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DEBATE

Demographic dynamics and rights-based population policies for effective climate change adaptation and mitigation

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ABSTRACT Contemporary demographic patterns differ widely between countries. The combined trajectories of population growth and the climate crisis will lead to a redistribution of people on the planet, with urbanization offering both promise and risk for efforts to mitigate climate change. While all individuals contribute to emissions, they do not do so in the same ways, and nor are they affected proportionately. In this paper, we argue for a more evidence-based use of demographic data to bolster the effectiveness of climate change mitigation and adaptation to reduce both population risks and vulnerabilities, and underscore the important role of rights-based, people-centred population policies in climate action. In doing so, we present fresh perspectives for policymakers and researchers dedicated to sustainable development. By aligning adaptation and mitigation strategies with current and future population dynamics, we can identify interventions that create more resilient, equitable and greener societies.

KEYWORDS Demography • Climate change adaptation • Vulnerability • Mitigation • Urbanization • Population policies • Population dynamics

Introduction

In the last 30 years, global temperatures have risen steadily, with 2023 being the warmest year on record, and the 10 warmest years all being recorded in the last decade (World Meteorological Organization, 2024). These changes are already having irreversible effects on natural systems, causing rising sea levels, the melting of the ice sheets, increasing sea temperatures and ocean acidification (Intergovernmental Panel on Climate Change, 2023a). Scientists argue that we have entered a new geological epoch, the Anthropocene, in which humans are the primary drivers of change in the Earth's natural systems, with clear signs that the planet cannot offset the acceleration of the global fossil fuel economy of the past 70 years (Dixson-Declève et al., 2022). The latest estimates suggest that if the current global economic system is not drastically transformed, we will reach 3.2 °C of warming by the end of the century, exposing an estimated 50–75% of the global population to periods of

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"life-threatening climatic conditions" of extreme heat and humidity (Intergovernmental Panel on Climate Change, 2023b).

Population growth and economic growth are often identified as the main anthropogenic drivers of climate change, including global warming (UN DESA, 2021). However, evidence suggests that "rising levels of income per capita have been more important than population growth in driving the increases in resource extraction and material consumption of recent decades" (UN DESA, 2021). Hence, claims that the current pattern of population growth in the developing world is an important driver of climate change should be carefully interrogated, as they re-direct vital advocacy efforts and resources away from more critical climate actions related to demography, and cultivate a false narrative about who and what must change (Kanem, 2017).

While all individuals contribute to emissions, they do not contribute in the same ways, and nor are they affected proportionately. Consumption patterns differ dramatically between countries and communities, regardless of whether they are examined on a per capita basis in a given year or as cumulative effects over time. For example, the Climate Inequality Report 2023 points out that "North America and Europe created half of all accumulated global greenhouse gas (GHG) emissions since 1850. Thus these two continents have contributed as much to anthropogenic climate change as all other countries combined, despite having but a small fraction of the global population" (Chancel et al., 2023). On a per capita basis, residents of the USA, Russia, Japan and China are estimated to generate 14.95, 11.4, 8.5 and 7.99 tonnes of CO_2 per capita, respectively, while people living in Nigeria, Uganda and Mali generate a mere 0.59, 0.31 and 0.13 tonnes of CO_2 per capita, respectively. Hence, there is a more than 100-fold difference in the per capita emissions generated by people living in the USA and people living in Mali (see Figure 1). Between 1990 and 2019, cumulative global emissions increased from 22.77 to 879.77 gigatonnes. The wealthiest 1% of people accounted for 16% of total emissions and the wealthiest 10% accounted for more than half, while the poorest 50% accounted for just 7% (Nilsson Lewis et al., 2023).

Yet it is the poorest countries that are the most impacted and that face the largest economic losses due to the climate crisis, with untold suffering already being experienced by millions in the developing world. The 2023 Climate Inequality Report shows that there is a "strong socio-economic relationship between exposure (and especially vulnerability) and current living conditions, whereby those worse off economically are more affected by the climate crisis than the rest" (Chancel et al., 2023).

