



NHSMUN

G20

BACKGROUND GUIDE

Secretary-General

Terry Wang

Director-General

Jordan Baker

Delegate Experience

Nastasja Vásquez

Global Partnerships

Daniela Maciel

Sebastian Jimenez

Under-Secretaries-General

Nachiketh Anand

Alina Castillo

Seonghyun Chang

Naina Dhawan

Ximena Faz

Kellie Fernandez

Grace Harb

Adiva Ara Khan

Anshul Magal

Analucia Tello

Sofia Velasco

Renata Venzor

Dear Delegates,

Hello and welcome to the Group of 20 committee for NHSMUN 2025! My name is Alejandra Vargas, and I am more than honored to be your Director for Session I. I am looking forward to sharing this amazing experience with all of you guys.

I am in my third year of college at Universidad Americana, Nicaragua. I am studying Diplomacy and International Relations which I am very passionate about and it is what got me started in MUN. I had the pleasure of being the CSW Session I director for last year's NHSMUN and fell in love with it. I have been participating in Model UNs since 2022 and I have loved every minute of it. It has given me the opportunity to meet so many amazing people and develop various skills that have helped me grow personally and professionally. One of my other passions is sports. I absolutely love football, and I am the biggest Barcelona fan ever, I also love formula 1 and baseball. When I am not crying about my teams not doing good, you can probably find me watching movies and tv shows. My favorite movie is The Godfather, and my favorite show of all time is Game of Thrones, but I have a very broad taste. I am also very much obsessed with Taylor Swift and Harry Styles.

My co-Director Arian and I have worked very hard to put together this Background Guide that will help you guys navigate through this year's topics. The topics are "Strengthening Global Health Security" and "The Disproportionate Effects of Climate Change on Vulnerable Populations". Topic A refers to efforts to improve country's ability to prevent, detect, and respond to global health emergencies. Topic B shows how climate change has projected to worsen vulnerable populations' livelihoods. I advise you to get familiar with the content of this document, research as much as you can about the topics, and never stop having curiosity about how you can solve these problems and be the difference we need.

I hope you can walk away from NHSMUN with amazing memories and hunger for new knowledge and new experiences that can help you grow into an amazing young leader. I am very excited to meet you and hear all about your great ideas for this committee. If you have any questions and/or concerns, feel free to reach out to myself or my co-Director. We are at your service and cannot wait to welcome you to New York!

Best regards,

Alejandra Vargas

Group of 20

Session I

nhsmun.g20@imuna.org



Secretary-General

Terry Wang

Director-General

Jordan Baker

Delegate Experience

Nastasja Vásquez

Global Partnerships

Daniela Maciel

Sebastian Jimenez

Under-Secretaries-General

Nachiketh Anand

Alina Castillo

Seonghyun Chang

Naina Dhawan

Ximena Faz

Kellie Fernandez

Grace Harb

Adiva Ara Khan

Anshul Magal

Analucia Tello

Sofia Velasco

Renata Venzor

Dear Delegates,

Hello! My name is Arian Bordbar, and I am your director of G20 for NHSMUN 2025. I am Kurdish from Iran but was born in Oklahoma City, and I have lived in Edmond, Oklahoma all my life. Last year, I had the pleasure of being an Administrative Assistant Director for NHSMUN 50. I am currently studying pre-law, majoring in Political Science at the University of Central Oklahoma and will transfer to the University of Oklahoma after completing my general education studies. I am extremely active in my spare time. I mainly play soccer with my friends and work out at the gym, but I also play basketball and run. Some of my hobbies other than physical activity include cooking, reading, buying clothes, hanging out with my close friends, and watching movies.

This background guide covers two very important topics. The first, Strengthening Global Health Security, relates to the deterrence, response, and strategic prevention of global health emergencies. The second, The Disproportionate Effects of Climate Change on Vulnerable Populations, discusses the disastrous effects of climate change on the livelihoods of vulnerable populations and its contributions to sea rise and food insecurity. We have put a lot of time and effort into writing these and recommend that you put the same amount of effort into researching, questioning, and analyzing all aspects of these topics to ensure you get the most out of your committee sessions.

My high school did not offer a Model United Nations club, so I want to create a NHSMUN experience for delegates that I never got to experience. Good luck with research and never let your curiosity fade. Please reach out to me or my co-director, Alejandra, if you have any questions. We cannot wait to see you in NYC!

Best regards,

Arian Bordbar

Group of 20

Session II

nhsmun.g20@imuna.org



Table of Contents

A Note on the NHSMUN Difference	5
A Note on Research and Preparation	7
Committee History	8

Strengthening Global Health Security 9

Introduction	10
History and Description of the Issue	11
Current Status	19
Bloc Analysis	25
Committee Mission	27

The Disproportionate Effects of Climate Change 29

Introduction	30
History and Description of the Issue	30
Current Status	44
Bloc Analysis	49
Committee Mission	51
Research and Preparation Questions	53
Important Documents	54
Works Cited	55

A Note on the NHSMUN Difference

Esteemed Faculty and Delegates,

Welcome to NHSMUN 2025! We are Terry Wang and Jordan Baker, and we are this year's Secretary-General and Director-General. Thank you for choosing to attend NHSMUN, the world's largest and most diverse Model United Nations conference for secondary school students. We are thrilled to welcome you to New York City in March.

As a space for collaboration, consensus, and compromise, NHSMUN strives to transform today's brightest thinkers, speakers, and collaborators into tomorrow's leaders. Our organization provides a uniquely tailored experience for all through innovative and accessible programming. We believe that an emphasis on education through simulation is paramount to the Model UN experience, and this idea permeates throughout numerous aspects of the conference:

Realism and accuracy: Although a perfect simulation of the UN is never possible, we believe that one of the core educational responsibilities of MUN conferences is to educate students about how the UN System works. Each NHSMUN committee is a simulation of a real deliberative body so that delegates can research what their country has said in the committee. Our topics are chosen from the issues currently on the agenda of that committee (except historical committees, which take topics from the appropriate time period). We also strive to invite real UN, NGO, and field experts into each committee through our committee speakers program. Moreover, we arrange meetings between students and the actual UN Permanent Mission of the country they are representing. Our delegates have the incredible opportunity to conduct first-hand research, asking thought-provoking questions to current UN representatives and experts in their respective fields of study. These exclusive resources are only available due to IMUNA's formal association with the United Nations Department of Global Communications and consultative status with the Economic and Social Council. No other conference goes so far to deeply immerse students into the UN System.

Educational emphasis, even for awards: At the heart of NHSMUN lies education and compromise. Part of what makes NHSMUN so special is its diverse delegate base. As such, when NHSMUN distributes awards, we strongly de-emphasize their importance in comparison to the educational value of Model UN as an activity. NHSMUN seeks to reward students who excel in the arts of compromise and diplomacy. More importantly, we seek to develop an environment in which delegates can employ their critical thought processes and share ideas with their counterparts from around the world. Given our delegates' plurality of perspectives and experiences, we center our programming around the values of diplomacy and teamwork. In particular, our daises look for and promote constructive leadership that strives towards consensus, as real ambassadors do in the United Nations.

Debate founded on strong knowledge and accessibility: With knowledgeable staff members and delegates from over 70 countries, NHSMUN can facilitate an enriching experience reliant on substantively rigorous debate. To ensure this high quality of debate, our staff members produce detailed, accessible, and comprehensive topic guides (like the one below) to prepare delegates for the nuances inherent in each global issue. This process takes over six months, during which the Directors who lead our committees develop their topics with the valuable input of expert contributors. Because these topics are always changing and evolving, NHSMUN also produces update papers intended to bridge the gap of time between when the background guides are published and when committee starts in March. As such, this guide is designed to be a launching point from which delegates should delve further into their topics. The detailed knowledge that our Directors provide in this background guide through diligent research aims to increase critical thinking within delegates at NHSMUN.

Extremely engaged staff: At NHSMUN, our staffers care deeply about delegates' experiences and what they take away from their time at NHSMUN. Before the conference, our Directors and Assistant Directors are trained rigorously through hours of workshops and exercises both virtual and in-person to provide the best conference experience possible. At the conference,

delegates will have the opportunity to meet their dais members prior to the first committee session, where they may engage one-on-one to discuss their committees and topics. Our Directors and Assistant Directors are trained and empowered to be experts on their topics and they are always available to rapidly answer any questions delegates may have prior to the conference. Our Directors and Assistant Directors read every position paper submitted to NHSMUN and provide thoughtful comments on those submitted by the feedback deadline. Our staff aims not only to tailor the committee experience to delegates' reflections and research but also to facilitate an environment where all delegates' thoughts can be heard.

Empowering participation: The UN relies on the voices of all of its member states to create resolutions most likely to make a meaningful impact on the world. That is our philosophy at NHSMUN too. We believe that to properly delve into an issue and produce fruitful debate, it is crucial to focus the entire energy and attention of the room on the topic at hand. Our Rules of Procedure and our staff focus on making every voice in the committee heard, regardless of each delegate's country assignment or skill level. Additionally, unlike many other conferences, we also emphasize delegate participation after the conference. MUN delegates are well researched and aware of the UN's priorities, and they can serve as the vanguard for action on the Sustainable Development Goals (SDGs). Therefore, we are proud to connect students with other action-oriented organizations to encourage further work on the topics.

Focused committee time: We feel strongly that face-to-face interpersonal connections during debate are critical to producing superior committee experiences and allow for the free flow of ideas. Ensuring policies based on equality and inclusion is one way in which NHSMUN guarantees that every delegate has an equal opportunity to succeed in committee. In order to allow communication and collaboration to be maximized during committee, we have a very dedicated administrative team who work throughout the conference to type up, format, and print draft resolutions and working papers.

As always, we welcome any questions or concerns about the substantive program at NHSMUN 2025 and would be happy to discuss NHSMUN pedagogy with faculty or delegates.

Delegates, it is our sincerest hope that your time at NHSMUN will be thought-provoking and stimulating. NHSMUN is an incredible time to learn, grow, and embrace new opportunities. We look forward to seeing you work both as students and global citizens at the conference.

Best,

Terry Wang
Secretary-General

Jordan Baker
Director-General

A Note on Research and Preparation

Delegate research and preparation is a critical element of attending NHSMUN and enjoying the debate experience. We have provided this Background Guide to introduce the topics that will be discussed in your committee. We encourage and expect each of you to critically explore the selected topics and be able to identify and analyze their intricacies upon arrival to NHSMUN in March.

The task of preparing for the conference can be challenging, but to assist delegates, we have updated our [Beginner Delegate Guide](#) and [Advanced Delegate Guide](#). In particular, these guides contain more detailed instructions on how to prepare a position paper and excellent sources that delegates can use for research. Use these resources to your advantage. They can help transform a sometimes overwhelming task into what it should be: an engaging, interesting, and rewarding experience.

To accurately represent a country, delegates must be able to articulate its policies. Accordingly, NHSMUN requires each delegation (the one or two delegates representing a country in a committee) to write a position paper for each topic on the committee's agenda. In delegations with two students, we strongly encourage each student to research each topic to ensure that they are prepared to debate no matter which topic is selected first. More information about how to write and format position papers can be found in the NHSMUN Research Guide. To summarize, position papers should be structured into three sections:

I: Topic Background – This section should describe the history of the topic as it would be described by the delegate's country. Delegates do not need to give an exhaustive account of the topic, but rather focus on the details that are most important to the delegation's policy and proposed solutions.

II: Country Policy – This section should discuss the delegation's policy regarding the topic. Each paper should state the policy in plain terms and include the relevant statements, statistics, and research that support the effectiveness of the policy. Comparisons with other global issues are also appropriate here.

III. Proposed Solutions – This section should detail the delegation's proposed solutions to address the topic. Descriptions of each solution should be thorough. Each idea should clearly connect to the specific problem it aims to solve and identify potential obstacles to implementation and how they can be avoided. The solution should be a natural extension of the country's policy.

