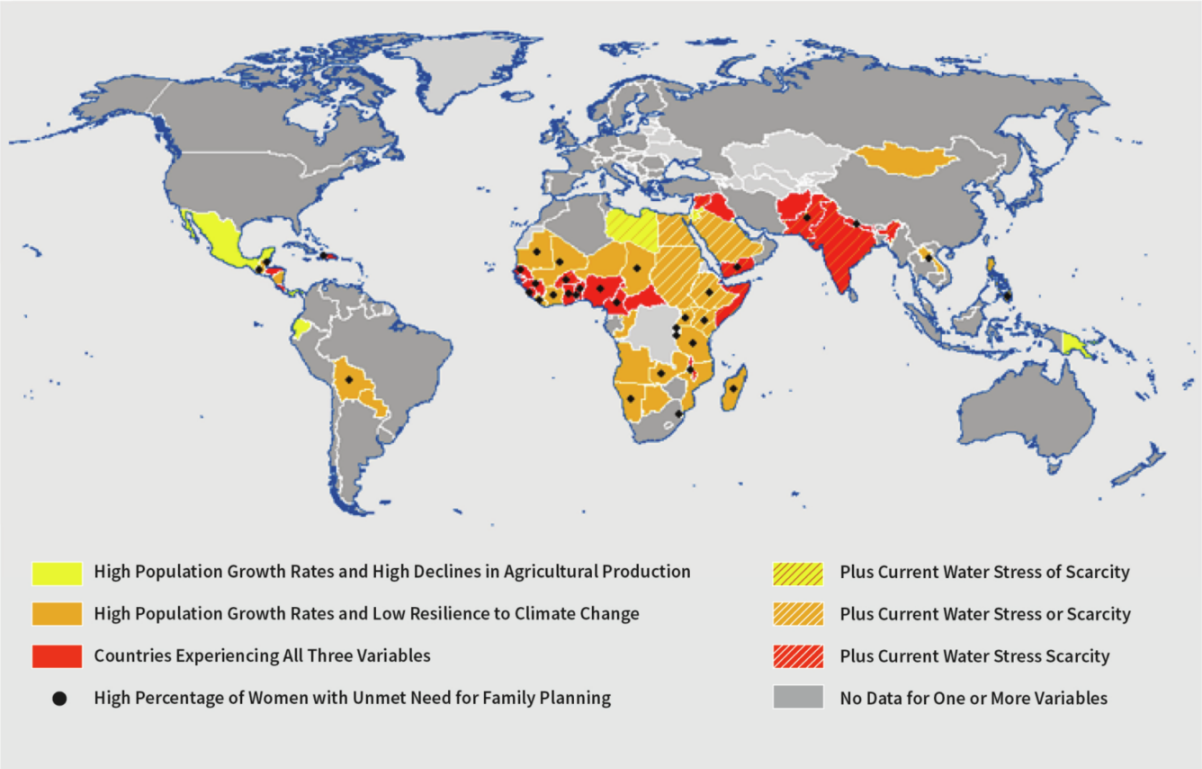
Human-rights-based policies that empower women and address unmet needs for reproductive health services in all regions of the world would reduce population growth rates through voluntary reductions in fertility [5]. These changes, in effect, would help avoid future carbon emissions while fostering sustainable development and increasing capacity for communities to adapt to climate change impacts.

A woman's ability to choose whether and when to bear children, as well as how many children she will have over the course of her lifetime, is a basic human right. Empowering women can lead to poverty reduction and foster sustainable development [45]. It also creates a more equitable society over time. When people, in particular women and girls, gain access to education, they also gain political, economic, and social power. This facilitates economic growth, improves health and livelihoods, and delivers higher levels of bodily autonomy [46]. Women who are educated tend to have fewer children, and those that they bear are healthier [47]. As individuals, families, and communities gain access to higher levels of education and quality health care, these tools are passed on to subsequent generations. Thus, the benefits of health and education compound over time. Within the context of climate change, the additional health, education, and economic benefits afforded through family planning would greatly reduce climate vulnerability and increase resilience for women and families across the world.

Worldwide, many of the same regions that experience high fertility, low economic status, and high climate vulnerability also have a high unmet need for contraceptives and reproductive health services (Figure 5) [4]. In much of the Sahel region, for example, contraceptive use is below 10% [28]. While recent surveys indicate that only 5% of Niger's married women between the ages of 15 and 49 use modern contraceptives, about 20% have expressed an unmet need for family planning [48]. In the face of very real threats related to climate change and food security, increasing access to voluntary family planning services can lower fertility rates and reduce pressures on food supply [28].

The UN medium projection showing the global population reaching 9.7 billion by 2050 assumes a decline of fertility for countries where large families are still prevalent [49]. Without investments in family planning and the removal of barriers preventing people from accessing reproductive health care, this number will be much larger.

FIGURE 5.
FAMILY PLANNING NEEDS IN POPULATION AND CLIMATE CHANGE HOTSPOTS.



Source: http://pai.org/wp-content/uploads/2013/03/Hotspots.pdf

INVESTING IN WOMEN AS A LOW COST CLIMATE SOLUTION

Global carbon emissions hit 55 gigatons of CO_2-equivalent in 2018, over two-thirds of which came from fossil fuel burning. Keeping the global average temperature from exceeding 1.5°C in a cost effective manner would entail reducing global emissions by more than half by 2030 [50].


Children at Primary School in Bwindi, Uganda. Photo by Hannah Evans

Research examining the potential impacts of increased investment in family planning found that funding family planning and girls' education could avoid a cumulative 85 gigatons of CO2 emissions between 2020 and 2050. That scale of reduction is similar to what could be achieved by shutting down 22,000 coal-fired power plants [51].

Family planning options could be provided in low income countries at an annual cost close to $10 per user [21]. The cost of avoiding emissions [52] through investments in family planning comes out to about $4.50 per ton of CO2. Educating girls yields emissions reductions at close to $10 per ton of CO2. Both are cheaper than some other attractive emissions reduction options, such as wind and solar power ($24 and $28 per ton, respectively), or new coal plants with carbon capture and storage technology ($95 per ton) [53]. This makes family planning incredibly cost-effective as a climate change solution—both in terms of upfront cost and return on investment.

There is currently a $5.3 billion funding gap for meeting family planning needs worldwide [54]. Family planning programs receive less than one percent of international development aid [54]. Increasing spending to fill the

unmet need for family planning services will help address a variety of global challenges, ranging from development and human rights to climate change mitigation and adaptation. Healthy and educated populations are also better equipped to weather the effects of climate change [55]. This much is clear: efforts to address climate change must include increasing access to reproductive health care services, education, and family planning options.

> **"Honoring the dignity of women and children through family planning is not about governments forcing the birth rate down (or up, through natalist policies). Nor is it about those in rich countries, where emissions are highest, telling people elsewhere to stop having children. When family planning focuses on healthcare provision and meeting women's expressed needs, empowerment, equality, and well-being are the result; the benefits to the planet are side effects."**

excerpted from the book, *Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming,* 2017

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