

JULY 2023



Population and Climate Change Vulnerability:

Understanding Current Trends to Enhance Rights and Resilience



The background of the page is a light purple color with a pattern of small, white human icons. These icons are arranged to form the outline of a world map, with a higher density of icons in the Americas and Europe, and fewer in Africa and Asia. The icons vary slightly in size and orientation, creating a textured, mosaic-like effect.

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Acknowledgments

The Population Institute is deeply grateful for the comments, insight, and support of the following individuals in the creation of this report: Taira Bhargava, Tanja Bos, and Céline Delacroix.



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KEY MESSAGES

- Populations are growing significantly faster than the global average pace in countries that are highly vulnerable to human-caused climate change.

- Rapid population growth exacerbates multiple dimensions of climate change vulnerability. Foremost among these dimensions are the scale of human **exposure** to climate change impacts, the **sensitivity** to climate variations of such necessities of life as food and water, and the **capacity for societies to adapt** to rapid and ongoing environmental change.

- Gender inequity leaves many women and girls disproportionately vulnerable to the impacts of climate change. Promoting gender equity—especially through incorporating gender-responsive strategies in adaptation efforts—helps to build resilience and adaptive capacity.

- Adaptation plans can be strengthened through the incorporation of interventions that empower people while addressing key drivers of rapid population growth. The critical interventions—yielding multiple benefits in addition to climate-related resilience—are investing in rights and opportunities for women and girls, addressing people’s sexual and reproductive health needs, and advancing reproductive autonomy.

- Many initiatives around the world focus on the intersections of population, gender equity, and climate change resilience. Their examples offer hope for greater stability, development, and prosperity in the face of the emerging impacts of climate change—and for a more just and sustainable future.

PART 1: POPULATION AND CLIMATE CHANGE VULNERABILITY WORLDWIDE



PART 1

Population and climate change vulnerability worldwide



1.1 Overview

In 2022, the world's population surpassed 8 billion people. Global population is projected to continue growing throughout this century. While the path of future population growth is dependent on many factors, by 2100 demographers expect the world's population to be between 8.9 and 12.4 billion.¹ Population trends differ dramatically around the world, however, with many countries experiencing stable or declining populations, while others continue to experience rapid growth.

In any discussion of the challenges that come with a warming world,

it is important to note that human-induced climate change has been driven by disproportionate consumption patterns in the Global North, and that the countries that are most vulnerable to the impacts of climate change bear little to no responsibility for creating the climate crisis. Addressing the climate crisis requires political commitment and significant investment from countries in the Global North to shift patterns of production and consumption, in addition to robust support for a clean energy transition and resilience in countries that are most vulnerable.

This report demonstrates that in many of the countries most vulnerable to the impacts of climate

change, populations are growing significantly faster than in the world as a whole. This rapid growth tends to exacerbate vulnerability at the household, community, and national level, as increasing human needs face growing strains from ever more damaging extremes of weather and water in a warming world. At the same time, rapid growth can undermine efforts to build resilience and adaptive capacity. Yet few climate change adaptation plans assess demographic factors in preparing for a near-certain future of climate change vulnerability. Nor do the plans incorporate interventions designed to address population-related challenges. Such interventions could include efforts

to support people’s reproductive autonomy and gender equity, which have been shown to strengthen the resilience and adaptive capacity of the current generation, while reducing fertility and thereby slowing population growth over the long term.

The report brings together population, gender, and reproductive health indicators for the 80 most vulnerable countries in the world, as ranked by the Notre Dame Global Adaptation Initiative. It describes global trends in population growth and climate change vulnerability. And it highlights five countries around the world where the convergence of these trends creates significant challenges for resilience and adaptation over the long term. However, community efforts in these countries demonstrate innovative policy and program approaches that advance gender equity, reproductive health and rights, and climate change adaptation in an integrated fashion. Scaling up such efforts offers significant untapped opportunity to strengthen both near-term and long-term prospects for adaptation and resilience.

1.2 Climate Change Vulnerability

Climate change vulnerability is defined as “the propensity or predisposition of human societies to be negatively impacted by climate hazards.”² Measures of vulnerability take into account a wide range of factors, from the severity of climate change impacts—extreme heat, storms, droughts, melting glaciers, rising seas, and forest fires are the deadliest and most damaging—in a particular geographic location, to the ways in which public infrastructure and livelihood strategies shape people’s lives. Social factors—ways that societies organize themselves—can shape people’s agency and

“Vulnerability to climate change for ecosystems will be strongly influenced by past, present, and future patterns of human development, including from unsustainable consumption and production, increasing demographic pressures, and persistent unsustainable use and management of land, ocean, and water.”

— SYNTHESIS REPORT OF THE IPCC SIXTH ASSESSMENT REPORT

access to resources in ways that powerfully influence vulnerability.

As noted by the Intergovernmental Panel on Climate Change (IPCC), past, present, and future patterns of human development are powerful forces in determining vulnerability. Persistent patterns of unsustainable consumption and production, unsustainable use of natural resources, and population growth all present challenges to our abilities to navigate the negative impacts of a changing climate.³

This report relies on the measurements of the Notre Dame Global Adaptation Initiative (ND-GAIN) vulnerability scores for comparing key data of countries vulnerable to climate change impacts.⁴ ND-GAIN creates measures of the vulnerability of a country by considering life-supporting sectors including food, water, health, ecosystem services, human habitat, and infrastructure. Each of these sectors is assessed through an analysis of data that sheds light on cross-cutting components of

vulnerability, including exposure, sensitivity, and adaptive capacity (see box).

1.3 Population Growth and Climate Change Vulnerability

Population growth has important implications for the three cross-cutting components of climate change vulnerability: exposure, sensitivity, and adaptive capacity.

Exposure

In measuring vulnerability related to exposure, ND-GAIN assesses projected changes in variables such as freshwater availability due to reduced annual runoff and groundwater recharge, longer and warmer periods of high heat, increases in flooding, and rising sea levels. A growing population means that the number of people exposed to such impacts will increase over time. In the most vulnerable countries, population is growing fast: **While the world’s population is currently growing at 0.9 percent a year, in the 80 most climate-vulnerable countries, population is growing on average at twice that pace, 1.8 percent a year.** If this rate of growth remained stable, populations in these countries would double in less than four decades. Populations in a dozen of the most vulnerable countries are growing at more than three times the global average speed.

Sensitivity

Population growth influences sensitivity to climate change impacts that is embedded in various measures of vulnerability. Factors influencing this sensitivity include people’s dependency on “natural capital” (resources stemming from the living

and non-living natural world), the proportion of the population living in informal housing, and the rate of freshwater withdrawal. Worldwide, agriculture uses an average of 70 percent of all freshwater withdrawals, rising to 90 percent in many poorer countries.⁵ In many of the most vulnerable countries, large majorities of the population work in agriculture, and many households' food security is linked to small-holder farming, much of which is rainfed. Already, food security is a significant challenge for vulnerable countries: **In the 80 countries assessed in this report, the average proportion of the population experiencing severe food insecurity is 20 percent.** Population growth will further challenge efforts to effectively address hunger, particularly as countries—many of them already experiencing subdivision of farmland,

soil mining and erosion, and freshwater demand approaching the limits of natural systems—grapple with rising temperatures and shifting rainfall patterns driven by climate change.

Where and how people live also has significant implications for sensitivity to climate change impacts. Currently, about one quarter of the world's population lives in the near coastal zone, and evidence suggests that population in this zone is growing faster than the global average.⁶ This zone is also increasingly urban, with nearly a quarter of those in urban centers concentrated in informal housing, characterized by poor access to basic services such as potable water, sanitation, power, accessibility, stormwater control and health care.⁷

Adaptive capacity

In assessing vulnerability related to the capacity for communities to adapt to the negative impacts of climate change, ND-GAIN incorporates multiple indicators including access to improved sanitation, electricity access, and disaster preparedness.

Under conditions of rapid population growth, governments will be further strained in their ability to provide basic services that are already insufficient in many of the most vulnerable countries. Already, one-third of the world's population—mostly in least developed countries and small island developing states—are not covered by early warning systems that enable communities to anticipate storms, heatwaves, floods, and droughts.⁸

1.4 Gender Inequity and Climate Change Vulnerability

As noted by UN Women, the climate crisis is anything but “gender neutral.” Numerous studies indicate that the impacts of climate change disproportionately affect women and girls.¹⁰ In many regions, women and girls bear primary responsibility for securing food, water, and fuel for their households, all of which are sensitive to changes in climate. This has implications for how women and girls spend their time, the opportunities they forego, and the risks they encounter.* Such impacts amplify existing gender inequalities, and they interact as well with inequalities faced by indigenous communities, older people, LGBTQ+ people, people with disabilities, migrants, and those living in conflict and disaster-prone areas.