Each topic's position paper should be **no more than 10 pages** long double-spaced with standard margins and font size. **We recommend 3–5 pages per topic as a suitable length.** The paper must be written from the perspective of your assigned country and should articulate the policies you will espouse at the conference.

Each delegation is responsible for sending a copy of its papers to their committee Directors via [myDais](#) on or before **February 21, 2025**. If a delegate wishes to receive detailed feedback from the committee's dais, a position must be submitted on or before **January 31, 2025**. The papers received by this earlier deadline will be reviewed by the dais of each committee and returned prior to your arrival at the conference.

Complete instructions for how to submit position papers will be sent to faculty advisers via email. If delegations are unable to submit their position papers on time, please contact us at info@imuna.org.

Delegations that do not submit position papers will be ineligible for awards.

Committee History

The Group of 20 (G20) was born out of a recognition that existing global forums were insufficient to tackle the increasingly interconnected global economy. First established in 1999 as a response to the Asian financial crisis, the G20 served a critical role in uniting central bank governors and finance ministers from the biggest economies in the world to foster international economic cooperation.¹ After the 2008 financial crisis, the group was expanded to include heads of state and government, highlighting its significance as a forum for addressing global economic challenges.

Originally focused on financial stability and macroeconomic policy, its agenda has expanded to include urgent topics including climate change, health crises, and digital evolution. Throughout its existence, the G20 modified its mandate to take evolving international challenges into account. For instance, as part of a more comprehensive approach to economic governance, recent summits have addressed matters such as the Sustainable Development Goals.² This shift demonstrates a comprehension of the connection between economic growth and social welfare.

Consisting of 19 countries, the G20 accounts for two thirds of the world's population and about 85 percent of its gross domestic product.³ The two main tracks of the forum are the Financial Track, overseen by central bank governors and finance ministers, and the Sherpa Track, managed by Sherpas, who are personal envoys of the leaders of member countries.⁴ This structure allows a more holistic discussion on development challenges and economic policy. Despite not being a United Nations agency, the G20 works closely with the UN and other international organizations. It serves as a platform to discuss topics that align with UN goals and its structure allows it to function flexibly while addressing global challenges that also concern the UN.

The G20 operates through a rotating presidency held by its members rather than having a permanent secretariat or physical location. During its term, each presidency oversees organizing meetings and setting agendas for the summits. Brazil currently holds the G20 presidency⁵, which will last until November 30, 2024. "Building a Just World and a Sustainable Planet" is Brazil's presidency theme, emphasizing social justice and sustainability. After Brazil's period, South Africa will assume the G20 presidency from December 1, 2024, to November 30, 2025.⁶ South Africa seeks to address development challenges facing Africa and the Global South during its presidency.

Historically, the G20 has collaborated with different organizations for implementation support and policy analysis, such as the Organization for Economic Co-operation and Development.⁷ Its noteworthy accomplishments include the suspension of debt payments towards member nations owed by less developed countries during the COVID-19 pandemic and a commitment to address climate change.⁸ However, certain obstacles still exist; for example, reaching agreements between member states can be a challenge due to different national interests. Critics argue that this has led to a lack of action on important and urgent issues.

1 James McBride, Anshu Siripurapu, and Noah Berman, "What Does the G20 Do?" *Council on Foreign Relations*, October 11, 2023, <https://www.cfr.org/background/what-does-g20-do>.

2 "FACT SHEET: Delivering an Ambitious Agenda for the G20," The White House. September 11, 2023, <https://www.whitehouse.gov/briefing-room/statements-releases/2023/09/09/fact-sheet-delivering-an-ambitious-agenda-for-the-g20/>.

3 "The Group of Twenty (G20)," National Portal of India, accessed September 16, 2024, <https://www.india.gov.in/spotlight/group-twenty-g20>.

4 "Overview of G20," Indian Ministry of Earth Sciences, India, accessed September 16, 2024, https://moes.gov.in/g20-india-2023/moes-g20?language_content_entity=en.

5 "Previous Summits," G20 Brasil 2024, accessed September 16, 2024, <https://www.g20.org/en/about-the-g20/previous-summit>.

6 "Government Prepares for G20 Presidency and Summit," SAnews, August 8, 2024, <https://www.sanews.gov.za/south-africa/government-prepares-g20-presidency-and-summit>.

7 "OECD and G20," OECD, accessed September 16, 2024, <https://www.oecd.org/en/about/oecd-and-g20.html>.

8 James McBride, Anshu Siripurapu, and Noah Berman, "What Does the G20 Do?"



G20

NHSMUN 2025



TOPIC A: STRENGTHENING GLOBAL HEALTH SECURITY

Photo Credit: UK Department for International Development

Introduction

The importance of strengthening global health security cannot be understated. Diseases are completely unpredictable. In 36 hours, a pathogen, the microorganism that causes a disease, can spread to every major city in the world. If a disease outbreak is not controlled, the consequences on a global scale are massive. This includes the loss of millions of lives and the complete disruption of the world's economy.¹

Per the Centers for Disease Control and Prevention (CDC), COVID-19 is not the last pandemic that humankind will experience. How the international community addresses the next public health emergency depends on proper prevention, detection, and response preparations.² Large-scale disease outbreaks are produced by weaknesses in a country's health security. Examples are poorly established water and sanitation infrastructures, poverty, and inequality. That said, the overall state of health security is behind where it should be. This is why in the 21st century, outbreaks of disease are not uncommon. In addition to the COVID-19 global pandemic, this century has also seen Ebola across Africa, the Middle East respiratory syndrome (MERS) in Saudi Arabia and the Republic of Korea, and the H1N1, H5N1, and severe acute respiratory syndrome pandemics (SARS) in several regions. Moreover, many countries are experiencing epidemics of yellow fever, cholera, polio, dengue, and measles.³

Deadly infections can be contained or naturally go extinct. The first attempt at managing a pandemic was during 541-542 AD when the Byzantine Emperor ordered everyone to isolate themselves along with the food that was imported from other countries.⁴ This idea of isolation was not popularized until the first Bubonic Plague. The lack of medical innovation and cures meant that isolating the people was the best way to prevent the spread. The most recent public health emergency was the outbreak of the COVID-19 pandemic. Throughout

this pandemic, over seven million people died, and over 775 million were infected.⁵ Yet, this is not the only time the international community has struggled to manage a public health emergency. The Black Death from 1334-1353 totaled around 75-200 million deaths across a world population of 475 million, making it the deadliest plague in human history.⁶ Populations across Europe needed between 80 to 150 years to repopulate and recover. The 1918 flu is also notable for its estimated 50-100 million deaths. After every pandemic, knowledge about medical technology and response measures increased. For example, cholera taught city officials where and how to implement adequate sanitation and how to quarantine an individual who is sick.⁷

Currently, there are several ways of dealing with a deadly pandemic. The World Health Organization (WHO) has some guiding principles in case of an emergency outbreak. The most important and defining principles it lists are Country Focus, Humanitarian Principles, and Evidence-Based Programming.⁸ Many countries had different solutions for handling the pandemic, some of which take into consideration the principles of the WHO. The United States of America handled the outbreak by restricting travel early, having monetary relief acts, and immediately mobilizing healthcare workers. The People's Republic of China responded by implementing very strict mask and isolation rules and the construction of hospitals. The Russian Federation restricted

1 "What We Do," Centers for Disease Control and Prevention, last modified September 17, 2024, <https://www.cdc.gov/global-health-protection/php/programs-and-institutes/index.html/>.

2 Centers for Disease Control and Prevention, "What We Do."

3 IFRC, *Global Health Security* (Geneva: IFRC, 2021), https://www.ifrc.org/sites/default/files/2021-07/IFRC-GHS_July2021-2.pdf

4 Eugenia Tognotti, "Past the Virus - Containing Pandemics Throughout History," Institut Montaigne, last modified June 29, 2021, <https://www.institutmontaigne.org/en/expressions/past-virus-containing-pandemics-throughout-history/>.

5 "WHO COVID-19 Dashboard," World Health Organization, last accessed September 5, 2024, <https://data.who.int/dashboards/covid19/>.

6 Jessica Gergen and Maya Prabhu, "History's Seven Deadliest Plagues," VaccinesWork, 15 November 2021, 2021, <https://www.gavi.org/vaccineswork/historys-seven-deadliest-plagues/>.

7 J. Howard Beard, "The Contribution of Cholera to Public Health," *The Scientific Monthly* 43, no. 6 (December 1936): 515–21, <http://www.jstor.org/stable/16267>.

8 World Health Organization, *ERF Emergency Response Framework* (Geneva: WHO Health Emergencies Programme, 2024), <https://www.who.int/publications/i/item/9789240058064/>.

border access expanded resources to rural areas, and enforced mask and quarantine mandates.⁹ Although all of these countries eventually overcame COVID-19, their efforts were met with multiple issues and criticism. In the United States, political division and unequal access to resources were major problems to overcome. The People's Republic of China was quickly questioned on their strict enforcement rules which raised concerns over human rights. The Russian Federation faced problems with transparency due to the mystery that surrounded the creation of their vaccine.¹⁰

Countries have learned from the COVID-19 pandemic. However, their response measures are still weak and unsustainable for a future health crisis. The world was not fully prepared for the COVID-19 pandemic due to stressed health systems and supply and demand issues.¹¹ In some countries, there is a lack of transparency and not enough resources which harms recovery further by not allowing people to access the information and care they need. Along with a strain on supply chains, the world faced issues in workforce shortages and imbalances, government transparency and accountability, health budget and innovation cost, country access to medicine and technology, social inequality, and lack of access to healthcare.¹² Developing a targeted response measure for future health emergencies is important to avoid repeating past mistakes. At the peak of all of these pandemics, the world's most important institutions closed their doors, trade stopped, and food supply diminished. This led to many deaths that could have been prevented. The World Health Organization's emergency response framework can only help to a certain degree. The international community must dedicate itself to promoting health and safety. Only then can it minimize the devastation caused by these natural occurrences.

History and Description of the Issue

Addressing Ethical and Legal Challenges in Global Health Security

In the event of a public health emergency, accounting for ethics is often overlooked; however, it can often be the difference between an effective response and one that has no impact. Historically, ethics have not been prioritized, or even considered, especially due to the panic that is caused by an unexpected infection. During the 1901 smallpox epidemic in the United States, the government required everyone to get the vaccine, but many were reluctant because of quality concerns. Eventually, a monetary penalty and even a sentence of 10 days in jail was imposed for those who refused. The homeless population was forcibly vaccinated because of concerns that they would spread the virus more. A similar situation occurred during the H1N1 epidemic in 1918, when the US government required people to wear masks. This was met with backlash, and there was a mass rebellion.¹³ Situations like this are difficult to analyze due to the lack of available information. The scale and scope of medicine at the time of these health emergencies was very limited, and this understanding was made infinitely worse by unexpected emergencies. Public officials were doing what they thought was best at the time. What is not ethical at one moment in history may later be deemed as the correct move in the response guideline years later. Even when all the information is gathered about a pandemic, it is still difficult to judge if a mandate is ethical or not. A mask and vaccine mandate may prove to reduce the infectivity and death rate of the virus but is sometimes regarded as diminishing certain rights.

The WHO has implemented rules and regulations regarding

⁹ "COVID-19," International Monetary Fund, last modified March 20, 2020, <https://www.imf.org/en/Topics/imf-and-covid19/>.

¹⁰ Olga Doborvidova, "Russia's COVID-19 defense may depend on mystery vaccine from former bioweapons lab—but does it work?" Science, last modified April 6, 2021, <https://www.science.org/content/article/russia-s-covid-19-defense-may-depend-mystery-vaccine-former-bioweapons-lab-does-it-work/>.

¹¹ OECD, *Ready for the next Crisis? Investing in Health System Resilience* (Paris: OECD Publishing, 2023), <https://doi.org/10.1787/1e53cf80-en/>.

¹² Partnership for Health System Sustainability and Resilience, *Building Sustainable and Resilient Health Systems* (London: LSE, 2023), https://www3.weforum.org/docs/WEF_PHSSR_Building_Sustainable_and_Resilient_Health_Systems_2023.pdf.