In a context of widespread rhetoric about the role of population dynamics in the climate crisis, this paper addresses several overlapping debates: (1) the untapped value of demographic data for mitigating risk (section Demographic diversity and climate risks and vulnerabilities); (2) the rhetoric and the realities of pro-natalist policies and global ageing (section Demographic realities of 2024); (3) the potential to capitalize on the growing urbanization in low-income countries for climate mitigation purposes (Opportunities for adaptation and mitigation in urban planning); and (4) the inevitability of migration and displacement, coupled with the growing need for multi-national resettlement agreements (section Climate-induced population mobility and displacement). In this paper, we argue for a more evidence-based use of demographic data to bolster the effectiveness of climate

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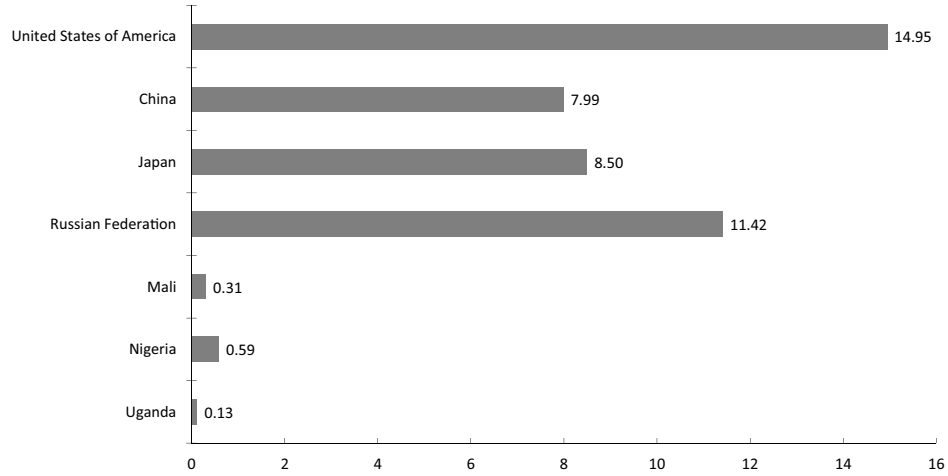
Figure 1 Tonnes of CO_2 per person for selected countries, 2022



Source: Global Carbon Project (2023).
Note: Emissions per person: t CO_2 per person = tonnes of CO_2 per person. CO_2 emissions per person are measured as the total CO_2 produced by a country as a consequence of human activities, divided by the population of that country.

change mitigation and adaptation to reduce both population risks and vulnerabilities, and underscore the important role of rights-based, people-centred population policies in climate action.

Demographic diversity and climate risks and vulnerabilities

It is a feature of the global population today that demographic patterns differ widely between countries. These differences should be accommodated in climate adaptation policies to address the risks and vulnerabilities of specific populations. Population characteristics such as age structure, geographic distribution and patterns of migration each contribute potential vulnerabilities to climate change. For example, older or disabled people face greater health and emergency risks from climate events than younger people, and pregnant women face some of the most critical health risks from excess heat (Vicedo-Cabrera et al., 2021). Across all countries, poor households are experiencing some of the most disruptive effects, including the progressive loss of livelihoods, rising child marriage rates and the dissolution of communities, which have resulted in increasing numbers of climate migrants and climate-related economic refugees. The climate crisis is contributing to changing fertility dynamics as well. There is, for example, evidence that young people are reporting explicit mental health effects from the climate crisis that are affecting their plans for the future and are discouraging them from planning to have children (Hickman et al., 2021;

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Powdthavee et al., 2024; Schneider-Mayerson and Leong, 2020). In countries where populations are undergoing unprecedented ageing and fertility decline, governments are experimenting with a range of pro-natalist policies, some of which threaten reproductive rights.

While the term climate *risks* refers to either climate hazards, such as climate-related events (rising sea levels, unpredictable weather patterns, etc.), or the exposure of people, infrastructure or assets to climate hazards; the term climate *vulnerability* addresses the degree to which individuals, communities or systems are affected by external exposures, or their inherent adaptive capacity to cope with external events, i.e., the ability of populations to adapt to, manage or mitigate such impacts.

The rapid urbanization currently underway in Africa offers considerable potential for implementing climate mitigation policies that would enable urban populations to lower their per capita emissions through more green urban planning. For example, the construction of more dense urban areas with shared access to green spaces, transport and essential services can reduce both residential segregation and the per capita carbon footprint.