CROSS-CUTTING COMPONENTS OF CLIMATE CHANGE VULNERABILITY, AS ASSESSED BY ND-GAIN

Exposure: The extent to which human society and its supporting sectors are stressed by the future changing climate conditions. Exposure as measured by ND-GAIN captures the physical factors external to human systems that contribute to vulnerability.

Sensitivity: The degree to which people and the sectors they depend upon are affected by climate related perturbations. Sensitivity increases with societies' dependence on sectors and resources that tend to change significantly with climate change. Sensitivity increases when larger proportions of a society are vulnerable to climate hazards due to topography and demography among other factors.

Adaptive capacity: The ability of society and its supporting sectors to adjust to reduce potential damage and to respond to the negative consequences of climate events. In ND-GAIN, adaptive capacity indicators seek to capture a collection of means, readily deployable to deal with sector-specific climate change impacts.

Women and girls are powerful agents of change in their households, communities, and nations, and empowering them can add significant and lasting impact to climate change responses.

*In this report, we use the terms “women” and “girls” when describing research findings and trends that did not measure experiences and outcomes for gender-diverse people. Otherwise, the Population Institute is committed to using gender-inclusive language to represent all individuals.



At the same time, women and girls are powerful agents of change in their households, communities, and nations, and empowering them can add significant and lasting impact to climate change responses. For example, women around the world play important roles in agricultural production, yet often do not have equal access to extension services and other resources and are excluded from consultation processes regarding agriculture. One study found, for example, that if all women smallholder farmers had equal access to resources, their farm yields would increase by 20 to 30 percent, and as many as 150 million people would be lifted from hunger.¹¹

There are growing calls around the world for climate change adaptation action to move beyond sensitivity to gender differences to being gender-responsive—that is, actively promoting gender equality through collective responses to climate change. This includes, for example, recognizing gender differences in needs, opportunities, and capacities; supporting equitable participation and influence in climate change

decision-making processes; and ensuring equitable access to financial benefits and other resources resulting from investments in climate action.¹² The UN Framework Convention on Climate Change (UNFCCC) has acknowledged that better integration of women and other marginalized groups into decision-making at all levels would improve climate change adaptation policies.¹³ The UNFCCC Gender Action Plan, adopted by countries at the 2019 international climate negotiations, aims to advance gender-responsive climate action.¹⁴

The UN Development Programme’s Gender Inequality Index (GII) reflects gender-based disadvantage in three dimensions—reproductive health, empowerment, and the labor market.¹⁵ It ranges from zero, where women and men fare equally, to 1, where women fare as poorly as possible in all measured dimensions. In the United States, GII is 0.179, suggesting that there is still room for progress in advancing gender equality. By contrast, in many countries, women and girls are at significantly greater disadvantage: **in the 80 most climate-vulnerable countries, the average GII is 0.521.**

1.5 Sexual and Reproductive Health and Rights in the Context of Climate Change

Sexual and reproductive health and rights (SRHR)—including access to voluntary family planning founded in human rights, reproductive autonomy, and educational advancement—are critical to advancing gender equity in the face of responding to climate change challenges. Access to family planning and other sexual and reproductive health services fosters gender equity by improving women’s health, empowering women, and freeing them to pursue education, employment, and other life opportunities.¹⁶ A key component of this is the ability to achieve one’s desired family size and avoid unintended pregnancy, and yet, nearly half of all pregnancies worldwide are unintended—a trend that the UN Population Fund has called a “neglected crisis.”¹⁷ The ability to plan and space births better

The ability to plan and space births better equips individuals and families to navigate and survive shocks and stressors in their lives, including the impacts of climate change. Over the long-term, it will also slow population growth by enabling people to avoid unintended pregnancy and achieve their desired family size.

equips individuals and families to navigate and survive shocks and stressors in their lives, including the impacts of climate change. Over the long-term, it will also slow population growth by enabling people to avoid unintended pregnancy and achieve their desired family size.

Furthermore, the impacts of climate change can negatively affect people's sexual and reproductive health and the exercise of their rights. For example, extreme weather events affect health facilities, infrastructure, and medical supply chains, disrupting access to sexual and reproductive health services. Climate shocks and stresses can reduce household resources available for health care and increase incidences of gender-based violence, including early marriage, sexual violence, and sex trafficking.¹⁸

Our analysis of SRHR indicators in the most vulnerable countries demonstrates significant deficits in

meeting the sexual and reproductive health needs of women and girls. For example:

- **Adolescent birth rate:** Globally, 41 of every 1000 girls aged 15-19 give birth each year. In the 80 most vulnerable countries, this number jumps to an average of 76.
- **Maternal mortality:** In the 80 most vulnerable countries, the maternal mortality ratio is 25 percent higher than in the world as a whole.
- **Unmet need for family planning:** In the 80 most vulnerable countries, the average unmet need for family planning among women who would like to delay pregnancy or end childbearing is nearly double the global average.

These sexual and reproductive health deficits deepen people's vulnerability to the negative impacts of climate change, and limit the ability of individuals, families, and communities

to effectively respond to changing conditions around them. Addressing these challenges in the context of climate change adaptation plans offers opportunities for strengthening adaptive responses.

“The effects of climate change include food and water insecurity, civil conflicts, extreme weather events, and spread of disease—all of which put women at elevated risk of disease, malnutrition, sexual violence, poor mental health, lack of reproductive control, negative obstetric outcomes, and death. These factors also harm the health of communities and future generations, such as the erosion of the health care infrastructure needed to support healthy women and healthy families and studies suggesting an association between extreme temperatures and preterm birth and low weight.”

– “ADDRESSING CLIMATE CHANGE,” POSITION STATEMENT OF THE AMERICAN COLLEGE OF OBSTETRICIANS AND GYNECOLOGISTS, 2021



1.6 Population, Gender, and SRHR in National Adaptation Plans

National climate change adaptation plans seldom assess demographic factors in preparing for future climate change vulnerability or incorporate interventions, such as strengthening access to voluntary family planning and sexual and reproductive health services, that would build people's resilience and adaptive capacity while mitigating population-related challenges.

For example, a 2010 review of National Adaptation Programmes of Action (NAPAs)—documents developed by many low- and middle-income countries that identified their immediate adaptation needs—highlighted how the adaptation agenda has failed to adequately address population issues and reproductive health/family planning (RH/FP). The review found that a majority of the 44 NAPAs assessed identified rapid population growth as a key component of vulnerability to climate change impacts, but very few chose to prioritize NAPA funds for RH/FP programming.¹⁹

A 2022 review of National Adaptation Plans (NAPs)—prepared by countries to address medium- to long-term adaptation needs—found limited attention to issues of sexual and reproductive health (SRHR) in NAPs: Only 10 of the 19 documents reviewed contain any specific references to the components of SRHR included in the analysis.²⁰

A 2022 review of 164 Nationally Determined Contributions (NDCs)—documents prepared by countries for the UN Framework Convention on Climate Change that outline their plans to reduce emissions and adapt



“Attention to the following has the potential to bring about change: ...Increased access to reproductive health and family planning services, which contributes to climate change resilience and socioeconomic development through improved health and well-being of women and their children, including increased access to education, gender equity and economic status.”

– IPCC SIXTH ASSESSMENT REPORT, WGII

to climate change impacts—found that about one-third either link population growth to a negative effect and/or identify population growth as a challenge or trend affecting

societal needs. Common impacts of population growth noted were increased energy demand, natural resource degradation, vulnerability to climate impacts, and decreased food and water security. Only seven NDCs included strategies related to population growth, and none specified implementation measures.²¹

1.7 The way forward

Population growth trends, gender inequity, and people's lack of sexual and reproductive rights all have intimate connections to vulnerability and the capacity for people and communities to adapt to the negative impacts of climate change. While these factors are not typically assessed and addressed in climate change adaptation policies and plans, examples of holistic, multisectoral efforts from around the world—outlined in Part 3 of this report—demonstrate that such integration is possible, and offer hope for more just and sustainable adaptation outcomes.