¹³ Curt Anderson, "A Brief History of Ethics in the Presence of a Pandemic," *Advanced Journal of Social Science* 9, No. 1, (October 2021): 27-35, <https://journals.ajjr.org/index.php/ajss/article/view/4002/425>.



Woman receives COVID-19 vaccination in Strasbourg, France.

Credit: Claude Truong-Ngoc

forcible vaccinations. Necessity and proportionality, sufficient evidence of vaccine safety, sufficient evidence of vaccine efficacy and effectiveness, justice in access and availability, and public trust are some of the criteria for a mandatory vaccination.¹⁴ Even with very strict and concise guidelines, the gray area between ethics and legality is wide. What qualifies as necessary? Who determines justice in access? It is worth noting that vaccine mandates are not uncommon. Many schools, healthcare centers, and jobs around the world require some form of immunity. On the other hand, there are ethical concerns of not enforcing mask or vaccine mandates as well. During the severe acute respiratory syndrome (SARS) outbreak, many medical workers feared that they would contract the disease because SARS was highly infectious.¹⁵

Another issue that is widely viewed as an ethical issue is the allocation of resources. The determination of who receives certain services or resources is not always guaranteed to be fair,

equitable, or reasonable. The current system in the United States is “first-come-first serve” (FCFS). This seems rational but often excludes and hurts those who do not have immediate access to a hospital or medical station.¹⁶ The “first-come-first serve” approach has flaws that are specific to disaster scenarios such as the COVID-19 pandemic. FCFS does not treat all people equally, even if that is its intent. It unintentionally favors members of society who have more access to information, have the means to travel to places with better resources, and can get to the limited resources first. FCFS also does not maximize the benefits of resources: giving treatment to those who ask first means that resources can run out for those who need it later.¹⁷

The most debated aspect of ethics and legality regarding medicine is the idea of restricting rights in the interest of public health. The number one goal of any health response is “to prevent disease transmission and minimize illness and death.”¹⁸ When health security measures affect established

14 World Health Organization, *COVID-19 and Mandatory Vaccination: Ethical Considerations* (Geneva: WHO, 2022), <https://iris.who.int/bitstream/handle/10665/354585/WHO-2019-nCoV-Policy-brief-Mandatory-vaccination-2022.1-eng.pdf?sequence=1>.

15 Joint Centre for Bioethics, *Ethical Considerations in Preparedness Planning for Pandemic Influenza* (Toronto: University of Toronto, 2005), https://jcb.utoronto.ca/wp-content/uploads/2021/03/stand_on_guard.pdf.

16 Denise Sese, MD, Mahwish U. Ahmad, MD, MPH and Prabalini Rajendram, MD, *Ethical Considerations during the Covid-19 Pandemic* (Ohio: Cleveland Clinic Journal of Medicine, 2020), <https://doi.org/10.3949/ccjm.87a.ccc038>.

17 Arthur Rawlings, Lea Brandt, Alberto Ferreres, Horacio Asbun, and Phillip Shadduck, “Ethical considerations for allocation of scarce resources and alterations in surgical care during a pandemic,” *NIH 35* (May 2020): 2217–2222, <https://doi.org/10.1007%2Fs00464-020-07629-x>.

18 Nancy Kass, Jeffrey Kahn, Audrey Buckland, Amy Paul, and the Expert Working Group, *Ethics Guidance for the Public Health Containment of Serious Infectious Disease Outbreaks in Low-Income Settings: Lessons from Ebola* (Maryland: Johns Hopkins Berman Institute of Bioethics, 2019), https://bioethics.jhu.edu/wp-content/uploads/2019/03/Ethics20Guidance20for20Public20Health20Containment20Lessons20from20Ebola_April2019.pdf.

rights, problems occur. An example of this phenomenon is health surveillance. One of the best ways to monitor a pandemic is by surveillance, or “continued watchfulness.” This has been proven to track trends in the country and has led to breakthrough insight throughout history. The WHO has guidelines for surveillance, one of them being “countries have an obligation to develop appropriate, effective mechanisms to ensure ethical surveillance.”¹⁹ During the COVID-19 pandemic, countries like the People’s Republic of China were questioned about their “ethical” use of surveillance to contain the spread of disease. Another point of interest in the conversation about ethics is how different countries use ethics to contain their citizens. The United States did not mandate masks and vaccines in the interest of preserving rights. The People’s Republic of China, on the other hand, forced people to isolate themselves, wear masks, and get vaccines in the interest of preserving life. Finding a way to manage outbreaks while ensuring ethics are accounted for is essential to gaining the public’s trust.

When the government violates rights without repercussions, it gives legitimacy to other violations of rights. Ethical considerations are also a key aspect of treating the problem in a manner that can be replicated for future pandemics. Leaders must plan for the unknown, especially in the event of an unforeseen outbreak.²⁰ If the previous response had ethics violations, then the next is likely to continue that trend due to the gap in knowledgeable protocol.

Building Sustainable Health Systems Through International Collaboration

Pandemics and global health outbreaks affect the entirety of human life on earth. Every country will eventually deal with a health crisis. The important element of analysis when an emergency happens is whether the response was effective or

not. This response is largely reliant on the quality of health systems in the country of origin. If the systems are below the necessary threshold for an effective response, countries might see spillovers and an outbreak in their territory. With this being the case in many outbreaks, it is an issue that is of interest to all countries that enter the world of global politics and relations. Many countries around the world are not prepared to handle another pandemic, with an overwhelming majority scoring just 39 out of 100 on the Global Health Security Index in 2021 for their ability to detect, predict, set policy norms, treatment, risk-taking, and respond to an emergency.²¹ This means that most countries went through a disease outbreak and did not update any of their health systems or make any attempts to reinforce them. 155 out of 195 countries have not made any significant contributions towards their ability to handle the threat of a pandemic.²²

This is a problem because it negatively affects the trust that the government has with its people. If people feel that the government has no regard for the quality of healthcare in a country, especially when a health emergency is present, it can be extremely difficult to have the public adhere to mandates that have been put in place.²³ This, in turn, lowers the effectiveness of a response, and as a result, more people are affected. People die every year due to the lack of quality health systems because of low-performing treatment. Over six million people die every year from poor quality health care, while over three million dies from a lack of access.²⁴

A joint study with the WHO states that healthcare workers in seven low- and middle-income African countries were unable to deliver accurate diagnoses one-third of the time. In this case study, guidelines for common diagnosis were followed less than 45 percent of the time. The study also highlighted that research in high-mortality countries had significantly low-quality levels in antenatal, family planning, and sick-child

19 World Health Organization, *WHO Guidelines on Ethical Issues in Public Health Surveillance*, (Geneva: WHO, 2017), <https://iris.who.int/bitstream/handle/10665/255721/9789241512657-eng.pdf?sequence=1>.

20 Nancy Berlinger, PhD, et al., *Ethical Framework for Health Care Institutions & Guidelines for Institutional Ethics Services Responding to the Coronavirus Pandemic*, (New York: The Hastings Center, 2020), <https://www.thehastingscenter.org/ethicalframeworkcovid19/>.

21 “The 2021 Global Health Security Index,” GHS Index, December 5, 2023, <https://ghsindex.org/>.

22 GHS Index, “The 2021 Global Health Security Index.”

23 Guobang Chen, Hua Zhang, Yue Hu, and Chunyan Luo, *Trust as a Catalyst: Revealing the Impact of Government Trust and Professional Trust on Public Health Policy Compliance during a Pandemic*, (London: BioMed Central, 2024), <https://doi.org/10.1186/s12889-024-18449-2/>.

24 Gabriel Goldschmidt and Muhammad Ali Pate, “Every Year Nearly 6 Million People Die in Developing Countries from Low-Quality Healthcare - This Is How We Help Them,” World Economic Forum, November 25, 2019, <https://www.weforum.org/agenda/2019/11/effects-and-costs-of-poor-quality-healthcare/>.

care services. Moreover, 15 percent of hospital expenditure in countries of high income is from mistakes in care or patients being infected in hospitals.²⁵

This means that malpractice is an issue even when healthcare resources are abundant. Even high-income countries need help to create a robust and dynamic system to manage health security risks. This means that developing countries will be significantly more affected by incoming health crises. The first step in mitigating a weakened global health infrastructure is to understand the root causes. Developing global health systems usually requires more workforce or funding or dealing with unpredictable consequences from global interventions. Several states and NGOs are ready to assist nations in need, but this can sometimes lead to unintended adverse effects.²⁶

A great example of this happened in Africa when the AIDS and HIV epidemic broke out and there were several foreign interventions to strengthen the affected healthcare infrastructure. Many NGOs like GlaxoSmithKline were focused on delivering medicine at very low and affordable prices. Other foundations poured in resources to make the medicine for AIDS and HIV widely accessible to even the most rural and vulnerable. All these actions were implemented with good intentions, but unforeseen consequences were also produced. Several NGOs and organizations gave training to the local health force. Because of this new expertise, these trained workers later moved to the private sector and other countries because of better pay and working conditions. As a result, this further exacerbated the lack of healthcare workers in Africa. The worst unintended consequence was the issue of sustainability and dependency. The pharmaceutical industry became distorted after the NGOs administered free medicine which caused many local and national companies in the region to withdraw because of decreased profits.²⁷

This made the reliance on this readily available drug more

severe. The funding and resources for the epidemic lessened and this created a cycle of dependency on external support.²⁸ The region faced difficulties in funding its HIV and AIDS program. That said, the response to the HIV/AIDS outbreak was necessary and saved lives but would have been better if the health systems in the region were more prepared. Health systems in the region were not used to high levels of assistance and as a result, could not keep up after the NGOs left. HIV and AIDS differ vastly from COVID-19, but the principle still stays the same. If a country's health system is broken, then more problems will arise, and many will be affected.

One of the optimal ways to manage a large-scale disease outbreak is by having a vaccine readily available, or if a foreign virus emerges, the capacity to create one quickly. Organizations like the Coalition for Epidemic Preparedness Innovations (CEPI) support optimizing the capability of vaccine manufacturers in the global south, with a focus on regions that are prone to epidemics and deadly disease outbreaks. CEPI-backed vaccine developers will quickly be able to transfer their technology to pre-selected manufacturers with the right expertise, technology, and optimal geographical position to enable rapid production and equitable distribution of vaccines to affected populations.²⁹ The unequal global distribution of vaccine manufacturing capacity was a central driving force behind the tragic vaccine inequity that characterized the response to COVID-19. Having a united front when it comes to vaccines is important when distributing them.

Funding is imperative regarding research and resource sharing. Contributions to the discussion of innovation and technology in the field of medicine are not possible without substantial funding. The United Nations Office for the Coordination of Humanitarian Affairs is a key player in helping health security systems acquire funding and budgets for these scenarios. They have already begun to lay the foundations for a USD 47 billion

25 World Health Organization, "Low quality healthcare is increasing the burden of illness and health costs globally," *WHO*, July 5, 2018, <https://www.who.int/news/item/05-07-2018-low-quality-healthcare-is-increasing-the-burden-of-illness-and-health-costs-globally>.

26 Kathryn Oliver, Theo Lorenc, Jane Tinkler, and Chris Bonell, *Understanding the Unintended Consequences of Public Health Policies: The Views of Policymakers and Evaluators - BMC Public Health* (London: BioMed Central, 2019), <https://bmcpublihealth.biomedcentral.com/articles/10.1186/s12889-019-7389-6>.

27 Lisa Henderson, "The Law of Unintended Consequences," *PharmExec*, November 15, 2020, <https://www.pharmexec.com/view/law-unintended-consequences>.

28 Daniel Ogbuabor, Caroline Olwande, Iris Semini, Obinna Onwujekwe, Yewande Olaifa, and Chioma Ukanwa, *Stakeholders' Perspectives on the Financial Sustainability of the HIV Response in Nigeria: A Qualitative Study* (Maryland: Global Health: Science and Practice, 2023), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10141423/>.