Smart leaders invest in demographic knowledge, including in the analysis of population climate risks and vulnerabilities, and integrate demographic planning data into the design of climate adaptation and mitigation measures. Through the use of population projections, they explore likely future demographic scenarios and design climate policies that locate and respond to the most climate-vulnerable communities. Moreover, these leaders plan for the residential, structural and habitat conditions required for future population resilience, and create greener and more sustainable development pathways.

Touching on what is perhaps the most sensitive demographic debate, we observe that climate change is already contributing to increasing numbers of people around the world experiencing habitat loss and displacement. Indeed, nearly all climate projections indicate that there will be further population displacements and growing demands for resettlement solutions. Climate change will lead to worsening levels of water availability, food production, biodiversity and human health and well-being (Intergovernmental Panel on Climate Change, 2023b), and the effects of these developments on people across the globe are expected to be grossly unequal, as the populations with limited economic means to prepare or relocate are likely to be the most severely impacted. Heatwaves, tropical cyclones, floods and rising sea levels are already disproportionately affecting low-income countries, displacing millions of people and rendering their land areas uninhabitable. In the vast semi-arid agrosystems of West and Central Africa (WCA), for example, climate change is undermining the livelihoods of people dependent on agriculture and food economies (McOmber, 2020), leading to competition and conflicts over grazing land and water, and to climate-economic refugees. As the region is home to seven of the 13 countries classified as experiencing medium-intensity conflict (The World Bank, 2021), it is clear that global warming is exacerbating numerous pre-existing challenges, including droughts, floods, desertification, food insecurity, human displacement and political crises. Other critical climate hotspots include Small Island Developing States (SIDS), where sea level rise and more powerful cyclones pose existential risks

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(Mycoo et al., 2022). In such settings, there is an urgent need to understand the topography of population vulnerabilities to climate threats, and to better anticipate which populations are vulnerable to loss and displacement. Despite commitments and pledges from a number of countries to allocate funds to address climate-related vulnerabilities, adaptations and migration actions, these global efforts are far from adequate to support the populations that are already the most impacted.

This is another area where population data offer substantial untapped value, as these data can be used to identify and locate the populations that are most threatened by climate risks and vulnerabilities, i.e., the communities where resilience investments are most needed and will have the greatest impact. For example, geo-referenced data from a population and housing census can be used to generate population density maps for all high-risk, low-elevation coastal zones, thus allowing policymakers to identify the areas where populations would be most impacted. In addition, population data can help policymakers to identify communities that would benefit from resilience investments, and to target improvements in core population capabilities (e.g., access to quality education, knowledge and technology, life-long health, gender equality and access to decent work) that shape vulnerabilities and contribute to local capacities for innovation, adaptation and mitigation. Population data with geographical information can also be used to identify areas lacking critical infrastructure, such as flood defences, storm shelters or reliable communication networks, and to assess service distribution for optimal allocation.

Numerous countries are already capitalizing on population data for climate adaptation purposes and to inform their national climate plans. In Bangladesh, for example, the use of population data in the National Adaptation Programme of Action (NAPA) of 2005 (Ministry of Environment and Forests, 2005), the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) of 2009 (Ministry of Environment and Forests, 2009) and NAPA 2023–2050 (Ministry of Environment Forest and Climate Change, 2022) supported the identification of vulnerable communities, especially those in low-lying coastal areas that are flood- or cyclone-prone. Such demographically-informed climate planning enabled targeted improvements to women's health care, education and economic opportunities, and the optimal placement of resilient housing such as cyclone shelters. In Vietnam, population data have been used to guide the 2008 National Target Program to Respond to Climate Change (NTP-RCC) by mapping areas at high risk of flooding, especially those located within the Mekong Delta, and hence to identify appropriate locations for constructing flood-resistant infrastructure (Asian Development Bank, 2011). In Kenya, the first, second and third National Climate Change Action Plan(s) (NCCAP) 2013–2017 (Government of the Republic of Kenya, 2013); 2018–2022 (Government of the Republic of Kenya, 2018); and 2023–2027 (Government of the Republic of Kenya, 2023) used data on population and drought response to improve resource allocation and livelihoods.