PART 2: INDICATORS FOR THE 80 MOST VULNERABLE COUNTRIES



PART 2

Indicators for the 80 Most Vulnerable Countries

Country	ND-GAIN Vulnerability Rank	Population, millions (2023)	Population Growth Rate (2023)	Population Doubling Time, years	Gender Inequality Index	Adolescent Birth Rate per 1000 age 15-19	Maternal Mortality Ratio per 100K live births	Total Fertility Rate (2023)	Unmet Need for FP Married Women 15-49	% Severe Food Insecurity (2019-2021)
World		8045.3	0.9	76		41	223	2.31	11	11
USA	160	340.0	0.5	129	0.179	15	21	1.66	6	1
Niger	1	27.2	3.7	19	0.611	132	441	6.67	19	
Somalia	2	18.1	3.1	23		116	621	6.1	26	42
Chad	3	18.3	3.1	23	0.652	139	1063	6.12	24	
Guinea-Bissau	3	2.2	2.1	33	0.627	84	725	3.84	19	29
Sudan	5	48.1	2.6	27	0.553	87	270	4.32	27	17
Liberia	6	5.4	2.2	32	0.648	128	652	3.95	32	37
Mali	7	23.3	3.1	23	0.613	164	440	5.79	24	
Central African Rep.	8	5.7	2.9	24	0.672	184	835	5.83	25	62
Eritrea	9	3.8	1.8	39		76	322	3.71	28	
Dem. Rep. of the Congo	10	102.3	3.2	21	0.601	109	547	6.05	25	39
Rwanda	10	14.1	2.3	31	0.388	31	259	3.69	13	
Micronesia	12	0.5	1	72		33	74	2.74		
Uganda	13	48.6	2.8	25	0.530	128	284	4.36	21	23
Afghanistan	14	42.2	2.7	26	0.678	62	620	4.41	24	23
Tonga	14	0.1	0.9	82	0.631	21	126	3.15	25	6
Benin	16	13.7	2.7	26	0.602	108	523	4.82	30	14
Mauritania	17	4.9	2.7	26	0.632	90	464	4.27	32	7
Solomon Islands	19	0.7	2.2	32		78	122	3.87	18	
Ethiopia	19	126.5	2.5	28	0.520	73	267	3.98	21	20
Sierra Leone	20	8.8	2.1	33	0.633	102	443	3.79	24	32
Madagascar	21	30.3	2.4	29	0.556	143	392	3.73	14	10
Burundi	22	13.2	2.7	26	0.505	58	494	4.88	27	
Yemen	22	34.5	2.2	32	0.820	67	183	3.64	23	
Zimbabwe	24	16.7	2.1	33	0.532	108	357	3.39	9	31

Country	ND-GAIN Vulnerability Rank	Population, millions (2023)	Population Growth Rate (2023)	Population Doubling Time, years	Gender Inequality Index	Adolescent Birth Rate per 1000 age 15-19	Maternal Mortality Ratio per 100K live births	Total Fertility Rate (2023)	Unmet Need for FP Married Women 15-49	% Severe Food Insecurity (2019-2021)
World		8045.3	0.9	76		41	223	2.31	11	11
USA	160	340.0	0.5	129	0.179	15	21	1.66	6	1
Malawi	25	20.9	2.6	27	0.554	136	381	3.79	14	51
Vanuatu	25	0.3	2.3	30		81	94	3.66	19	2
Burkina Faso	27	23.3	2.5	28	0.621	127	264	4.57	23	19
Gambia	28	2.8	2.5	28	0.611	65	458	4.5	24	27
Bangladesh	29	173	1	68	0.530	74	123	1.94	12	11
Papua New Guinea	30	10.3	1.8	38	0.725	68	192	3.1	24	
Guinea	31	14.2	2.4	29	0.621	120	553	4.22	23	49
Senegal	31	17.5	2.6	27	0.530	71	261	4.25	21	11
Comoros	33	0.9	1.8	38		38	217	3.85	29	27
Haiti	33	11.7	1.2	57	0.635	55	350	2.73	33	45
Myanmar	35	54.6	0.7	96	0.498	25	179	2.12	13	4
Pakistan	35	240.5	2	35	0.534	54	154	3.35	17	9
Sao Tome & Principe	37	0.2	1.9	36	0.494	86	146	3.62	25	14
Laos	38	7.6	1.4	51	0.478	83	126	2.41	13	8
Kenya	39	55.1	2	35	0.506	73	530	3.24	14	26
Maldives	39	0.5	-0.6		0.348	5	57	1.67	29	2
Congo	41	6.1	2.3	31	0.564	72	282	4.03	18	56
Nepal	42	30.9	1.1	62	0.452	63	174	1.99	21	14
Togo	42	9.05	2.3	30	0.580	79	399	4.14	30	19
Zambia	42	20.6	2.7	25	0.540	135	135	4.18	18	33
Tanzania	45	67.4	2.9	24	0.560	139	238	4.59	19	26
Bhutan	46	0.8	0.6	110	0.415	8	60	1.39	12	
eSwatini	47	1.2	0.8	85	0.514	87	240	2.75	12	18
Mozambique	48	33.9	2.8	25	0.537	180	127	4.48	21	40
Côte d'Ivoire	49	28.9	2.5	28	0.613	119	480	4.29	26	9
Cambodia	50	17	1.1	66	0.461	57	218	2.28	10	15
India	51	1428.6	0.9	75	0.490	11	103	2	9	
Angola	52	36.7	3	23	0.537	163	222	5.12	35	30
Nigeria	53	223.8	2.4	29	0.680	75	1047	5.06	19	19
Timor-Leste	53	1.4	1.4	49	0.378	42	204	2.96	23	
Samoa	55	0.2	1.5	48	0.418	55	59	3.83	42	3

Country	ND-GAIN Vulnerability Rank	Population, millions (2023)	Population Growth Rate (2023)	Population Doubling Time, years	Gender Inequality Index	Adolescent Birth Rate per 1000 age 15-19	Maternal Mortality Ratio per 100K live births	Total Fertility Rate (2023)	Unmet Need for FP Married Women 15-49	% Severe Food Insecurity (2019-2021)
World		8045.3	0.9	76		41	223	2.31	11	11
USA	160	340.0	0.5	129	0.179	15	21	1.66	6	1
Lesotho	56	2.3	1.1	62	0.557	85	566	2.94	14	31
Viet Nam	57	98.9	0.7	105	0.296	29	124	1.93	5	1
Djibouti	58	1.1	1.4	50		21	234	2.72	26	17
Cameroon	59	28.7	2.6	27	0.565	122	438	4.3	21	27
Sri Lanka	60	21.9	0.3		0.383	17	29	1.96	7	1
Antigua and Barbuda	61	0.1	0.6	126		33	21	1.58	13	7
Namibia	62	2.6	1.5	47	0.445	64	215	3.21	15	33
Dem. People's Rep. of Korea	63	26.2	0.3			1	107	1.79	8	
Ghana	64	34.1	1.9	36	0.529	78	263	3.46	26	6
Seychelles	65	0.1	0.6	120		61	3	2.29		
Botswana	66	2.7	1.7	42	0.468	50	186	2.72	10	25
Syria	66	23.2	4.9	14	0.477	54	30	2.67	12	
Philippines	68	117.3	1.5	46	0.419	35	78	2.69	15	5
Honduras	69	10.6	1.6	44	0.431	97	72	2.31	10	18
Bolivia	70	12.4	1.4	48	0.418	71	161	2.55	16	
Guyana	71	0.8	0.7	96	0.454	65	112	2.35	28	
Belize	72	0.4	1.4	49	0.364	51	130	1.98	17	6
Bahamas	73	0.4	0.6	110	0.329	26	77	1.37	12	3
Saint Kitts and Nevis	74	0.05	0.2					1.51	14	6
Bahrain	75	1.5	0.9	77	0.181	9	16	1.79	12	
Indonesia	76	277.5	0.8	84	0.444	36	173	2.13	11	1
Ecuador	77	18.2	1	67	0.362	58	66	2	6	13
Guatemala	77	18.1	1.4	49	0.481	59	96	2.32	12	21
Dominica	79	0.07	0.5		0.429	50		1.58	13	
Nicaragua	79	7.1	1.9	50		104	78	2.25	6	
AVERAGE		48.8	1.8	47	0.520	75	274	3.32	19	20

Indicator Definitions

Vulnerability ranking: Vulnerability measures a country's exposure, sensitivity, and ability to adapt to the negative impact of climate change. ND-GAIN measures the overall vulnerability by considering vulnerability in six life-supporting sectors—food, water, health, ecosystem service, human habitat and infrastructure. The ND-GAIN rank ranges from one (most vulnerable) to 183 (least vulnerable).

Population: Projected size of national population at mid-year in 2023.

Population growth rate: Average percent rate of growth of the population over one year.

Population doubling time: The population doubling time corresponds to the number of years required for the total population to double in size if the annual rate of population change would remain constant.

Gender Inequality Index: GII is a composite metric of gender inequality using three dimensions: reproductive health, empowerment, and the labor market. A low GII value indicates low inequality between women and men, and vice-versa.

Adolescent birth rate: Number of births per 1,000 adolescent girls aged 15 to 19.

Maternal mortality ratio: Number of maternal deaths during a given time period per 100,000 live births during the same time period.

Total fertility rate: Number of children who would be born per woman if she lived to the end of her childbearing years and bore children at each age in accordance with prevailing age-specific fertility rates.

Unmet need for family planning: Percentage of women aged 15 to 49 years who are married or in union who want to stop or delay childbearing but are not using a method of contraception.

Percent severe food insecurity: The prevalence (percent) of individuals in the population living in households where at least one adult was found to be severely food insecure, defined as level of severity of food insecurity at which people have likely run out of food, experienced hunger and, at the most extreme, gone for days without eating, putting their health and well-being at grave risk.