29 "Manufacturing and Supply Chain," CEPI, accessed August 13, 2024, <https://cepi.net/manufacturing-and-supply-chain>.

funding package that would help over 180 million people in over 70 countries.³⁰ The Global Fund is also an organization that prioritizes funding to places that are in desperate need of resource allocation. Since 2002, The Global Fund has invested over USD 27 billion to fight the spread of HIV, 9.5 billion to fight the spread of tuberculosis, and 16 billion to fight the spread of malaria.³¹

The effectiveness of a response is solely determined by the quality of the associated workforce. During the COVID-19 pandemic, many workers reported burnout and exhaustion and as a result, many left.³² Many were also confused about the precautionary measures to take because it was the first major pandemic in their lifetime, and as a result, the quality of care weakened, and efficacy diminished. The World Health Organization (WHO) has already trained over 2,800 people for public health emergencies in an attempt to create a capacitated workforce.³³ In previous years training centers have been built to focus on combating Ebola. The National Ebola Training and Education Center (NETEC) was established in 2015 in response to the 2014–2016 Ebola virus disease outbreak in West Africa.³⁴ This served as beneficial in curbing the future of the Ebola outbreak but was created because of the outbreak, not to prevent one. Countries must aim to work proactively to create centers focused on the prevention of large-scale disease outbreaks. A clear line of communication between public and private medical authorities is resourceful for these matters.

International medicine circles are complete with data and resources. Countries use these resources to improve their health systems and to improve response to a health emergency. Normally, these measures prove effective, but it opens the question of what positive outcomes would be possible if every country collaborated to distribute resources, data, and

knowledge. This would allow all countries to be on an even playing field when a health emergency occurs. Developing countries would see a massive benefit to their healthcare workforce and developed states would benefit by reducing the chances of spillovers.

Complex and intricate infrastructures like health systems need to be examined from every angle to find a sustainable model that works for the country. While putting more emphasis on capacitating healthcare workers and medicine distribution is important, it is simply not enough to fix the issues that exist within them. An effective and efficient health system has a balance between eight elements: Preparedness, Protection, Promotion, Research, Communication, Workforce, Governance, and Surveillance.³⁵ When these elements function together, health infrastructures are fully capacitated to treat its citizens. Organizations like The Global Fund have already begun to help countries support their healthcare systems by sustaining the supply chains, increasing the use of technology, and giving resources to improve response capacity. International collaboration is important to ensure NGOs are working in hand with the governance of a region. If this is not done correctly it can lead to a clash in policy and result in a worse response than if no action was taken.

Bioterrorism

Ever since humans have built walls around their civilizations and created borders with other countries the threat of warfare has been evident. The oldest, deadliest, and most effective type of warfare involved disease and biological hazards. An estimated 500 million people died of infectious diseases. Several tens of thousands of these deaths were due to the deliberate release of pathogens or toxins.³⁶ Biological terrorism has its roots set deep into the Middle Ages when military leaders catapulted

³⁰ “Global Humanitarian Overview 2024,” UNOCHA, December 11, 2023, <https://www.unocha.org/publications/report/world/global-humanitarian-overview-2024-enarfrs>.

³¹ The Global Fund, *Results Report 2023: The Global Fund to Fight AIDS, Tuberculosis and Malaria*, (Geneva: The Global Fund, 2024), <https://www.theglobalfund.org/en/results/#covid-19>.

³² “Impact of the COVID-19 Pandemic on the Hospital and Outpatient Clinician Workforce: Challenges and Policy Responses,” ASPE, May 3, 2022, <https://aspe.hhs.gov/reports/covid-19-health-care-workforce>.

³³ “Building a Skilled Workforce to Prepare for and Respond to Emergencies,” World Health Organization, accessed August 13, 2024, <https://www.who.int/activities/building-a-skilled-workforce-to-respond-to-emergencies>.

³⁴ Christopher J. Kratochvil, et. al, “The National Ebola Training and Education Center: Preparing the United States for Ebola and Other Special Pathogens,” *Health Security* 15, no. 3 (June 2017): <https://doi.org/10.1089/hs.2017.0005>.

³⁵ “Integrated Health System Strengthening,” World Health Organization, accessed August 12, 2024, <https://www.who.int/teams/primary-health-care/health-systems-resilience/integrated-health-system-strengthening>.

³⁶ Friedrich Frischknecht, *The History of Biological Warfare. Human Experimentation, Modern Nightmares and Lone Madmen in the Twentieth Century*, (Heidelberg: EMBO reports, 2003), <https://www.embopress.org/doi/full/10.1038/sj.embor.embor849>.

previously infected and dead bodies to throw over city walls to infect a local population.³⁷ This was a revolutionary jump from the previous ways of conducting a city raid. Biological weapons meant that armies could clear out a city without having any of their men get in harm's way. Another example is when Polish-Lithuanian artillery general Kazimierz Siemienowicz placed saliva contaminated with rabies inside of a clay ball, to then shoot at the enemies³⁸. Because there was no cure at the time this meant certain death if one got hit with the clay projectiles.

As technology, research, and resources expanded, so did the capacity for creating new weapons of mass destruction. During World War I (WWI), three major gasses were used to gain an advantage: phosgene, chlorine, and the more frequently used mustard gas. The use of mustard gas is an example of humans deliberately creating a bioweapon instead of relying on natural diseases and illnesses to affect enemy combatants. Mustard gas creates a burning sensation when it comes in contact with skin and can be fatal at large doses. Nonetheless, it did not get a reputation for its effectiveness until World War II (WWII), where it was frequently used during trench

³⁷ "Medical Aspects of Chemical and Biological Warfare," Borden Institute, accessed August 13, 2024, <https://medcoe.army.mil/borden-tb-med-aspects-chembio-war>.

³⁸ Arnaud Tarantola, "Four Thousand Years of Concepts Relating to Rabies in Animals and Humans, Its Prevention and Its Cure," *TropicalMed* 2, no. 2 (March 24): <https://www.mdpi.com/2414-6366/2/2/5>.

³⁹ "Veterans at Risk: The Health Effects of Mustard Gas and Lewisite," Institute of Medicine (US) Committee on the Survey of the Health Effects of Mustard Gas and Lewisite, January 1, 1993, <https://www.ncbi.nlm.nih.gov/books/NBK236059/>.

⁴⁰ "1925 Geneva Protocol," United Nations Office for Disarmament Affairs, accessed August 13, 2024, <https://disarmament.unoda.org/wmd/bio/1925-geneva-protocol/>.

⁴¹ Ole Solvang, *Death By Chemicals* (New York: Human Rights Watch, May 1, 2017), <https://www.hrw.org/report/2017/05/01/death->

warfare. Its widespread use stems from being easy to produce in mass quantities. By the end of WWII, the United States had produced nearly 180 million pounds of the chemical.³⁹ Another reason was because of its effectiveness. Mustard gas spreads very fast in open air, and in a battlefield setting with wind, a light gust can cover the whole battlefield in a matter of minutes. The damage of bio weaponry during the war was so severe that The Geneva Conventions included the prohibition of bioterrorist technology.

International law is difficult to enforce, particularly in countries with limited resources or differing priorities. These countries are not bound by any rules or regulations and frequently violate codes of conduct in warfare. Nazi Germany violated many international rules regarding chemical weapons and bioterrorism. A modern day example of this rule being disregarded is the Al-Assad regime using chemical weapons on his people during the Syrian civil war.⁴⁰ On April 4, 2017, a Syrian government warplane attacked Khan Sheik Houn, a town in the northwestern governorate of Idlib, with a nerve agent, killing at least 90 people, 30 of them children.⁴¹ Many

A West German soldier wearing a nuclear-biological-chemical protective suit and mask.

Credit: Master Sergeant N. McBride



reports of the casualties and eyewitness accounts report that the chemical attack used extremely potent sarin gas.⁴² Similar instances can be seen on August 21, 2013, where the government used white phosphorus and sarin gas to inflict harm on political opponents and civilians.⁴³ In this instance over 700+ people were killed. Another example of disregarding international law is when Saddam Hussein used chemical weapons on the Kurdish town of Halabja during the height of the Iran -Iraq war.⁴⁴

Chemical weapons are also not just used by the military. Sometimes chemical weapons can be used in an act of terrorism. In 1995, The Japanese Doomsday Cult, also known as Aum Shinrikyo, used Sarin gas on the Tokyo subway system which resulted in the death of 13 and the injury of over 6000 other people.⁴⁵ Nonetheless, governments usually have bioterrorism response protocols but work by reacting to the attack not preventing them.

The public health response to bioterrorism requires a proactive approach that starts at local and state levels. For preparedness and response to be successful, collaboration between clinical and public health professionals is necessary. Resolving the impact of a bioterrorist attack requires health departments to commit to preparing comprehensive steps for a solution.⁴⁶

There are five steps to consider: preparedness, early warning, notifications, and recovery. Preparedness involves creating measures to ensure that the health system is ready to solve a biological attack. Upgrading laboratory facilities, enhancing hospital emergency response capabilities, and capacitating health care professionals are a priority. Strengthening legal frameworks and securing enough medical resources. Security responses such as mock drills are also useful in increasing preparedness levels. Educating the public on biological attacks

helps with reporting suspicious activities. The early warning phase focuses on surveillance to properly analyze disease-related data. The notification phases require quick reporting to health authorities to facilitate investigations, testing, and well discussed isolation measures. This phase also helps facilities prepare for a high influx of patients. The response phase requires rapid implementation of preventive, curative, and specific control measures. Common protocols for rapid response are outbreak investigation, sample collection, patient care, disease control, and guaranteeing affected individuals. Lastly, communication with the public is essential to mitigate panic and ensure public collaboration.⁴⁷

International Health Regulations

International health regulations play extensively in how the world responds to a public health emergency. These regulations act as a guideline on how to approach an outbreak and how to properly deliver care. The obligations that countries have are outlined to one another and their citizens.⁴⁸ These International Health Regulations (IHR) are essential to international law and are legally binding in 196 countries, including the 194 World Health Organization Member States. The International Health Regulations grew out of the response to deadly epidemics that once overran Europe. They are also important because they keep tourists and foreign nationals safe. There are two very important elements to consider: Implementation and preparedness. Implementation can be split into three areas. The first is detection. Detection is vital when trying to contain a health outbreak because health officials must find the origin and understand the type of protocol to use. The World Health Organization requires that every member country can detect outbreaks in a timely manner. The second is assessing and reporting an outbreak. Every country must report any health

chemicals/syrian-governments-widespread-and-systematic-use-chemical-weapons.

42 Jim Garamone, "U.S., Allies Strike Syrian Targets in Response to Regime's Chemical Attacks," Joint Chiefs of Staff, April 13, 2018, <https://www.jcs.mil/Media/News/News-Display/Article/1493780/us-allies-strike-syrian-targets-in-response-to-regimes-chemical-attacks/>.

43 Human Rights Watch, *Attacks on Ghouta*, (New York: Human Rights Watch, 2023), <https://www.hrw.org/report/2013/09/10/attacks-ghouta/analysis-alleged-use-chemical-weapons-syria>.

44 James P. Rubin, "Anniversary of the Halabja massacre", news release, March 16, 1998, <https://1997-2001.state.gov/briefings/statements/1998/ps980316a.html>.

45 Scott Neuman, "Japan Executes Cult Leader Responsible for 1995 Sarin Gas Attack on Tokyo Subway," *NPR*, July 6, 2018, <https://www.npr.org/2018/07/06/626434965/>.

46 S Das, and VK Kataria, "Bioterrorism : A Public Health Perspective," *Med J Armed Forces India*, no. 3, (July 2011): 255-260, [https://doi.org/10.1016/S0377-1237\(10\)80051-6](https://doi.org/10.1016/S0377-1237(10)80051-6).