Far more demographically-informed climate policies are needed. In this paper, we argue not only for more evidence-based use of local demographic data for climate mitigation and adaptation purposes, but also for integrating climate projections and risks into population policies, and crafting population policies that prioritize human development and capabilities in light of demographic and climate trends.

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Demographic realities of 2024

Today's demographic realities are characterized by extraordinary diversity across countries. While a small number of countries continue to grow rapidly and will account for half of global population growth in the coming 25 years, more than 60% of the global population now live in a country where fertility is below the replacement level (i.e., the total fertility rate below 2.1), and more than 60 countries are projected to undergo population decline by 2050.

This diversity includes differences in numerous demographic characteristics that can shape climate risk and vulnerabilities, and can thus influence decisions regarding how best to protect people from the consequences of climate change. For example, one aspect of the present demographic diversity is that the median ages of national populations have never been so far apart: while the median age in Europe and North America is 40.9 years, the median age in sub-Saharan Africa is 18.1 years (UN DESA, 2024) This gap in the median age translates into many different responses and vulnerabilities to climate adaptation and mitigation.

For the increasing number of countries that are ageing rapidly, it will be crucial to recognize that climate change has a disproportionate effect on the health of older people, as they have less adaptive capacity than younger people. During heatwaves, older people's ability to thermoregulate can be impaired, and they are the most susceptible age group to ill health effects, with even mild dehydration having a direct impact on their cognitive performance and other bodily functions (Harper, 2019).

Older populations are also less likely to leave their homes during storms, hurricanes and other climate events, and they are less likely to migrate away from areas of growing climate vulnerability. As well as integrating ageing into their population policies, countries with older populations need to accommodate the climate vulnerabilities of older persons, adapt their emergency response systems to enable them to locate and attend to older residents, and ensure that residential and long-term care facilities and age-friendly cities protect older residents from the risks of heat and storms.

Younger people of today will experience the climate crisis differently than older people. Young people already recognize a direct correlation between what we do now and their future, knowing that the actions we take currently will have lifelong implications for them. According to the IPCC, children aged ten or younger in 2020 are projected to experience almost a four fold increase in extreme events by 2100 under a 1.5 °C warming scenario, and a five fold increase under a 3 °C warming scenario. By comparison, a person aged 55 in 2020 would not experience such an increase in exposure to extreme weather events in their remaining lifetime under any warming scenario (Intergovernmental Panel on Climate Change, 2023b).

These different lifetime risks highlight the challenges that younger generations now face in adapting to future increases in temperature. The economic burden of adapting to and recovering from frequent extreme weather events due to rising temperatures will be substantial, affecting infrastructure, livelihoods and global economies. Future generations may also face far greater global, regional and national inequalities, as climate change disproportionately affects vulnerable communities, raising ethical concerns about

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intergenerational justice and the responsibilities of current generations to mitigate the risks and consequences of climate change.

There is already evidence that the stress of climate change is affecting the attitudes and outlooks of young adults, although data on this topic currently exist for only a small number of countries. Hickman et al (2021) surveyed 10,000 young people aged 16–25 years in 10 countries, asking them about their thoughts and feelings regarding climate change. The respondents across all countries expressed worry about climate change (59% were very or extremely worried and 84% were at least moderately worried). More than 50% of the respondents reported feelings of sadness, anxiety, powerlessness, helplessness and guilt, with more than 45% saying that their feelings about climate change negatively affected their daily lives and functioning. In addition, the respondents rated governmental responses to climate change negatively, and reported strong feelings of betrayal (Hickman et al., 2021). Other studies have found that young people's anxiety about the impact of the climate on their future is affecting their fertility preferences, contributing to lower aspirations to have children (Powdthavee et al., 2024; Schneider-Mayerson and Leong, 2020).