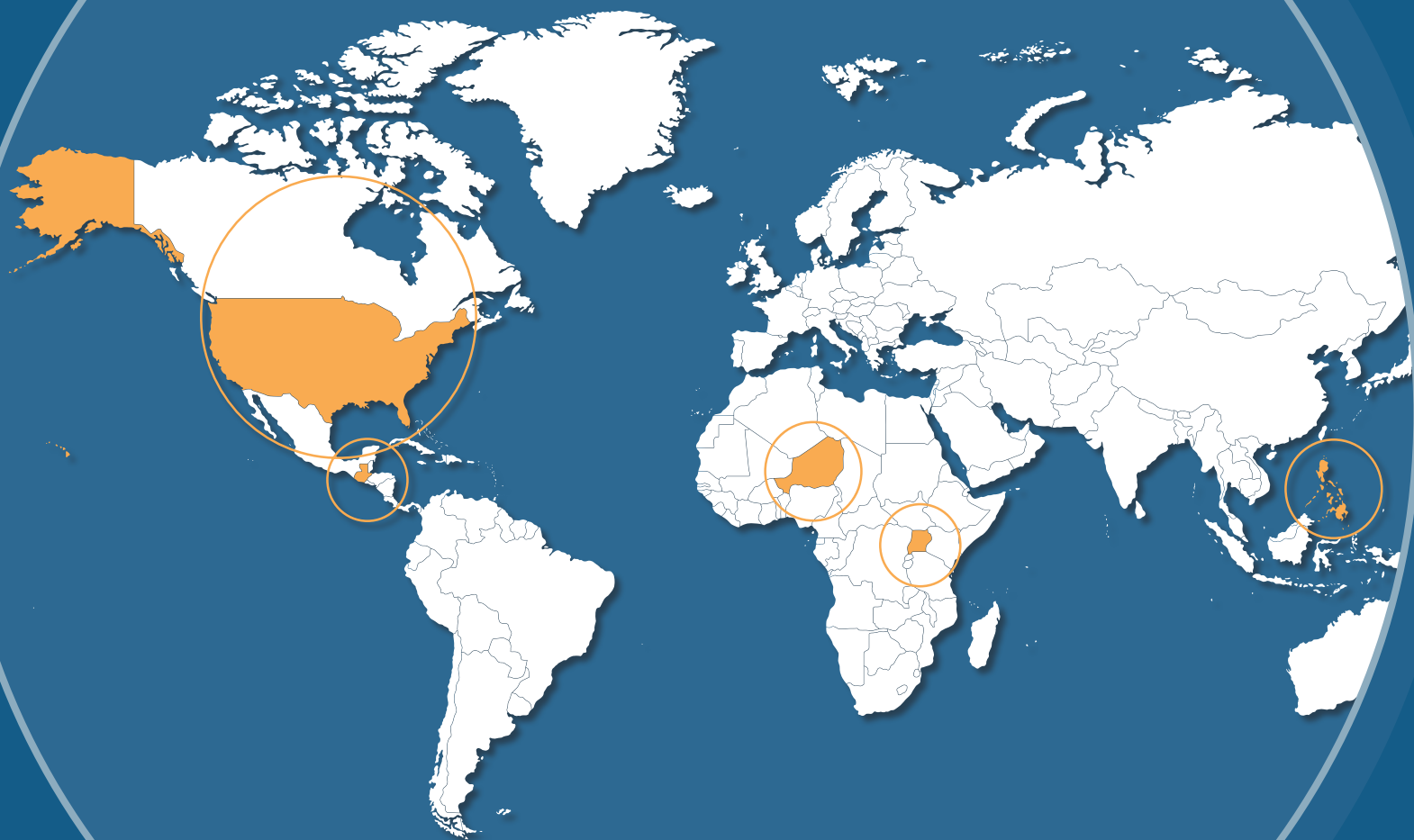
Data Sources

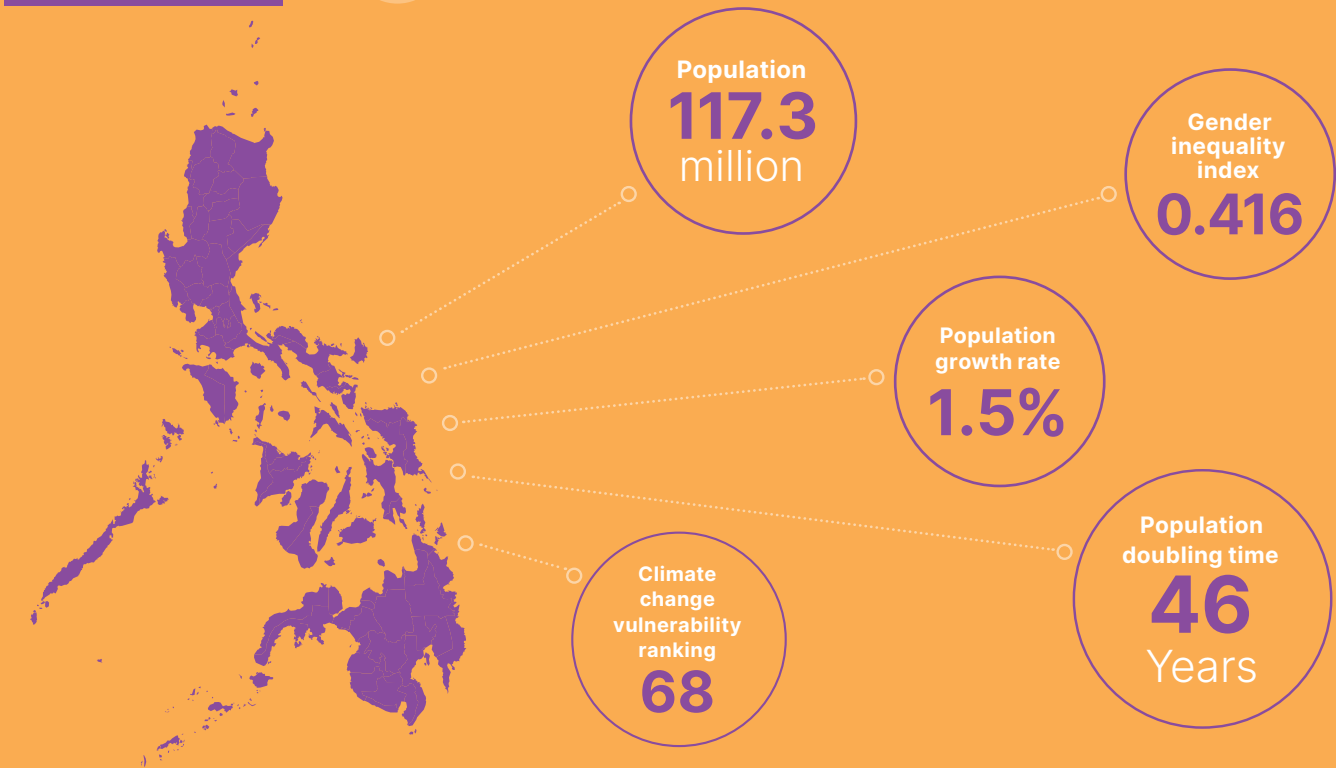
- **Vulnerability ranking:** Notre Dame Global Adaptation Initiative Country Index rankings, downloaded in May 2023
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PART 3: COUNTRY PROFILES

In many parts of the world, communities and organizations have been pioneering promising approaches that integrate population, reproductive health, and gender equity to foster resilience to climate change. These efforts offer models for action and advocacy. Their encouraging successes, while small in scale, suggest what could be accomplished if governments and societies develop and scale up initiatives based on similar integrative strategies. We profile some of these geographically diverse community-based projects in this chapter.





The Philippines faces some of the most extreme disaster risks in the world, and such risks are projected to intensify as climate change proceeds.²² The country experiences an average of 20 cyclones a year, with approximately eight making landfall, jeopardizing the safety of millions of people and causing extensive damage. Typhoon Haiyan, for example, killed 6000 people, damaged more than a million homes, and resulted in agricultural and infrastructure damages of more than USD\$800 million.²³



Community members participate in fisheries monitoring activities in Oriental Mindoro, Philippines

Photo credit: PATH Foundation Philippines

The Philippines is an archipelago made up of more than 7,000 islands, and its extensive coastline means that many residents are exposed to sea-level rise, extreme weather, and storm surge. Sea-level rise is advancing at an above-average rate in some areas, exposing up to one million people to flooding from rising sea levels by 2070–2100.²⁴ In the absence of effective adaptation action and disaster risk reduction strategies, climate change is likely to exacerbate existing high levels of income and wealth inequality, and progress on poverty alleviation will be slowed.²⁵

Population growth and increasing population density in climate-sensitive landscapes will play a

significant role in shaping climate change vulnerability in the coming decades. Population growth will also further strain the capacity of coastal fisheries and agricultural systems that support livelihoods and food security for millions of residents. Meanwhile, communities across the Philippines face persistent barriers to sexual and reproductive health care, with the poorest and most isolated communities facing the most significant barriers. These challenges are reflected in national-level reproductive health indicators that underpin population growth. The adolescent birth rate, for example, continues to be among the highest in the region, and only 59 percent of women have their needs for family planning satisfied with modern methods of contraceptives.²⁶

PATH Foundation Philippines: Strengthening Climate Resilience at the Intersection of Population, Health, and Environment

The Verde Island Passage is an important marine ecosystem in the Philippines that sustains unique marine biodiversity and provides food and livelihood for more than 7 million people.²⁷ The passage is considered by experts as the “center of the center of marine shore fish biodiversity,” and is dubbed the “Amazon of the oceans.”²⁸ Climate change has resulted in increased sea surface temperature, sea level rise, and increased storm frequency and intensity. These changes pose threats to the ecosystem’s functions and services and have detrimental impacts on the lives of the people living there, many of whom rely on fishing for income and food security.