47 Das and Kataria, "Bioterrorism : A Public Health Perspective," 255-260.

48 "International Health Regulations," World Health Organization, accessed August 13, 2024, https://www.who.int/health-topics/international-health-regulations#tab=tab_1.

emergency, big or small, to the World Health Organization. The final element of the detection regulation is response. The most important aspect of the IHR is how well a country can respond to a growing health outbreak and emergency, to limit the spread of health risks to neighboring countries, and to prevent unwarranted travel and trade restrictions. The second element of these IHRs is preparedness. The WHO supports preparedness by aiding member states, supporting them in their efforts to assess their existing national public health structures and capacities for surveillance and response, and determining whether a particular event constitutes a public health emergency of international concern with advice from external experts.⁴⁹

In recent years compliance to the IHR has been difficult due to varying opinions. The IHR has added new amendments to increase compliance. An example is to define what a pandemic is to avoid confusion.⁵⁰ When COVID-19 emerged, the IHR did not define a “pandemic,” and the WHO and its member states were slow to respond to the outbreak. This makes it so that when a pandemic is announced they can quickly react and create a strategy of attack for containment.

The second amendment added was to help developing countries with funding for their medical resources and equipment. Part of the IHR’s failure during the COVID-19 pandemic was the lack of funding and necessary medical products for developing countries to implement surveillance, information-sharing, and pandemic control obligations. This amendment allows all countries to effectively respond to the health crisis on a level playing field. The final amendment added was to introduce implementation monitoring. To ensure effective implementation of the IHR, two new amendments establish a States Parties Committee and National IHR Authorities as bodies to promote and support the agreement’s provisions within and between member states. The committee

will evaluate and support member state cooperation on the IHR.⁵¹ Although a great start for world cooperation, many have their doubts regarding their effectiveness. The compliance mechanisms we see are a patchwork, they involve no independent expert evaluation of countries, they are underdeveloped, and nowhere do they indicate accountability for not complying.⁵²

IHRs are ineffective without consequences for non-compliance. There are several instances where countries have disregarded the comprehensive guidelines, even when these regulations are intended to protect global and national health. The lack of penalties for not complying can undermine the success of international collaboration in addressing health challenges.

During the 2006-2007 Avian Flu H1N1 in Indonesia, the country withheld samples of the virus from the WHO arguing that samples provided freely by developing countries are used by companies in developed countries to produce vaccines that the developing countries can’t afford. Indonesia wants a guarantee that it will share in the benefits from the samples it provides.⁵³ Controversially, Indonesia was marked for violating the international regulation of sharing information in a timely manner for global and public good. Another instance can be seen during the MERS-CoV outbreak in Saudi Arabia in 2014. MERS-CoV is a virus that is found in Arabian Camels. The Ministry of Health of Saudi Arabia reported three cases of MERS-CoV in Riyadh, without reporting a link to camels and healthcare workers. Nonetheless, all three cases were later found to be linked to the same healthcare facility.⁵⁴

The rapid sharing of information is essential to form successful global health responses. Delays in releasing critical data can harm efforts to contain outbreaks. During the COVID-19 pandemic, there were concerns about how certain countries, including The People’s Republic of China, released information

49 World Health Organization, “International Health Regulations.”

50 Chloe Searchinger, “The New Amendments to the International Health Regulations,” *Think Global Health*, June 4, 2024, <https://www.thinkglobalhealth.org/article/new-amendments-international-health-regulations>.

51 Searchinger, “The New Amendments to the International Health Regulations.”

52 Caroline Foster, “Compliance and Accountability Mechanisms in the 2024 Revisions to The Who International Health Regulations (2005),” *EJIL: Talk!*, June 21, 2024, <https://www.ejiltalk.org/compliance-and-accountability-mechanisms-in-the-2024-revisions-to-the-who-international-health-regulations-2005/>.

53 Robert Roos, “Indonesia Details Reasons for Withholding H5N1 Viruses,” *CIDRAP*, July 15, 2008, <https://www.cidrap.umn.edu/avian-influenza-bird-flu/indonesia-details-reasons-withholding-h5n1-viruses>.

54 Vasso Apostolopoulos, et al., “MERS Outbreak in Riyadh: A Current Concern in Saudi Arabia,” *Le Infezioni in Medicina*, no. 2, (June 2024): 264-266, <https://doi.org/10.53854/liim-3202-15>.

about the virus. Delays contributed to the rapid spread of the disease and misaligned efforts for international cooperation.⁵⁵ Because the Chinese government delayed information to the WHO, it slowed response, and because of this slowed response the situation worsened. The Chinese government's implementation of "Zero-COVID" policies to mitigate the issue has impacted its population and economy. The measure raised concerns about human rights and economic disruptions, highlighting the importance of transparent communication and international collaboration when addressing health crises on a global scale.⁵⁶

Making member states comply with the IHR has not been an easy task and with the new amendments, it is still not a guarantee. One proposal is to introduce sanctions for countries that do not comply. Sanctions are a form of punishment used by an organization or country to target a country's economy and get the nation to stop an act or comply with one.⁵⁷ Economic sanctions include travel bans, export restrictions, trade embargoes, and asset seizures. Iran, Cuba, and North Korea are all under US sanctions. These sanctions can be made by another country or by the United Nations Security Council.

Current Status

The Outbreak of Mpox

Recent advancements in health security infrastructure have improved our ability to manage future disease outbreaks. Thanks to innovation in vaccination development and emergency response tools, emerging health threats have been addressed. Despite these efforts, outbreaks and spillover events remain a global issue. A recent example is the ongoing mpox

outbreak in the Democratic Republic of Congo (DRC) and neighboring countries in Africa.

Mpox is a disease caused by the *Monkeypox virus*, a zoonotic disease, meaning that it spreads between animals and people. Central and West Africa are regions most affected by the virus and have been found in monkeys, small rodents, and different mammals that inhabit the regions. Mpox was discovered in 1958 when two outbreaks of a rash-forming disease spread in a colony of monkeys kept for research.⁵⁸ The disease is characterized by its flu-like symptoms and rashes that commonly develop on the hands and soles of the feet.⁵⁹ Currently, there are two types of the virus responsible for mpox: clade I and clade II.⁶⁰ Clade I is more prone to causing severe illness and death, especially in patients with weakened immune systems. The mortality rate ranges between 1-10 percent and common symptoms include rash and lesions that cover several areas of the body. The primary area of contention is the DRC with over 50 percent of mpox cases being children. Clade II is the variant synonymous with the 2022 global outbreak, with several clusters of cases being reported across the United States as well. Clade II has a mortality rate between 1-4 percent and produces a much less noticeable rash.⁶¹

Fourteen countries in Africa have reported a total of 25,237 suspected and confirmed mpox cases, with 723 suspected and confirmed deaths in 2024. As of September 8, 2024, 15 countries reported 5,776 confirmed cases, including 32 deaths. As of that same date, DRC, Burundi, and Nigeria have the most cases in Africa, with 5,160, 385, and 55 cases respectively.⁶²

Africa is not the only continent affected. Clade I and clade II cases of mpox are now happening around the globe. As of July 31, 2024— 103,048 confirmed cases have been reported

55 Associated Press, "China Delayed Releasing Coronavirus Info, Frustrating WHO," *PBS*, June 2, 2020, <https://www.pbs.org/newshour/health/china-delayed-releasing-coronavirus-info-frustrating-who>.

56 Associated Press, "China Delayed Releasing Coronavirus Info, Frustrating WHO."

57 Brent Radcliffe, "How Economic Sanctions Work," Investopedia, last modified August 30, 2024, <https://www.investopedia.com/articles/economics/10/economic-sanctions.asp>.

58 "About Mpox," CDC, last modified September 3, 2024, <https://www.cdc.gov/poxvirus/mpox/about/index.html/>.

59 Delia D. Djuicy, et al., "Concurrent Clade I and Clade II Monkeypox Virus Circulation, Cameroon, 1979–2022," *CDC* 30, no. 3 (March 2024), https://wwwnc.cdc.gov/eid/article/30/3/23-0861_article.

60 CDC, "About Mpox."

61 "Mpox Outbreak - Clade I vs Clade II," Johns Hopkins Bloomberg School of Public Health, accessed on September 13, 2024, <https://publichealth.jhu.edu/sites/default/files/2024-06/mpox-clad-i-vs-ii.pdf>.

62 "2022-24 Mpox (Monkeypox) Outbreak: Global Trends," World Health Organization, September 12, 2024, https://worldhealthorg.shinyapps.io/mpx_global/.

to the World Health Organization. The 10 most affected countries are The United States of America, Brazil, Spain, the Democratic Republic of Congo, France, Colombia, Mexico, the United Kingdom, Peru, and Germany, accounting for 80 percent of all reported cases.⁶³

The manners in which these countries have monitored and mitigated mpox cases vary. The United States has been working since December 2023 to prepare its capacity to deal with the clade I variant. The US has implemented health surveillance protocols such as wastewater testing and optimizations of its diagnostic testing capacity. Throughout 2022-2024, the Administration for Strategic Preparedness and Response distributed more than one million vaccine vials across the country to manage the Clade II mpox outbreak. In 2024 so far about 1,900 cases have been reported. A CDC study reports that two doses of mpox vaccines can prevent contracting the disease, and those that have already contracted once would unlikely contract it again.⁶⁴ It is expected that those vaccinated for the clade II outbreak should be protected against the clade I variant as well. Partners across the United States government are working to better understand the effectiveness of treatments towards clade I mpox, if a case becomes laboratory-confirmed in the country.⁶⁵

In two years, the confirmed cases from African countries significantly increased. In 2022, the World Health Organization declared that mpox was a Public Health Emergency of International Concern (PHEIC), with fewer than 1,300 reported cases in 14 African countries. In 2023 the PHEIC status was lifted due to dropping numbers. But in 2024, numbers spiked again to about 18,000 suspected cases, a 160 percent increase from last year.⁶⁶

The Democratic Republic of Congo is still the main hub of the disease, accounting for 96 percent of incoming cases and deaths. Mpox is now spread across 22 of the 26 provinces, with

most cases confirmed being children younger than 10 years old. In July 2024, mobile populations in DRC brought over 300 mpox cases to Burundi, Kenya, Rwanda, and Uganda. Recently, outbreaks of mpox have been reported in South Africa, Côte d'Ivoire, Nigeria, the Central African Republic, and the Republic of Congo.

The rapid spread of mpox in Africa is, at its core, caused by defects in the logistical management of the health security crisis. In September 2024, after several months of delay, the first cohorts of mpox vaccines donated by Western countries finally began arriving in the Democratic Republic of Congo. African countries depend on the only mpox vaccine manufacturers, Japan and Denmark. Administrative errors caused delays. Nonetheless, 99,000 doses from the European Union and 50,000 from the United States were delivered to the DRC.⁶⁷ That said, the DRC faces a dilemma that most African countries found themselves in during the COVID-19 pandemic: relying on subsidized shipments that would arrive far after the most critical period of the health crisis. The DRC has a population of almost 100 million people, meaning that depending solely on vaccine donations will not suffice if the outbreak worsens.⁶⁸

Solutions to counter mpox such as vaccines and treatments are still missing in affected African countries. There is an estimated need for 10 million vaccines, with just around 2.6-3.6 million of them currently available through mostly donations. While WHO has recently helped facilitate access to vaccines in African countries via regulations, more financial resources and commitment from manufacturers are required to reach the 10 million targets by 2025.⁶⁹

Currently, there are no treatments for mpox. A smallpox antiviral, tecovirimat is currently being tested on subjects that have contracted the disease. The best method to mitigate the effects of mpox is to lower the risk of infection and disease,

63 World Health Organization, "2022-24 Mpox (Monkeypox) Outbreak: Global Trends."

64 CDC, "About Mpox."

65 "United States Response to the Clade I Mpox Outbreak in Several African Countries," U.S. Department of State, August 22, 2024, <https://www.state.gov/united-states-response-to-the-clade-i-mpox-outbreak-in-several-african-countries/>.

66 Krutika Kuppallia, Jake Dunning, Inger Damond, Daniel Mukadi-Bamulekae, Placide Mbalaf, and Dimie Ogoing, "The worsening mpox outbreak in Africa: a call to action," September 10, 2024, [https://doi.org/10.1016/S1473-3099\(24\)00577-2](https://doi.org/10.1016/S1473-3099(24)00577-2).