Despite such changes in fertility aspirations, countries with large youthful populations also have higher fertility, and it is in the youngest countries of Africa and South Asia where the highest proportions of pregnancies and births will occur in the coming decades. This is critical, given that excess heat has especially adverse effects on pregnant women and on healthy pregnancy outcomes. Thus, greater attention should be paid to reproductive health care and related infrastructure in climate National Adaptation Plans and investments. Additionally, in high-fertility countries, it is crucial to promote environmental awareness and a low-carbon future among younger generations. There are already numerous examples of youth environment programmes, such as the Ethiopia Climate-Resilient Green Economy (CRGE) Strategy (Government of Ethiopia, 2011), which aims to build a green economy by integrating climate resilience into the national development agenda, promoting climate change awareness in school, and encouraging students to participate in environmental clubs and activities that promote sustainability practices. Other initiatives include the Nigeria 2021 Revised National Climate Change Policy (Federal Ministry of Environment, 2021), which aims to raise awareness about climate change and promote environmentally friendly practices, such as tree planting, waste management and energy conservation projects.

Opportunities for adaptation and mitigation in urban planning

Ultimately, the combined trajectories of population growth and the climate crisis anticipate a redistribution of people on the planet, and urbanization offers both promise and risk for climate change mitigation efforts. Populations living in urban, peri-urban and informal settlements are often more vulnerable to extreme weather events (Satterthwaite, 2017) such as flooding, landslides and heatwaves. People living in slums and informal settlements are especially exposed to extreme weather events because of the poor waste disposal practices, inadequate drainage, overcrowding, insufficient ventilation and lack of cooling systems in these settlements, all of which further amplify the impacts of climate change.

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According to the latest UN population projections (UN DESA, 2019), the urban population will grow by an additional 2.5 billion by 2050. Most of the population increases in urban areas will take place in Asia and Africa. The proportion of people living in urban areas in Africa will increase from 40% today to 60% in the next 30 years. This rapid urbanization will reflect both migration into cities and population growth in urban settlements (African Development Bank, 2018).

How we plan and adapt urban areas will determine the per capita emissions of these additional 2.5 million urban residents. The planning typology of new cities and growing urban settlements will significantly affect the overall regional and global trajectories of carbon dioxide reduction over the next few decades (Georgescu et al., 2021; Mahtta et al., 2022). Scientific evidence regarding the planning and infrastructure requirements of green cities already exists (Wheeler and Rosan, 2021), including knowledge about the mechanisms needed to reduce social inequalities and material consumption, as well as per capita emissions (Zhang et al., 2023).

This underscores the importance of integrating climate and population policies, and of regulating urban planning to ensure that cities achieve green, social and economic sustainability by minimizing their energy use, waste, heat output and air and water pollution. It also presents a powerful opportunity for mayors and other government leaders to promote investments that are inclusive, safe, resilient and sustainable, and to make urbanization an instrument for climate action.

Brazil's National Adaptation Plan(s) to Climate Change (PNA) for 2017 (Ministério do Meio Ambiente, 2017) incorporate population information to identify climate vulnerabilities in densely populated urban areas that are exposed to extreme weather events, and support adaptation strategies to improve drainage structures and promote the optimal location of green urban areas. Other examples of green city programmes include the Accra Urban greening and waste management initiatives (Abuaku, 2020; Ministry of Sanitation and Water Resources, 2021; White, 2023), which promote tree planting and urban greening to improve air quality and urban aesthetics, and encourage waste management and promote recycling to reduce landfill waste. In addition, the Cape Town Climate Action Plan and Carbon Neutral 2050 Commitment (City of Cape Town, 2020, 2021) supports energy efficiency in buildings, promotes renewable energy sources, and supports the preservation and expansion of urban green spaces and biodiversity corridors.

Climate-induced population mobility and displacement

We humans have mostly lived under the same climate conditions for about 6,000 years. But as temperatures and precipitation patterns shift, populations across the world are also shifting. A World Bank assessment found that in the absence of concrete climate and development action, climate change could lead to more than 219 million people migrating within their own countries in six regions by 2050 (86 million in sub-Saharan Africa, 17 million in Latin America, 40 million in South Asia, 49 million in East Asia and the Pacific, five million in Eastern Europe and 19 million in North Africa). The report also found that people who experience water scarcity, lower crop productivity, sea level rise or other extreme weather

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events will be more likely to migrate. However, the report estimated that if countries took positive actions to curb global emissions and implemented other policies to address the socio-economic drivers of migration, this internal migration could be reduced by 80% (Clement et al., 2021).