To better understand the multiple dimensions of climate change vulnerability in the area, PATH Foundation Philippines undertook

a scoping study to assess the perceptions and practices of community members and policymakers in relation to the region’s climate vulnerability, population dynamics, gender roles, and reproductive health and rights. Findings of the study indicate that women and fishers were aware of climatic changes and have long been experiencing its impacts. Respondents in the study indicated that family planning, reproductive health, and responsible parenthood were all important components of adapting to the impacts of climate change, citing that with these components in place, they could give more attention to their family’s health, children’s education, and coastal resource and environmental conservation.²⁹

Respondents noted that the impacts of climate change are more challenging for fisher households and families with many children, and that climate change brings greater burdens to women, who now need to work harder for a smaller return and engage in multiple jobs to feed their families. Policymakers in the region also recognized that population, environment, reproductive health, and climate change are interdependent issues, and that the consequences of these interrelationships should be dealt with holistically.

PATH Foundations Philippines has a long history of implementing holistic, community-based programs that respond to the connected issues of population, health, and the environment (PHE). For more than two decades, PFPI and other nongovernmental organizations (NGOs) that make up the Philippines PHE Network have developed and strengthened integrated strategies to improve natural resource management, deliver greater reproductive health services, and enhance food security and the sustainable livelihoods across the

Philippines.³⁰ Evidence indicates that that such multisectoral programs in the Philippines can deliver stronger outcomes than single-sector approaches³¹—and they offer significant hope for effectively addressing the multiple dimensions of climate change vulnerability.



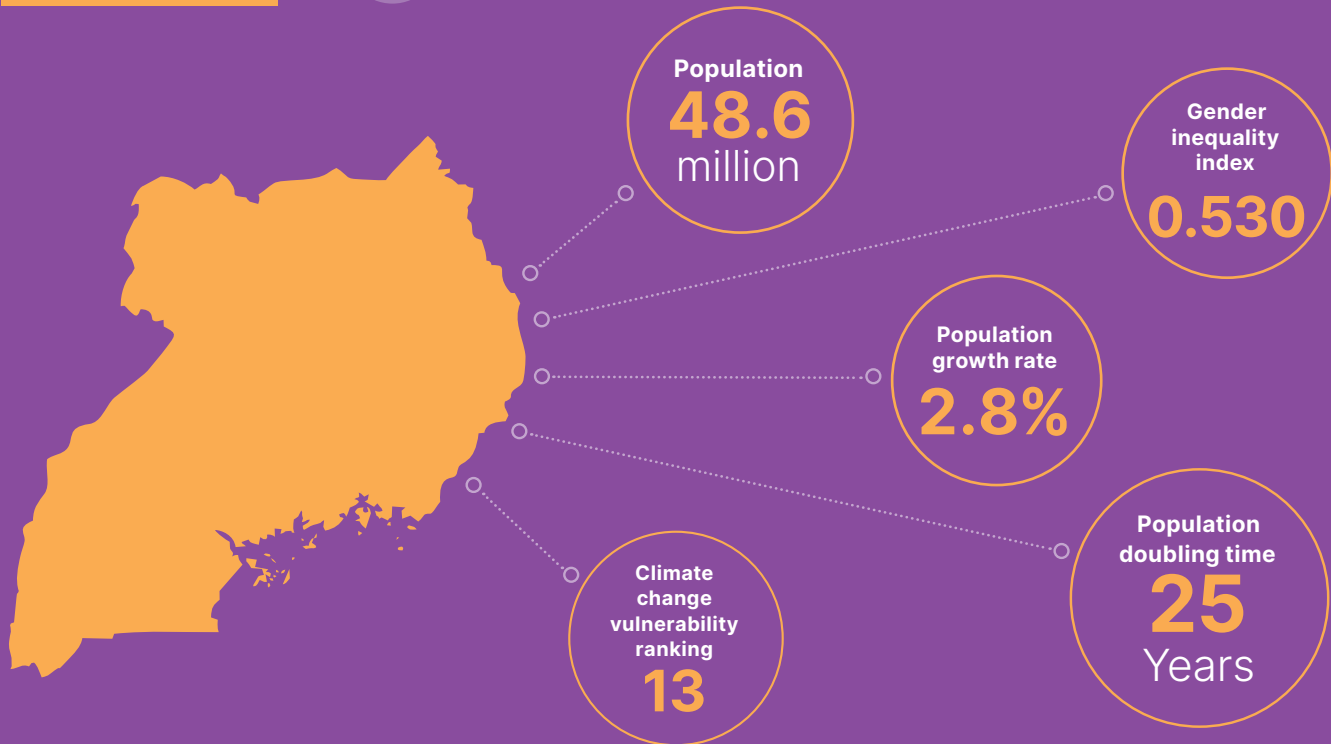
Our scoping study confirmed that residents and policymakers alike believe that with sexual and reproductive health and rights, families and communities are healthier. This contributes to building climate change resiliency, and allows more time and resources for conservation and community initiatives – all of which increase resilience to climate change and slow population trends that exacerbate poverty and climate change impacts.”

— JOAN CASTRO, PATH
FOUNDATION PHILIPPINES





Country Profile: **Uganda**



Uganda feels the impacts of climate change acutely. Especially in recent years, the increasing frequency and severity of extreme weather events has severely undermined the country's economy and its people's well-being. The National Risk and Vulnerability Atlas of Uganda identifies prolonged droughts, floods, landslides, windstorms, hailstorms, lightning, as the major climate-induced hazards directly and indirectly disrupting and threatening agricultural productivity, peoples' livelihoods, ecosystems, and the health and well-being of millions of people. According to ND-GAIN, Uganda is the 13th most vulnerable nation in the world.

Climate change vulnerability in Uganda is accentuated by the population's high level of dependence on climate-sensitive sectors such as agriculture, fisheries, tourism, and forestry. Floods and landslides have been particularly devastating to people and the economy in Uganda in recent years. Over the last 10 years, landslides in the Busigu sub-region reportedly killed at least 1,000 people and left thousands of families displaced and homeless.³² Floods in the Eastern region, triggered by heavy rainfall, claimed the lives of at least 30 people, left 400,000 without access

to clean water, and destroyed more than 2,000 hectares of crops.³³ More than 900 people died of hunger in the Karamoja sub-region of northeastern Uganda, mostly as a result of prolonged drought, a region where eight in every 10 households are food-insecure.³⁴ Poverty, land degradation, rapid and unplanned urbanization, and weakly coordinated disaster response strategies are among the primary drivers of vulnerability for Uganda's population.³⁵

Meanwhile, Uganda is also experiencing one of the most rapid

population growth rates in the world, straining its efforts to adapt to climate change and exposing more and more people to risk. If current population growth rates were to continue, Uganda's population would double from 48.6 million to more than 90 million in just 25 years.³⁶

Childhood and early marriage, limited access to family planning and reproductive health services, and high rates of unintended pregnancy underpin high fertility rates that drive population growth. Women and girls, who often experience a disproportionate burden of the



A small holder farmer in Uganda demonstrates the organic fertilizer used in her kitchen garden as part of the PHE model practices

Photo credit: Regenerate Africa

impacts of climate change, have limited opportunities to go to school, enter the workforce, and exercise autonomy in multiple aspects of their lives. Insufficient access to reproductive health services is reflected in the country's high adolescent birth rate and a maternal mortality ratio that is roughly 25 percent greater than the global average.

Regenerate Africa: Working with Partners to Foster Multisectoral Policies and Programs for Climate Change Adaptation

Regenerate Africa, a Uganda-based NGO, has been at the forefront of advocacy efforts to encourage policies and programs that directly address intersecting challenges of climate change vulnerability, high population growth rates, and gender inequity.

Working in collaboration with other NGOs that are part of Uganda's Population, Health and Environment Network, Regenerate Africa has encouraged continuous, informed, and constructive multisectoral engagement with policymakers, practitioners, and other stakeholders to build a broad understanding of the interconnectedness of issues that are often addressed in silos. The

government's National Population Council, which supports community-based projects with a long history of multisectoral integration, has also played an important role in promoting the benefits of such integration.