67 Shola Lawal, "Mpox crisis: Why do African countries struggle to make or buy vaccines?" *Al Jazeera*, September 12, 2024, <https://www.aljazeera.com/news/2024/9/12/why-african-countries-struggle-to-produce-vaccines>.

68 Lawal, "Mpox crisis: Why do African countries struggle to make or buy vaccines?"

69 Kuppallia, "The worsening mpox outbreak in Africa: a call to action."

which is why vaccinations have been the main solution for this issue. Nonetheless, mpox prevention will require more than just vaccines. In countries that rely on non-vaccine measures the mpox outbreak can only be mitigated by isolation, wearing a mask, practicing good hygiene, and covering lesions.⁷⁰ Yet, it is difficult to instate these behaviors in the community because areas with large outbreaks are usually gravely limited in resources and overcrowded. Misinformation is also a large issue, which is why several communities in the DRC are not clear on what steps to take to prevent contracting the disease.⁷¹

One of the problems associated with the manufacturing of vaccines has been supply chain logistics. The biggest vaccine manufacturer for the disease, Bavarian Nordic (BAVA), underwent renovations to its factories in 2022, which delayed the creation of new vaccines. This has strained the deployment of vaccines because of the limited supply.⁷² In August 2023, BAVA received a USD 120 million contract from the US Biomedical Advanced Research and Development Authority to manufacture the mpox vaccine in bulk. This has only partly restored the depleted US stockpile, which is believed to be the world's largest.⁷³ The stigma around the vaccine has also caused issues with deployment in the DRC. The DRC is a vaccine-hesitant country. An alternative stems from Japanese manufacturer KM Biologics. Their manufacturing of the MVA-BN and LC16-KMB vaccines has been steady and ready to distribute, but their vaccines come with deployment difficulties. The MVA-BN vaccine requires two doses, which will prove difficult for many residents because of the uncertainty of a second dose. The LC16-KMB vaccine requires an intradermal skin admission (under the skin), which is not a complicated procedure, but requires training for the local health force which is currently unsure of how to administer the drug.⁷⁴ Moreover, the drug is not certified or tested for children, and most of the deaths associated with this disease are of children under 15. Because of this fundamental

misunderstanding about the nature of diseases, and how they can reappear, paired with multiple supply chain and local issues, the mpox outbreak in Africa has been hard to keep under control.⁷⁵

The recent mpox outbreak in Africa highlights the obstacles and hurdles in managing global health emergencies despite advances in health security. Nonetheless, the consistent outbreaks and spillover events have made it clear that innovations in vaccine development require more vigilance and international collaboration to meet objectives. The DRC and other African countries have faced the significant bulk of the mpox endemic due to logistical and cultural challenges such as limited access to vaccines and vaccine hesitancy within the community. Nonetheless, this outbreak is not only affecting the DRC; several countries in North America and Europe are addressing this health security issue comprehensively. The international community should follow suit to ensure these processes are available for all countries affected. Increased vaccine production, improved supply chain management, and strategic public health intervention are key to mitigating future disease outbreaks.

Health Security and Global Migration

Migration is a vital global phenomenon that intertwines strongly with health security. As populations cross borders, for various reasons, health becomes a concern for them and host countries. From poor living and travel conditions that result in disease to overburdened medical centers in host countries, these form a plethora of challenges for health security worldwide.

The UN High Commissioner for Refugees (UNHCR) reported that, by June 2023, over 110 million refugees, internally displaced persons (IDPs), and asylum seekers, were forcibly displaced worldwide.⁷⁶ This exceptional number highlights the importance of addressing all the concerns surrounding

70 Madeline Barron, "Controlling Mpox Requires Inclusive, Global Efforts," American Society for Microbiology, September 6, 2024, <https://asm.org/articles/2024/september/controlling-mpox-requires-inclusive-global-effort>.

71 Barron, "Controlling Mpox Requires Inclusive, Global Efforts."

72 Elaine Ruth Fletcher, "WHO Says It Is Trying to Expedite Mpox Vaccination in DRC - but Faces Multiple Hurdles," *Health Policy Watch*, March 24, 2024, <https://healthpolicy-watch.news/who-says-it-is-trying-to-expedite-mpox-vaccination-in-drc-but-faces-multiple-hurdles/>.

73 Fletcher, "WHO Says It Is Trying to Expedite Mpox Vaccination in DRC - but Faces Multiple Hurdles."

74 Fletcher, "WHO Says It Is Trying to Expedite Mpox Vaccination in DRC - but Faces Multiple Hurdles"

75 Fletcher, "WHO Says It Is Trying to Expedite Mpox Vaccination in DRC - but Faces Multiple Hurdles"

76 "Mid-Year Trends," UNHCR, accessed September 16, 2024, <https://www.unhcr.org/mid-year-trends>.

migration, especially health. Such populations are often the most vulnerable to health threats. As they suffer from inadequate living conditions, paired with limited access to necessities, such as clean water, safe food, and healthcare, they are at high risk of contracting diseases. In many cases, despite the presence of medical services, communication, cultural issues, and bureaucratic problems deny displaced people access to the care they need.⁷⁷ Additionally, such populations are often not considered the priority of host countries and thus are not allocated sufficient resources. At the same time, strict immigration policies adopted by some states add more barriers to the already limited access. Overall, health security is not an issue pertaining only to specific individuals; the connections between health and migration impact the systems of many actors across the globe, especially under-resourced or overwhelmed states.

Communicable diseases are often a constant struggle for migrants in overcrowded conditions. These are diseases caused by a virus or bacteria that spread through contact. Contaminated surfaces, blood, insects, and the air are all means for the spread of such illnesses.⁷⁸ As many are forced into camps with insufficient space and resources, the transmission of illnesses from one person to the next occurs both easily and rapidly.

This was best showcased in the rise in cholera cases in Bangladesh's Rohingya refugee camps.⁷⁹ In June 2024, a total of 77 cases were reported across 16 camps. Despite earlier large-scale cholera vaccination campaigns that dropped the number of cases significantly, the WHO has given these outbreaks a severity rating of 32 percent. This rating underscores the serious condition of the unsanitary water sources the migrants

were forced to rely on. As such, the organization opted to scale up Water, Sanitation, and Hygiene (WASH) interventions and provide safer water to the affected populations.⁸⁰ Still, such interventions cannot be considered a long-term solution, as the roots of the issue run deep.

Another such situation was observed among Venezuelan migrants several years prior. In 2018, migrants fleeing to Colombia experienced a surge in Malaria cases.⁸¹ 4,402 cases were recorded that year, compared to 1,260 in 2015. Similar cases were observed along the Ecuador-Peru border, with Venezuelan migrants accounting for 96 percent of the cases in that region.⁸² Many of the affected individuals did not have access to the necessary treatments to handle the disease transmitted by mosquitoes. The WHO, local NGOs, and health authorities launched mass treatment campaigns. Still, many challenges are standing in the way of controlling the spread of such diseases in moving populations.

While communicable diseases are the most obvious concern, non-communicable diseases (NCDs) are also crucial players in global health security and migration. NCDs, such as diabetes, respiratory diseases, cancer, or mental health issues, among others, are prevalent among displaced populations.⁸³ While these diseases are not transmittable to others, their effects are worsened by poor living conditions, the lack of necessary resources, or stress.

Many migrants suffer from one or a combination of such diseases, adding to their hardships and worsening their chances of survival in harsher conditions. A prime exhibit of NCDs among migrants can be seen among the millions of refugees from the Syrian civil war. Even before the war, 77

77 "Refugee and Migrant Health Toolkit," World Health Organization, accessed on September 16, 2024, <https://www.who.int/tools/refugee-and-migrant-health-toolkit/essential-knowledge-health-and-migration>.

78 Peter F. Edemekong and Ben Huang, "Epidemiology of Prevention of Communicable Diseases," last modified October 24, 2022, <https://www.ncbi.nlm.nih.gov/books/NBK470303/>.

79 "Battling Cholera: WHO's lifesaving efforts in Rohingya Camps amid global resurgence!" World Health Organization, July 23, 2024, <https://www.who.int/bangladesh/news/detail/23-07-2024-battling-cholera-who-s-lifesaving-efforts-in-rohingya-camps-amid-global-resurgence>.

80 World Health Organization, "Refugee and Migrant Health Toolkit."

81 Shannon Doocy, Kathleen R. Page, Fernando de la Hoz, Paul Spiegel, and Chris Beyrer, "Venezuelan Migration and the Border Health Crisis in Colombia and Brazil," *Journal on Migration and Human Security* 7, no. 3 (2019): 79-91, <https://journals.sagepub.com/doi/pdf/10.1177/2331502419860138>.

82 Robinson Jaramillo-Ochoa, et al., *Effects of Political Instability in Venezuela on Malaria Resurgence at Ecuador-Peru Border, 2018* (Atlanta: Emerging Infectious Diseases, 2019), <https://doi.org/10.3201%2F2504.181355>.

83 "Noncommunicable diseases," World Health Organization, accessed September 16, 2024, <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>.

percent of deaths in Syria were linked to NCDs, especially cardiovascular diseases (CVD).⁸⁴ Displacement disrupts their access to medicine and care, worsening the effects of these conditions and putting them at risk of premature death. As many of these displaced persons cannot officially resettle into Lebanon, Jordan, or other host countries, they struggle to access proper healthcare.⁸⁵ Ultimately, legal barriers, financial constraints, and underprepared refugee health systems have impacted these refugees' ability to cope.

Mental health is a vital perspective to include in our understanding of global health. Disorders such as anxiety, depression, or post-traumatic stress disorder (PTSD) tend to be higher amongst displaced populations than others.⁸⁶ Traumatic events during displacement, such as violence, torture, or other violations, often lead to the development of these disorders. Migrant women and girls are more likely to experience sexual violence and exploitation during migration, putting them at higher risk of depression and PTSD. Such events, paired with

readjusting to the uncomfortable conditions of a camp or settlement, amplify the effects of PTSD, depression, and other struggles. This is reflected strongly among Congolese refugees in Uganda. Several studies conducted in the region showed PTSD rates of 20-89 percent among the 426,000 refugees from the DRC in different settlements.⁸⁷ Reports further confirmed that suicide prevention programming and trauma services specific to refugees' cases were vital, emphasizing the severity of this aspect of displacement.

Overall, mobility across borders is intertwined deeply with health security, as the medical needs of millions of migrants, refugees, and displaced people are constantly at stake.⁸⁸ Migrants suffer from several health challenges, including the diseases themselves and barriers keeping them from accessing the care they need as they move. The harsh conditions in which such populations live, such as camps or temporary settlements add strain to existing health conditions and make way for the emergence of new ones amidst the group. At the same

⁸⁴ A. Al-Oraibi, O. Hassan, Kaushik Chattopadhyay, and L.B. Nellums, "The prevalence of non-communicable diseases among Syrian refugees in Syria's neighbouring host countries: a systematic review and meta-analysis," *Public Health* 205, (April, 2022): 139-149, <https://www.sciencedirect.com/science/article/abs/pii/S0033350622000415>

⁸⁵ Fatima M. Karaki, Ola Alani, Maya Tannoury, Farrah L. Ezzeddine, Robert E. Snyder, Arifi N. Waked, and Zouhair Attieh, *Noncommunicable Disease and Health Care-Seeking Behavior Among Urban Camp-Dwelling Syrian Refugees in Lebanon: A Preliminary Investigation* (Utah: Health Equity, 2021), <https://doi.org/10.1089%2Fheq.2020.0106>.

⁸⁶ World Health Organization, "Five key themes for improved mental health care for refugees and migrants," *WHO*, October 10, 2023, <https://www.who.int/news/item/10-10-2023-five-key-themes-for-improved-mental-health-care-for-refugees-and-migrants>.

⁸⁷ Jessica E. Lambert and Elise Denis-Ramirez, *Trauma and Mental Health Difficulties Among Refugee Adults in Kyaka II Settlement in Uganda*, no. 37 (Copenhagen: Dignity), <https://dignity.dk/wp-content/uploads/publication-series-37.pdf>.