Rising sea levels will have an increasing impact on vulnerable low-lying coastal populations, impacting habitability and leading to out-migration and displacement. The AR6 of the Intergovernmental Panel on Climate Change (IPCC) recently recognized that these populations are particularly affected by climate change through sea level rise and the increasing occurrence of cyclones and floods, all of which directly and indirectly affect health infrastructures and economic systems. A large portion of the populations of the Small Island Developing States (SIDS) will either choose or be forced to migrate or resettle in other locations (Mycoo et al., 2022).

These forced displacements can jeopardize human rights and capabilities, obstructing access to education, health services and economic opportunities. Policies that recognize the inevitability of increasing numbers of climate-related migrants are needed to protect the rights of those who are forced to relocate, and of those who decide not to move. In this context, population and climate policies are deeply intertwined and need to be mutually reinforcing to protect the rights of affected persons; to acknowledge the growing number of climate-related migrants; and to move migration "politics" towards greater cooperation between nations on migration and resettlement solutions.

Population policies for climate change mitigation and adaptation

The attention paid to demographic trends in the context of climate action is too often focused on high fertility in the poorest countries, where the people contribute the least to global emissions. While many high-fertility countries would indeed benefit from increased national investments in family planning, reproductive health care and women's empowerment, a climate narrative focused principally on high fertility reflects the misguided equation of "numbers of people" with emissions, and an under-appreciation of how population and climate policies can, and should be, more effectively aligned. Such false equations can not only deflect national and global attention away from the tough work of changing patterns of production and consumption, but they can also distract leaders (and the public) from the more valuable work of using demographic knowledge to formulate population policies that align the planning of residential areas, transport routes and public services (e.g., healthcare facilities) with climate adaptation and mitigation priorities.

Population policies are policies that use demographic, economic and social evidence to promote the well-being and capabilities of people, and to improve their opportunities to thrive. This year marks the 30-year anniversary of the International Conference on Population and Development (ICPD), which was a historic inflection point in efforts to move population policies and programmes away from a focus on human numbers and towards a focus on human rights, reproductive health and sustainable development (United Nations, 1994). Accepted by 179 governments, the ICPD Programme of Action (PoA) emphasized the integral and mutually reinforcing linkages between population

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and development and the need for population and development plans based on principles of human rights, inclusion, equality and universality, with gender equality being placed at its core, and reproductive health being recognized as a basic right.

The ICPD challenged the historic notion of population policies as instruments for controlling population size through measurable policy targets and desired fertility levels in society, which put potentially damaging pressure on women to conform to reproductive norms. Thus, the ICPD Programme of Action represented a paradigm shift, as it recognized that demographic trends are influenced by a complex and interconnected set of social, cultural, economic, environmental and political factors, and therefore require comprehensive and holistic policy responses, the main aim of which is to *enable* people to have and to afford to support the number of children they desire, thereby exercising their reproductive rights to both avoid unwanted pregnancies and, equally, to conceive, bear and raise the number of children they desire.

Against this backdrop, a country's population policies can lay out its vision for integrating demographic patterns and trends in the context of rights-based sustainable development. This vision can be channelled into a standalone population policy or integrated into sectoral policies that recognize and project how population dynamics will affect broader sustainable development outcomes.

An example of standalone population policies that integrate climate adaptation or mitigation efforts is the 2023 Kenya National Population Policy for Sustainable Development, which emphasizes the need to integrate population factors into climate adaptation and mitigation strategies. Another example is the 2012 Bangladesh National Population Policy, which acknowledges the link between population growth and environmental sustainability, highlighting the importance of family planning in reducing vulnerability to climate change and integrating climate change education into school curricula to raise awareness among young people. The development of the national population policy has also helped to enable the integration of population risks and vulnerabilities into the 2015 Bangladesh National Strategy on the Management of Disaster and Climate-Induced Internal Displacement. This strategy addresses displacement caused by climate change and natural disasters by identifying vulnerable communities and preplanning their relocation and rehabilitation.