The result has been numerous national policy frameworks that incorporate multisectoral approaches. This is particularly evident in Uganda's Nationally Determined Contribution (NDC), the government's official communication to the UN Framework Convention on Climate Change. Uganda's NDC (2022) makes numerous references to population dynamics, including trends in growth, urbanization, and shifting age structure. It sets an example for how other NDCs and national climate policies can better reflect sexual and reproductive health. It contains commitments to gender-responsive approaches to climate action, such as enhancing women's participation in decision-making, mainstreaming gender and climate change in budgets and local government plans, and developing gender disaggregated data for its implementation plan. The NDC also includes, among its priority actions, a commitment to "implement integrated health related climate interventions considering policies on water and sanitation, education, social protection and reproductive health care."³⁷

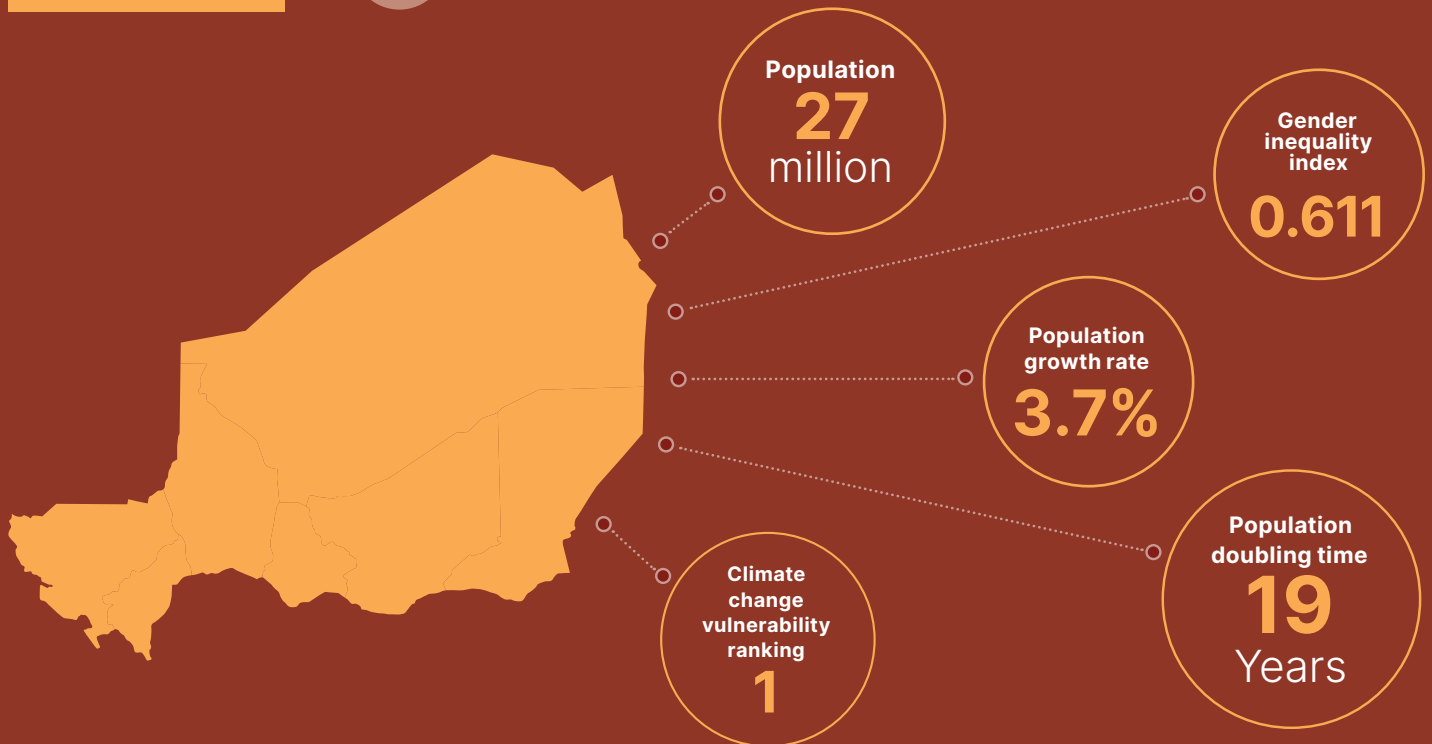


"Across Uganda, families and communities experience intertwined and interconnected challenges of rapid population growth, gender inequity, and climate change vulnerability. In this context, multisectoral strategies offer hope for long-term, collective benefit. We need to continue engaging decision makers, organizations, and funding partners, and convincing them with the evidence and firsthand experience that such strategies have multiple benefits for healthy and resilient communities."

– CHARLES KABISWA, EXECUTIVE DIRECTOR OF REGENERATE AFRICA

BACKSLIDING ON UNIVERSAL HUMAN RIGHTS

A note from the Population Institute: While the Ugandan government has demonstrated progressive leadership in advancing multisectoral policies and programs that address climate change and gender equity, the May 2023 enactment of the Anti-Homosexuality Act illustrates unacceptable backsliding on universal human rights and has the potential to undermine sexual and reproductive health service delivery. The Act and the harms it perpetuates have been widely criticized by the international community³⁸ and condemned by the U.S. government.³⁹

Country Profile: **Niger**

Niger is the world's most climate-vulnerable country, based on ND-GAIN's assessment of the extreme challenges it faces in all three of the characteristics the index measures. Temperatures in Niger are rising faster than in other parts of the world, and by 2100, there could be a rise in temperature of three to six degrees Celsius.⁴⁰ Such warming is expected to have severe implications for agricultural productivity, and with more than 80 percent of the population dependent on agriculture, livelihoods and food security are in jeopardy. Already, 2.5 million people are acutely food insecure, and 47 percent—nearly half—of children under five suffer from chronic malnutrition.⁴¹



The JVE team meets local leaders

Photo credit: JVE

With recurring challenges linked to environmental degradation, pervasive poverty, political instability, and climate change, Niger's rapid population growth rate compounds existing vulnerabilities. Water scarcity, longer dry seasons, and impacts of higher temperatures may trigger new conflict and forced migration, problems already rife throughout the region.⁴²

Persistent gender inequality in Niger means women and girls have little agency in their lives, as demonstrated by Niger's Gender Inequality Index ranking. Many don't have a say in their own basic life choices, such as whether to attend school, when and whom to marry, whether to work outside the home or seek healthcare.⁴³ Niger has one of the highest rates of child marriage in the world, with 77 percent of girls—more than three out of four—marrying before age 18, and nearly one-third marrying before age 15.⁴⁴ Such early marriage constrains girls' opportunities and poses risks to their health and well-being. Since many girls become mothers within their first year of marriage and have many years left in their reproductive lives, high rates of child marriage are linked to Niger's high fertility. Averaging 7 live births per woman, the country's fertility rate is the highest in the world.⁴⁵

In this context, increasing access to family planning and quality education are strategic, mutually reinforcing interventions that enhance self-determination for women and girls and can help reduce multiple dimensions of climate change vulnerability. These interventions, founded in human rights to reproductive autonomy and educational advancement, can address people's health and well-being in the near-term. Over time they will slow population growth and help generate a "demographic dividend"—a term that describes a more economically favorable ratio of children to working adults that results from declines in fertility in high-

fertility populations—that can put the Niger on the path toward greater resilience and sustainability.⁴⁶

Jeunes Volontaires pour l'Environnement (JVE): Working to Ensure Family Planning is Recognized as a Vital Climate Resilience Strategy in the Sahel

In May 2023, Sani Ayouba and several young volunteers stood in the middle of a large group of people from the municipality of Loga in Niger, engaged in an animated discussion about the climate crisis, sustainable alternatives to burning wood, family planning, and the demographic dividend. To many, this would seem like a disjointed debate, but Sani has found that the linkages between these seemingly disparate topics hardly need explaining at the local level.

The local meeting is one of many JVE is leading about the intricate interplay between population growth, local customs, and the climate crisis. The town hall discussions allow the JVE team to put forward vital strategies that will increase their ability to adapt and build resilience, including the need to prioritize local budgets to increase access to family planning.

The municipal-level advocacy dovetails with the intensive national advocacy JVE is undertaking to ensure that family planning is highlighted as a priority intervention in Niger's climate adaptation plan. These discussions are more challenging. Sani feels this is because national politicians are less affected by the climate crisis, and they have to navigate political motives, competition for scarce resources, and socio-religious biases. Given this context, JVE has joined together with a diverse set of local CSOs with expertise in climate change, family planning, and youth action, to push unrelentingly for change.