⁸⁸ UNHCR, "Mid-Year Trends."



Syrian refugee with her infant at a clinic in Jordan
Credit: UK Department for International Development

time, the intensified psychological needs of refugees must be addressed, which requires tailored approaches and specific resources that are not easy to provide everywhere.⁸⁹ Handling this issue requires coordinated global support from countries, organizations, and humanitarian agencies.

Sustainable Development Goals

The Sustainable Development Goals (SDGs) are a set of 17 goals that act as a call to action for countries across the globe.⁹⁰ In 2015, UN Member States adopted the 2030 Agenda for Sustainable Development, fueled by the 17 goals. The SDGs address aspects crucial to the betterment of living conditions everywhere and the maintenance of a positive global partnership between countries. From SDG1: “No Poverty” to SDG17: “Partnership for the Goals,” these goals provide a comprehensive array of points to focus on when addressing any global challenges. The SDGs include environmental, humanitarian, and security aspects.⁹¹

The topic of “Strengthening Global Health Security” falls directly under SDG3: “Good Health and Wellbeing.” This goal is in place to promote well-being and ensure healthy lives for all.⁹² The more particular goals of this SDG include improving the effectiveness of treatments, ensuring the proper immunization of children, and providing affordable healthcare to all. Several events, such as partnerships or global conferences, have taken place and continue to do so to further this SDG.⁹³ Global Health Security is an indispensable element in the success of this goal. Improving crisis response and preparedness for medical emergencies, as well as building sustainable health systems across countries, lie at the core of

“Good Health and Wellbeing.” Additionally, the inability to provide affordable healthcare or easy access to treatment further diminishes success in this area.

The G20 has actively worked towards realizing these 17 vital SDGs. The organization has often addressed matters ranging from financing sustainable development and cooperation to employment, education, and equality.⁹⁴ These efforts extend to SDG3 as well. The G20 Health Working Group (HWG) was established in 2017 under the German Presidency, clearly placing health on the organization’s agenda.⁹⁵ Furthermore, in 2021, the Italian Presidency founded the Joint Task Force on Finance and Health to strengthen collaboration in pandemic preparedness. Another one of the organization’s most notable contributions to this goal was the foundation of the Pandemic Fund in 2022.⁹⁶ This fund approved USD 338 million to be invested in pandemic prevention and response across 37 low and middle-income countries. The plan involved co-financing USD 1.85 billion in total, mobilizing USD six for every USD one received through donors. While many other institutions have financed COVID-19 prevention, this fund was unique because this emergency was its sole focus.⁹⁷ The G20 has also constantly advocated for Universal Health Coverage (UHC).⁹⁸ The organization has often hosted meetings, summits, and working groups to address this matter. In February 2022, the co-chairs of the UHC2030 highlighted the G20’s current focus on investing in UHC and connecting it to health security.⁹⁹ The organization also called for international cooperation and coordination to attain the full potential of emerging digital health technologies.¹⁰⁰ With the advancement of technology in this sector, the G20 finds it crucial to make use of its full

89 World Health Organization, “Refugee and Migrant Health Toolkit.”

90 “The 17 Goals,” United Nations, accessed August 25, 2024, <https://sdgs.un.org/goals>.

91 “The 17 Goals,” United Nations.

92 “Ensure healthy lives and promote well-being for all at all ages,” United Nations, accessed August 25, 2024, <https://sdgs.un.org/goals/goal3>.

93 “Featured Events,” United Nations, accessed on August 25, 2024, <https://sdgs.un.org/events/>.

94 UNDP, *The G20 Contribution to the 2030 Agenda in Times of Crises 2019-2023* (Geneva: UNDP-OECD, 2023), <https://www.undp.org/publications/g20-contribution-2030-agenda-times-crises-2019-2023>.

95 “Health,” G20, accessed August 25, 2024, <https://www.g20.org/en/tracks/shepa-track/health>.

96 “Background,” The Pandemic Fund, accessed August 25, 2024, <https://www.thepandemicfund.org/>.

97 “Background,” The Pandemic Fund.

98 Gabriela Cuevas, and Justin Koonin, “A statement from UHC2030’s Co-chairs following the G20 Summit in India,” news release, September 12, 2023, <https://www.uhc2030.org/news-and-events/news/news-now-is-the-time-for-all-countries-to-take-action-on-universal-health-coverage/>.

99 Gabriela Cuevas Barron and Dr Justin Koonin, “A statement from UHC2030’s co-chairs to the G20 health working group,” news release, February 20, 2024, <https://www.uhc2030.org/news-and-events/news/g20-2024-a-chance-to-take-bold-action-towards-equitable-and-resilient-health-systems-for-universal-health-coverage/>.

100 Basu Chandola, “Digital health in the G20,” Observer Research Foundation, April 5, 2024, <https://www.orfonline.org/expert-speak/digital-health-in-the-g20>.

capabilities as quickly and cooperatively as possible. Under Argentina's Presidency, G20 Health Ministers highlighted the importance of e-health tools, while the Japanese Presidency later addressed ethical digital health technologies and their ties to UHC.¹⁰¹ These ideas were further explored and discussed by the subsequent Presidencies as well, pointing to developments and efforts to harness new capacities.

The topic of "Strengthening Global Health Security" also ties into SDG17: "Partnerships for the Goals." Collaboration plays a major role in providing resources and advancing healthcare systems everywhere. Resource sharing, information swapping, and cooperation in various forms are necessary to advance health security internationally.

Much of the G20's work highlights the need for collaboration and looks favorably upon it. The organization has actively called for cooperation between its members and other entities to succeed in various fields. Whether through collaborative funds, joint Task Forces, or direct contributions from one country to another, the G20 has constantly pushed for a united approach to crisis management and health security.¹⁰²

Bloc Analysis

Points of Division

Naturally, healthcare is an important topic across the world. Countries work actively to improve the safety of their citizens and develop better health systems. Still, healthcare systems are not identical from one state to the next. Many countries, such as Canada and the United Kingdom, boast universal healthcare systems.¹⁰³ Such a system provides people with access to all the essential healthcare services they need without resorting to private entities. The services offered range from prevention to treatment or rehabilitation.¹⁰⁴ Other countries,

like the United States, use a mixed system.¹⁰⁵ This means that people must seek both public and private services, depending on their needs. Generally, healthcare systems vary significantly from one country to another. Even within the same style, each state adopts mechanisms that best suit its situation and goals. As such, these are not the most accurate indicators of a country's position on the topic of health security. After all, no single system holds all the answers to perfect infrastructure.

Instead, observing countries' preparedness for unforeseen health risks provides a more clear-cut bloc divide. The Global Health Security (GHS) Index most comprehensively measures this. The index provides a preparedness score based on norms, health, risk, prevention, response, and detection.¹⁰⁶ It includes data about all 195 states party to the 2005 International Health Regulations (IHR). The GHS Index ranks countries across five levels—0.0-20.00, 20.1-40.0, 40.1-60.0, 60.1-80.0, and 80.1-100.0. The higher a country ranks, the more "prepared" they are to handle emerging epidemics, pandemics, or emergencies.¹⁰⁷ While no country is fully ready (score of 100) to handle unexpected global emergencies, the index provides a reasonable differentiation between the level of preparedness of countries across the globe.

For this background guide, blocs will be divided across three categories defined as low, medium, and high preparedness (0.0-30.00, 30.1-60.0, 60.1-100), instead of the index's original five.

Low Preparedness on GHS Index (Score of 0.0-30.0)

This bloc consists of countries with lower preparedness for health emergencies. This means that they do not have sufficient resources or infrastructure to mitigate the effects of public health security crises effectively. This bloc is composed primarily of low-income countries facing other internal

101 Basu Chandola, "Digital health in the G20."

102 Gabriela Cuevas Barron and Dr Justin Koonin, "A statement from UHC2030's co-chairs to the G20 health working group," Basu Chandola, "Digital health in the G20;" "Health," G20.

103 "Countries with Universal Healthcare 2024," World Population Review, accessed on August 24, 2024, <https://worldpopulationreview.com/country-rankings/countries-with-universal-healthcare>.

104 "Universal health coverage (UHC)," World Health Organization, accessed on August 24, 2024, [https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-\(uhc\)](https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-(uhc)).

105 "Single payer healthcare: Pluses, minuses, and what it means for you," Harvard Health Blog, <https://www.health.harvard.edu/blog/single-payer-healthcare-pluses-minuses-means-201606279835>.

106 GHS Index, "The 2021 Global Health Security Index."

107 GHS Index, "The 2021 Global Health Security Index."

challenges. While no state in this bloc is completely unprepared (score of 0), the average score is 25.¹⁰⁸ 60 countries fall into this category, with Somalia having the lowest score of 16. Members of this bloc saw the most challenges throughout the COVID-19 pandemic. They often struggled with aspects like accommodating COVID-19 patients in hospitals, controlling the outbreak, or providing vaccines. By March 2021, Egypt, for example, had only vaccinated 0.2 percent of its population, only reaching 5.4 percent in August of that year.¹⁰⁹ Similarly, Papua New Guinea suffered from low vaccination rates and a lack of COVID-19 testing facilities in many areas.¹¹⁰ Healthcare development and preparedness have not been consistent within this bloc. While many states, such as Timor Leste, Marshall Islands, and Haiti, saw improvements in their score from 2019 to 2021, others, such as Madagascar, Namibia, and Cameroon, saw the opposite. This bloc must focus on progressive solutions that also consider other complexities on the national scale.

A key area of improvement for countries with lower preparedness on the GHS index is to increase its response time to disease outbreaks in rural areas. That can be mitigated by having enough available diagnostic tests and capacitating human capital to interpret and report the findings of disease outbreaks. Quickly available rapid diagnostics tests can help overcome the cold-chain obstacles allowing a diverse range of pathogens to be screened and evaluated during disease outbreaks. More importantly, these countries should communicate closely with the principal health centers of the region to assist with testing and training.¹¹¹

Moreover, countries should prioritize building and maintaining health security infrastructure and capacities in national budgets. These capacities are not only for health security emergencies; they can help respond to routine health threats and assist with

the overall development of the infrastructure. Countries that also require or are asking for assistance from the international community should be transparent about their capacities and risk factors. To efficiently improve a country's health security, decision-makers need truthful and easily available information about the health infrastructure to respond correctly to any health crisis.¹¹²

Medium Preparedness on GHS Index (Score of 30.1-60.0)

This is the most populated of all the blocs. 116 of the 195 countries included in the index have a score within this range.¹¹³ The average score for this group is 41.68, leaning towards the lower end of preparedness. Generally, this group is very diverse. Geographic, economic, or healthcare aspects vary significantly across these countries and cannot be used as a connecting factor. Additionally, these states adopted different measures to battle the COVID-19 pandemic.¹¹⁴ Singapore, for instance, required vaccination to renew work and residence permits, while Brazil's vaccine requirements varied among municipalities and did not apply to all professions or establishments.¹¹⁵ Despite these differences, this bloc is united by the fact that there is room for improvement. One country's struggle with immunization can be resolved through the ideas of another country with a successful vaccination mandate. Similarly, a state with inefficient testing facilities can gain more insight into their improvement through the triumphs of others. Essentially, this bloc can prepare very extensive solutions by considering the vast experiences and challenges its many members have faced in recent years.

Context is most important when decision-makers should not draw simple correlations with countries' overall scores. The overall scores of the GHS index summarize the country's

¹⁰⁸ GHS Index, "The 2021 Global Health Security Index."

¹⁰⁹ Ragui Assaad et al., *Egypt Covid-19 Country Case Study* (Geneva: International Labour Organization, 2022), https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@africa/@ro-abidjan/@sro-cairo/documents/publication/wcms_838226.pdf.

¹¹⁰ Chris McCall, "Disrupted care in Papua New Guinea: the harms of COVID-19," *Elsevier - PMC Covid-19 Collection* 10321 (January 2022): 226-227, [https://doi.org/10.1016/S0140-6736\(22\)00051-4](https://doi.org/10.1016/S0140-6736(22)00051-4).