With many shared principles, climate adaptation policies are generally aimed at reducing population risks and vulnerabilities, and at enhancing the resilience of social, economic and environmental systems to climate change (Intergovernmental Panel on Climate Change, 2022a). These goals can be found in National Adaptation Plans; sector-specific, ecosystem-based, community-based adaptation policies; infrastructure and urban planning; and other insurance and financial instruments (Intergovernmental Panel on Climate Change, 2022). In contrast, mitigation policies are designed to reduce greenhouse gas emissions and enhance carbon sinks to mitigate the impact of climate change. These goals are reflected in the Nationally Determined Contributions, renewable energy policies, energy efficiency policies, carbon pricing, forestry and land use policies, transport policies and other industrial emission reduction policies (Intergovernmental Panel on Climate Change, 2022b; The World Bank, 2016). All such climate plans can be adapted by countries to accommodate their current demographic reality, and to prepare for their demographic future. As described above, the integration of demographic considerations into national adaptation

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and mitigation plans may offer previously untapped opportunities to support human-centred and rights-based measures in national adaptation and mitigation responses.

The recent emergence of pro-natalist population policies aimed at reversing fertility decline in a number of countries is an example of a policy approach in which climate action, population policy and human rights goals are not well integrated. Such policies not only undermine women's empowerment (Asadisarvestani and Sobotka, 2023) and reverse reproductive rights that were widely affirmed by the ICPD PoA 30 years ago, but also challenge sustainability, as most of these pro-natalist policies are being promoted in large countries with some of the highest per capita carbon emissions, including the Russian Federation and China. Fertility increases in these countries could have far more deleterious effects on global emissions than the current high fertility levels of the Global South.

Based on the principles adopted at the ICPD in 1994, population policies optimize development only to the extent that they promote and protect women's empowerment, gender equality and the rights of all persons to decide on the timing and the number of children they desire. Rights-based population policies can strengthen resilience and adaptation to climate change by ensuring that all people have sound knowledge about climate risks and vulnerabilities, and by promoting the inclusion of women and high-risk communities in climate planning. Targeted improvements in infrastructure, healthcare, education and economic opportunities are critical to bolster a community's capacity to handle acute assaults and chronic degradation related to climate change.

Population policies can also inform and provide rights-based standards of support when population relocation and resettlement programmes are needed for populations in high-risk areas. Migration can serve as an adaptation measure when human rights considerations are given appropriate weight. Migration is an example of a phenomenon for which population and climate policies must be considered in tandem. Far greater coordinated support between nations and the recognition of the inevitability of increased human mobility are needed in light of the climate crisis.

The use of population projections can aid in scenario planning; in improving our understanding of demographic patterns of vulnerability; and in the design of interventions that protect the most vulnerable, such as older persons living alone, individuals living with disabilities, people living in coastal areas, the housing-challenged and individuals vulnerable to climate impacts. For example, census data can be used to identify older persons living alone who may need special assistance during climate-related disasters or climate extremes.

Population policies can also support the development of climate mitigation policies, and provide a demographic context for policies designed to reduce pressure on resources, promote sustainable resource management practices, reduce environmental degradation and preserve natural ecosystems; or for policies that reduce emissions from transport and infrastructure. By focusing on the well-being and capabilities of people and optimizing their opportunities to thrive, population policies can contribute to both climate adaptation and mitigation, and support comprehensive rights-based solutions to sustainable development.

In rapidly urbanizing countries, more attention should be paid to the latest research on sustainable urban planning and designs for greener and healthier cities. Key design features include core people-centred, dense and green residential areas with pedestrian-friendly and

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sustainable infrastructure and public services. These features can all contribute to both mitigation and adaptation measures. By encouraging sustainable urban planning, population policies can also promote social and economic goals, such as those related to housing and food security, intergenerational work and friendships, the integration of migrants and equal access to sexual and reproductive health services.

In summary, population policies can aid in the alignment of both climate adaptation and mitigation strategies with current and future population dynamics by offering a range of policy interventions that create more resilient, equitable and greener societies for both present and future generations. The principles of human-centred population policies that were widely endorsed in 1994 are highly relevant today, and offer critical guidance for the alignment of climate adaptation and mitigation policies with national demographic realities.

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