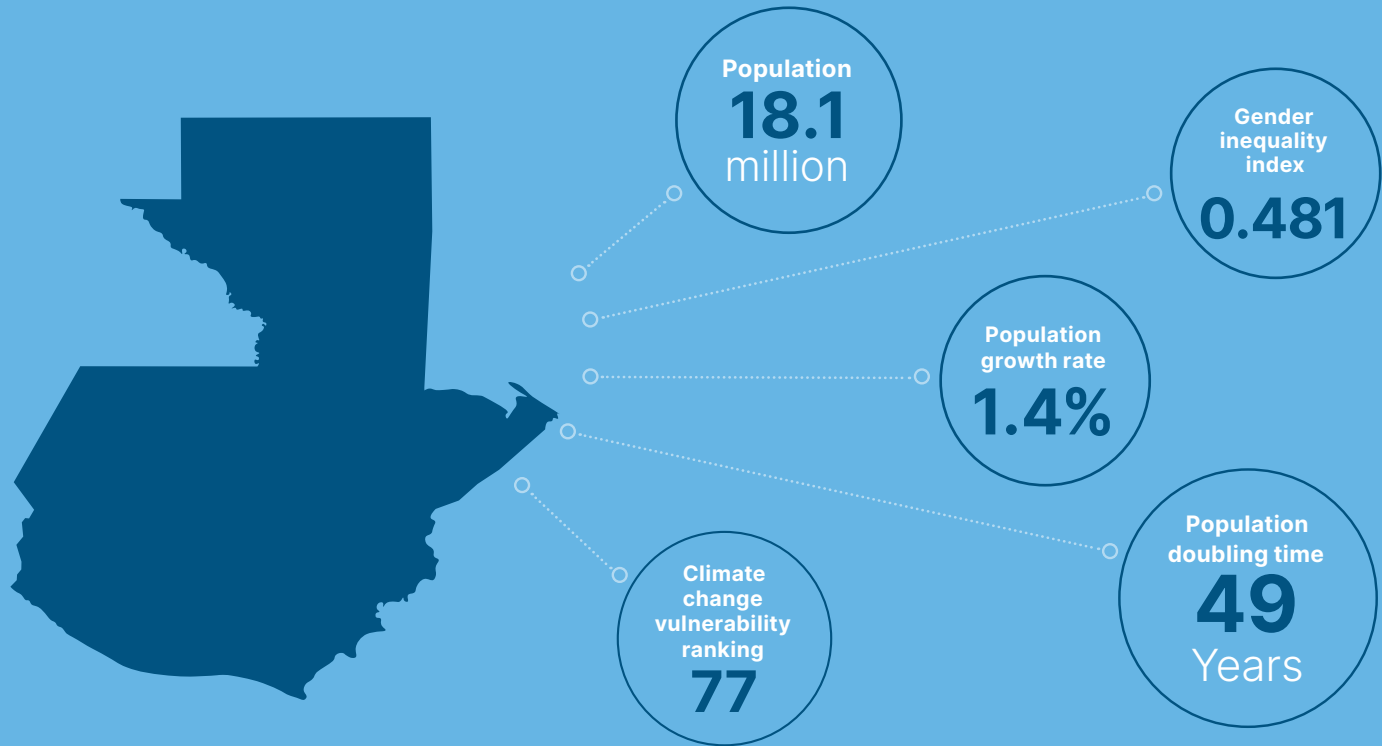


“At present, the land and the fields are no longer sufficient to meet the needs of the community. A field that used to be farmed by a single father now has five to six heads of family on it, with the population growth.”

**– ADAMA ISSOUFOU,
COMMUNITY LEADER**

At a global level, JVE has highlighted the plight of the Sahel and the urgent need for increased recognition of the interrelationships of population dynamics and the climate crisis at international family planning conferences, climate negotiations, and other high-level gatherings. Human health will be a central theme of the international climate Conference of the Parties in Dubai, United Arab Emirates, in December 2023, and JVE is strategizing to make sure that family planning and the Sahel gain space in the spotlight.

To Sani, advocating at all levels in parallel is critical. For one thing, he feels time is running out. For another, a coherent strategy that actively involves those who are already affected by the impact of the climate crisis is what is needed. As Sani says, “their perspectives need to be heard, and frankly, they know better.”



The most populous country in Central America, Guatemala faces a wide variety of environmental hazards. Guatemala's location in the Americas makes it particularly vulnerable to climate related disasters such as hurricanes, floods, droughts, and landslides. Over 40% of the country's population has experienced five or more environmental disasters simultaneously.⁴⁷ Studies have shown the frequency of these events will only increase with time due to climate change and they are a known contributor to poverty and poor health outcomes in the region.⁴⁸

Indigenous Guatemalans and those living in rural areas such as the Western Highlands often face significantly higher risks to their livelihood, especially women and girls. Much of Guatemala's economy is dependent on farming, and more than 70% of agricultural activity in Guatemala is rain fed. Fields are commonly in steep, mountainous terrain, making them highly vulnerable to drought and soil erosion that can come with extreme weather events.⁴⁹ For women farmers, inequities in access to land and economic and social resources

can make the recovery from extreme weather events particularly challenging.

In addition, women and girls across Guatemala lack adequate access to sexual and reproductive health services. Only 19% of indigenous women in rural areas receive medical care during pregnancy. The region also has high rates of adolescent pregnancy and limited employment opportunities for women and girls.⁵⁰ Overall, Guatemala is one of the few Latin American countries

whose adolescent pregnancy rate is still rising, including more than 4,000 pregnancies amongst girls age fifteen and younger in 2020.⁵¹ The lack of progress in overall access to sexual and reproductive health care makes the inequities endured by girls in rural areas all the more dire. Addressing climate change vulnerabilities as well as access to sexual and reproductive health services will be crucial in improving the lives and livelihoods of Guatemala's most vulnerable populations and the country at large.



Amalia (left) smiles at her daughter, Lilian, a participant in FUNDAECO's Healthy and Empowered Women and Girls scholarship program

Photo credit: FUNDAECO

FUNDAECO: Empowering Women and Girls in the Context of Forest Conservation

FUNDAECO is a conservation organization that works to conserve biodiversity and promote sustainable community development through the participatory establishment and management of protected areas in Guatemala. In a context of high vulnerability to climate change, the organization seeks to protect natural ecosystems and their environmental services, and to promote sustainable livelihoods for poor and vulnerable communities in regions of high biodiversity.

As part of this work, FUNDAECO employs a multisectoral approach that centers on reproductive health, combining modern healthcare with traditional indigenous knowledge to ensure service delivery to indigenous women and girls in isolated communities. The model ensures sustainability of women's clinics through self-management and user fees, focusing on creating demand with a culturally pertinent

perspective among rural youth, and links sexual and reproductive health with sustainable rural development and biodiversity conservation.

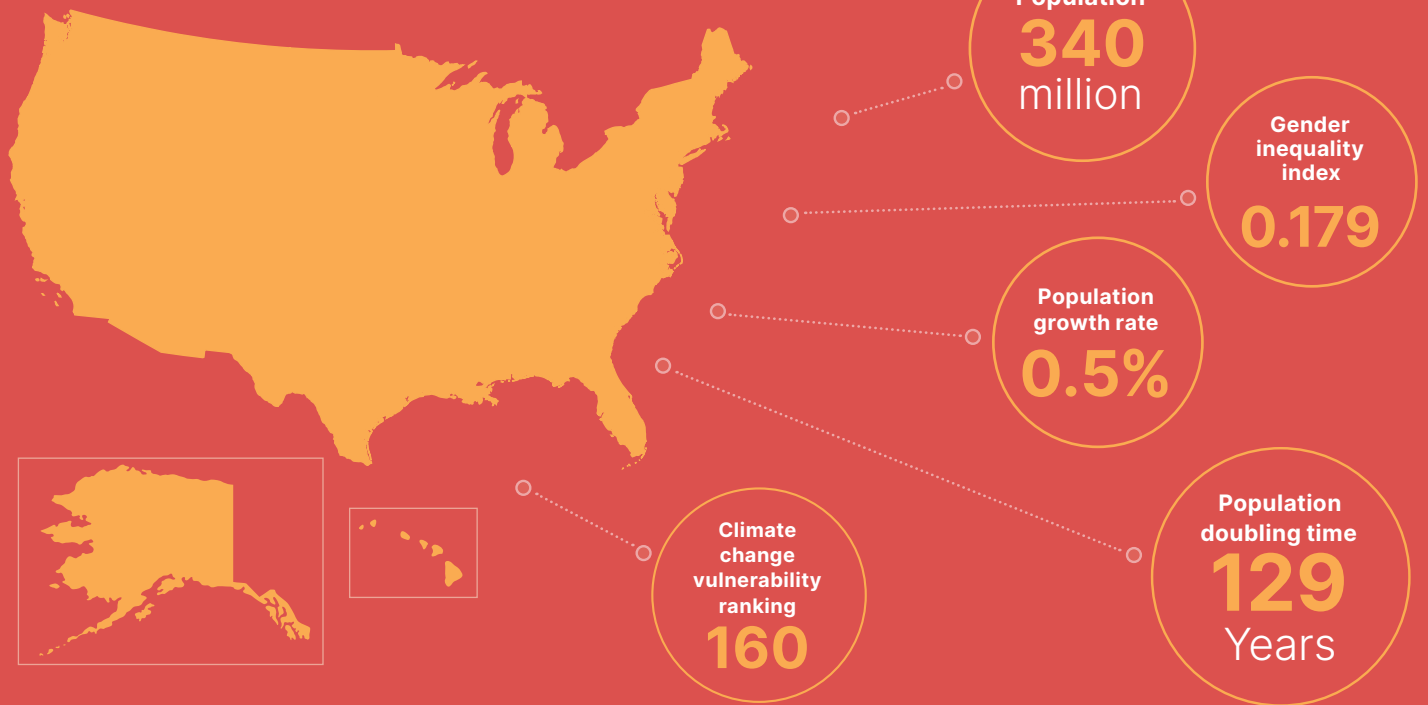
This approach extends to FUNDAECO's work to reduce climate-warming emissions through forest conservation. Through their participation in the REDD+ Project for Caribbean Guatemala, FUNDAECO works to foster the conservation of unique rainforests and to support community sustainable development. The project combines the implementation of agroforestry systems, environmental litigation and advocacy, strengthening of ecotourism activities, establishment of nature reserves, and socio-economic and biodiversity monitoring and research in protected areas. Through this effort, thousands of hectares of forest and hundreds of species have been protected, women have increased their skills and knowledge in natural resource management, health services have been improved, and an estimated six million tons carbon dioxide equivalent in net emissions reduction have contributed to climate change mitigation.



“Once women have access to health and family planning services, and they are empowered in their rights, it is a natural next step that they are willing to participate in natural resources management an income-generation activities.”

– INGRID ARIAS, FUNDAECO

Critically, FUNDAECO's work extends beyond the health clinic and the forest in addressing the intersecting challenges facing women and girls. The program operates a modest scholarship program that supports girls in advancing and completing their formal education. Girls in the program also participate in a leadership program that provides technical training and leadership skills that help to grow women's participation in community decisions. In addition, FUNDAECO seeks to ensure access to income generation for women by integrating them in agroforestry systems management and training and hiring women for specific activities, such as establishment of tree nurseries and harvesting processes. FUNDAECO's holistic approach is a strong example of how landscape level initiatives can deliver tangible economic and social benefits for local communities, empower women, and protect biodiversity while delivering results for climate change mitigation and adaptation.



As indicated by its climate change vulnerability ranking, the United States is better positioned than most countries to manage the impacts of climate change, even though bears the greatest responsibility of any nation for the build-up of atmospheric greenhouse gases that cause climate change.⁵² Notably, it is the world's pre-eminent economic powerhouse. Nevertheless, as illustrated by the impacts of forest fires (and their smoke), drought, and extreme storms in recent years, climate change creates a wide range of risks in the United States. These include not just extreme weather, floods, and fires, but also increases in infectious and chronic disease and intensified social and economic stresses.⁵³ The impacts of climate change are projected to intensify as sea levels and temperatures continue to rise, snow and rainfall patterns shift, and extreme weather becomes more common.⁵⁴

While population is growing at a slower rate in the United States than in the world as a whole, understanding population dynamics is vital to understanding climate change vulnerability and adaptation planning. For example, evidence suggests that the U.S. population has grown disproportionately faster in places exposed to climate hazards such as wildfires and hurricanes.⁵⁵ Florida and Texas—the former especially vulnerable to hurricanes and sea-

level rise, the latter to extreme heat and drought—are two of the fastest growing states in the country.

Understanding social vulnerability is also critical for adaptation planning. While the impacts of climate change affect everyone in the U.S., vulnerability is heightened among people with low incomes, people with less education, people and communities of color, recent immigrants, and the elderly.⁵⁶ As

in many places around the world, such social vulnerabilities can result in variations by gender in how people are able to respond to extreme weather events or long-onset climate change impacts across communities.⁵⁷

A recent evidence review found, for example, that men make up the majority of the U.S. workforce in sectors with significant occupational exposure to the effects

of climate change, while women face heightened risk of gender-based violence in the aftermath of natural disasters. Additional gender variations exist across climate impacts associated with health, employment, and extreme weather events, as well as with people's perceptions, attitudes, knowledge, and behavior. The review also found that family planning use can be affected by disasters; following hurricanes Katrina and Ike, for example, many women reported difficulty accessing contraception.⁵⁸

Center for Biological Diversity: A Growing Need for Gender Analysis in Municipal Climate Plans

The number of people on the planet means more and more people are dependent on a consumption-driven economy which is fueled by the United States, but the impacts of climate change are felt by everyone across the globe. Understanding social vulnerability and the gendered impacts of climate change is critical to developing plans that will enable communities to effectively manage and adapt to climate change impacts. In an effort to understand the ways in which U.S. municipalities are accounting for the gendered impacts of climate change, a team from the Center for Biological Diversity, a US-based NGO, conducted an analysis of 21 municipal climate plans in 2022.

Their findings were disappointing: While 15 of the 21 plans (representing about 10 percent of the U.S. population) recognized the importance of understanding and addressing social vulnerability, only two specifically indicated that women face unique climate-related vulnerabilities. Only one—the city of Boston's—included a gender-based strategy. (Boston's plan includes expanding biking classes to women and gender-nonconforming individuals

to improve and expand active transportation infrastructure.)⁵⁹

Based on their findings, the Center recommended steps and policies for implementation at the local government level, as well as through state and federal policies that can support local efforts to incorporate gender-based strategies into climate plans. Their recommendations include a wide range of interventions aimed at building a foundation of gender empowerment in the U.S., including offering comprehensive sex education, supporting contraception access, keeping abortion legal, providing access to menstrual-hygiene products, funding quality education programs, and addressing racial inequality in schools. All of these, the Center asserts, can strengthen comprehensive and inclusive climate action.

LOSING GROUND ON REPRODUCTIVE AUTONOMY AND SEXUAL RIGHTS

A note from the Population Institute: In June 2022, the U.S. Supreme Court, in its decision on *Dobbs v. Jackson Women's Health Organization*, rejected 50 years of precedent by overturning *Roe v. Wade*. The decision eliminates the federal right to abortion access, and in many states, abortion has been banned or severely restricted.⁶⁰ In addition, more than 300 bills aimed at the health and rights of transgender people in the United States have been introduced in state legislatures in the first half of 2023 alone.⁶¹ These developments undermine values of privacy, individual agency, bodily autonomy, and equitable access to health care, and are at odds with goals of supporting and sustaining a resilient and sustainable society.



“In a society fueled by capitalism and consumption, a growing population means increased use of extractive systems. The status of women is inextricably linked to the health of our environment and climate. Through empowerment strategies like gender justice, reproductive freedom, education and equity, women are better able to adapt to climate change and become more engaged in climate solutions.”

— KELLEY DENNINGS,
CENTER FOR BIOLOGICAL DIVERSITY



PART 4: CONCLUSION



PART 4

Conclusion



Population growth will play a meaningful role in shaping the future we will live in. Climate change is a long-term challenge that humanity must respond to, and over the long term the size of the human population will be among the decisive factors easing or complicating that response. But population growth rates and numbers can't tell the story on their own. Understanding where people live, how they live, the agency they have in their lives, and their access to resources and opportunities—all these factors are critical in understanding how population growth will affect our future.

These factors are also important to understanding how population growth matters for climate change vulnerability. In this report, we've looked at specific ways in which population growth affects people's climate change exposure, sensitivity, and adaptive capacity, and we've

shown that because population is growing disproportionately in countries that are already highly vulnerable to the impacts of climate change, incorporating a deeper look into population growth trends in the context of adaptation planning is warranted.

A deeper look into population growth trends includes investigating gender inequity and deficits in sexual and reproductive health and rights, both of which also serve to exacerbate vulnerability and limit adaptive capacity. With these connections in mind, it is possible to imagine climate change adaptation strategies that incorporate consideration of these trends and their intersections and include interventions designed to tackle them. Examples highlighted in this report—from the Philippines, Uganda, Niger, Guatemala, and the United States—offer insights and inspiration for such strategies. These examples are worthy of greater

investment, replication, and scale-up. The malleability of population trends, while not well understood by policymakers and the public, is among the most hopeful in a range of hopeful aspects of the needed societal responses to human-caused climate change. We know that population trends will follow a more sustainable path in response to better access and more use of contraception; more education for young people; and real improvements in gender equality and the autonomy of women, girls, and LGBTQ+ people. Climate change adaptation plans will be stronger and more durable when they incorporate interventions that empower people while ensuring a more sustainable population future, including investing in rights and opportunities for women and girls, addressing people's sexual and reproductive health needs, and advancing reproductive autonomy.

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