¹¹¹ Katherine E L Worsely-Tonks, et al., "Strengthening global health security by improving disease surveillance in remote rural areas of low-income and middle-income countries," *The Lancet*, no. 4, (April 2022): 582-583. 10.1016/S2214-109X(22)00031-6.

¹¹² GHS Index, "The 2021 Global Health Security Index."

¹¹³ GHS Index, "The 2021 Global Health Security Index."

¹¹⁴ Singapore Ministry of Health, "Covid-19 Vaccination To Be A Condition For Long-Term Passes, Work Passes And Permanent Residence", (Singapore: Ministry of Health, 2022), <https://www.moh.gov.sg/docs/>.

¹¹⁵ RT Staff Reporters, "Covid-19 vaccine passport: Where is it mandatory in Brazil?" *The Rio Times*, October 5, 2021, <https://www.riotimesonline.com/brazil-news/nosubscription/vaccine-passport-in-brazil-where-is-it-mandatory/>.

capacity across several categories. Countries with a high overall score may still have significantly low category level, indicator level, and sub-indicator level scores that are consistent with influencing health security crises. Countries on the medium preparedness scale should adjust their health security infrastructure to produce more nuanced solutions.¹¹⁶

High Preparedness on GHS Index (Score of 60.1-100.0)

This bloc is composed of countries that, based on the index's measurements, are more prepared to handle unforeseen medical emergencies. It is important to note that a state with a perfect score currently does not exist. Of the 16 countries with scores in this range, the United States ranks the highest, with a score of 75.6.¹¹⁷ The average score in this group is 77.8. Overall, these countries are considered to have the necessary medical infrastructure and crisis planning, among other things, to handle a pandemic. While none of these countries are fully prepared, they are likely to address the crisis efficiently early on. Canada, for example, excelled at keeping the cumulative per capita rate of COVID-19 cases low in comparison to other comparable countries. It also had low rates of COVID-19-related deaths and saw high vaccination rates.¹¹⁸ Members of this bloc can provide solutions for future preparedness based on their successes and previous efficient planning. Additionally, their solutions are likely to be similar in scope, as many countries in this score range had almost the same lockdown measures and vaccine policies in mind during the COVID-19 pandemic.

Committee Mission

In the realm of international governance, the Group of 20 (G20) committee plays a role in international economic

cooperation. It plays an important role in defining and strengthening global architecture and governance on all major international economic issues. The G20 is made up of 19 countries—Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Saudi Arabia, South Africa, Russia, Türkiye, UK, USA—and two regional bodies—the African Union and the European Union. The members of the G20 represent around 85 percent of the world's GDP, more than 75 percent of world trade, and nearly two-thirds of the world's population.¹¹⁹

The Group of 20 was established in 1999 after the Asian financial crisis.¹²⁰ Its purpose was to create a space for Central Bank Governors and Finance Ministers to discuss international financial issues. In 2008, as another financial crisis emerged, it was upgraded to include the Heads of State or Government of Member States. By the following year, it was considered the leading forum for economic cooperation. Several years later, in 2023, the African Union was unanimously accepted into G20 as a permanent member.

The group's summit is held annually in different parts of the world, depending on which country holds the presidency.¹²¹ While decisions are made by consensus, each Member State is responsible for implementing plans or policies at will on the national level. The G20 is not a legislative body; as such, it cannot issue binding decisions.¹²²

While initially focused on macroeconomic concerns, the G20's scope grew to include sustainable development, health, climate change, corruption, and other issues prevalent worldwide. An example of this is the 2009 summit, where a covert Iranian nuclear plant was discussed, or the 2017 summit including debates on a cease-fire in Syria.¹²³ Additionally, at the 2016 summit, several members announced their accession to the Paris Agreement. Under rotating presidencies, the G20 has

116 Sanjana Ravi, et al., "The value proposition of the Global Health Security Index," *BMJ Global Health*, no. 5 (September 2024), doi:10.1136/bmjgh-2020-003648.

117 GHS Index, "The 2021 Global Health Security Index."

118 "Public Health Agency of Canada's COVID-19 Response: Lessons Learned," Government of Canada, November, 2023, <https://www.canada.ca/en/public-health/corporate/transparency/corporate-management-reporting/evaluation/covid-19-response-lessons-learned-summary.html>.

119 "About the G20," G20, accessed August 16, 2024, <https://www.g20.org/en/about-the-g20>.

120 G20, "About the G20."

121 G20, "About the G20."

122 James McBride, Anshu Siripurapu, and Noah Berman, "What Does the G20 Do?" Council on Foreign Relations, last modified October 11, 2023, <https://www.cfr.org/backgrounder/what-does-g20-do>.

123 McBride, Siripurapu, and Berman, "What Does the G20 Do?"

adopted plans ranging from clean energy transitions and reductions in greenhouse gas emissions to phasing out fossil fuels. Such initiatives emphasize the group's commitment to acting for a better future.

Strengthening Global Health Security is extremely important regarding this committee because the economics is severely affected by a global health outbreak. The global economy has proven to be directly affected by public health emergencies, therefore strengthening global health security is a matter of importance on the G20's agenda. This topic is also relevant in other committees as health emergencies cause recurring incidents in several other public and private sectors as well. Diseases are invisible and must be treated with care, because of this even the most developed countries can be affected by a potent enough disease. As a committee, it is vital to invoke action to adapt the systems that are not prepared for another pandemic. Ultimately, health security is a topic every country has a stake in.



G20

NHSMUN 2025



TOPIC B:
THE DISPROPORTIONATE EFFECTS OF CLIMATE CHANGE

Photo Credit: Gregory Varnum

Introduction

Climate change poses one of the greatest threats to human rights of the 21st century.¹ Higher temperatures, extreme droughts, floods, and storms threaten basic rights to safe shelter, food, and water security. This impacts low-income populations living in high-risk areas. As the climate emergency grows more severe, safeguarding human rights for vulnerable groups must remain at the center of global climate policies and actions.

The impacts of climate change affect everyone. Nevertheless, certain groups are disproportionately affected by it. For instance, children, women, and the elderly are more vulnerable to health stressors, such as extreme heat, floods, poor air quality, among others. Similarly, individuals with outdoor occupations, like farmers, may be at greater risk of negative health consequences of extreme heat. A comprehensive approach to address the effects of climate change starts with an understanding of what groups of people are at increased risk. Ultimately, this can reduce the impacts from climate change.²

For over two decades, the Group of 20 (G20) played an important role in promoting global cooperation on economic and financial issues. Recently, G20 expanded the discussions to include threats like climate change. Such a threat can endanger economic prosperity and global stability if left unaddressed. Greenhouse gas concentrations are already 50 percent higher than pre-industrial levels. Furthermore, global temperatures exceed targets safe for humanity and the planet. Evidence shows that we have already passed the point of gradual transitions.³ While small island states and vulnerable populations currently bear most of the impact of climate change despite low emissions, all countries will ultimately face the consequences. Severe security, economic, and public health issues will begin to appear as the result of an overheating planet. The G20 has a responsibility to lead by example to help lessen the impacts of climate change. Through commitment and necessary policies, the organization can contribute significantly to solving the issue.

The committee is tasked with promoting a sustainable future.

This is done by implementing ideas such as a global shift to renewable energy, green infrastructure investment, natural carbon sinks, climate adaptation funding, and transition support for workers and frontline communities. The G20 can push for international cooperation and pave the way for stabilizing the climate in this critical decade. Inaction threatens to undermine decades of development progress and prosperity for all. It is vital to address the issue with immense considerations of a safe future.

History and Description of the Issue

Sea Level Rise and Flooding

In the end of the last ice age (14,000 BCE), the massive ice sheets pulled back from North America and northern Europe melted, causing sea levels to rise over 300 feet globally as large volumes of glacial ice melted and drained into oceans. This specific event is still one of the biggest contributors to rising seas in Earth's history. Additionally, the increase is fossil fuel burning since the Industrial Revolution also increased the greenhouse effect. The beginning of human-caused climate change sped up the glacier and ice sheet melting, contributing around eight to 10 inches to sea level rise.⁴

Sea level rise remains one of the most serious threats of climate change, particularly for the billions of people living along the coastlines around the world. Data from Human Climate Horizons provides a troubling glimpse into how significantly worse this problem is projected to become over the coming

1 "The Impact of Climate Change on the Rights of People in Vulnerable Situations," Office of the High Commissioner for Human Rights, accessed August 6, 2024, <https://www.ohchr.org/en/climate-change/impact-climate-change-rights-people-vulnerable-situations>.

2 "People Who Are Vulnerable to Climate Change," National Institute of Environmental Health Sciences, August 30, 2022, https://www.niehs.nih.gov/research/programs/climatechange/health_impacts/vulnerable_people.

3 "The Climate Crisis Disproportionately Hits the Poor. How Can We Protect Them?" World Economic Forum, January 13, 2023, <https://www.weforum.org/agenda/2023/01/climate-crisis-poor-davos2023/>.

4 "Sea Level Rise," Smithsonian Ocean, May 11, 2023, <https://ocean.si.edu/through-time/ancient-seas/sea-level-rise>.



A family trying to save their house after a flood
Credit: Ibne Firoz

decades if emissions are not lowered.⁵ At the current rate, by 2050, average global sea levels are projected to rise by 25-30 centimeters (cm). The range increases over time, with levels reaching 50-110 cm above today's heights by the year 2100. Major contributors to sea level rise include thermal expansion of warming ocean waters. This is a phenomenon through which oceans expand in volume as their waters get warmer due to climate change and melting of land-based ice sheets and glaciers. Low-lying coastal regions and small island states face extensive inundation of land and infrastructure due to this. Populations in Latin America and the Caribbean, East Asia and the Pacific, and Small Island Developing States are the most likely to be displaced from their homelands due to coastal flooding and permanent drowning of land.⁶

Isle de Jean Charles in Louisiana, United States, is one example of the direct consequences of flooding and sea levels rising. The island has shrunk dramatically due to erosion, going from an original size of around 20 square miles to just a quarter mile wide and two miles long now. In total, it has lost 98 percent of its original land. Flooding from storms and rising

sea levels has inundated much of the remaining land, making living conditions increasingly difficult on the island. Access to the mainland has become unreliable, as the only road often floods, disrupting transportation for work, school, and other necessities. Most residents have been gradually displaced over time due to the loss of their homes. Only about 26 families remain from a peak of 300 in the past.⁷ Construction of the new resettlement site is beginning, but not all former residents want to or are able to relocate, presenting challenges for preserving the community.

As seen from history of old civilizations and today's society, the impacts do not stop at physical displacement either. Disruptions can lead to tens of trillions of dollars in coastal infrastructure. Additionally, it can affect the complex supply chains that support billions of global citizens, which could lead to economic chaos and political instability. Entire regions may see decades of development progress reversed by sea level rise.⁸ Those least responsible for the climate crisis will often be impacted earliest and most severely. Countries like Kiribati and Tuvalu face becoming uninhabitable by 2100. Their

⁵ "Compare Impacts," United Nations Development Programme, July 4, 2024, <https://horizons.hdr.undp.org/#/risk/SSP5-85/globalAverage>.

⁶ "Climate Change's Impact on Coastal Flooding to Increase Five Times Over This Century," United Nations Development Programme, November 28, 2023, <https://hdr.undp.org/content/climate-changes-impact-coastal-flooding-increase-five-times-over-century>.

⁷ "The People of the Isle De Jean Charles Are Louisiana's First Climate Refugees—but They Won't Be the Last," Natural Resources Defense Council, March 1, 2024, <https://www.nrdc.org/stories/people-isle-jean-charles-are-louisianas-first-climate-refugees-they-wont-be-last>.

⁸ "Sea Level Rise 101," Natural Resources Defense Council, April 1, 2024, <https://www.nrdc.org/stories/sea-level-rise-101>.

populations will likely have to relocate permanently due to sea level rise impacts.⁹

Sea levels rise in two main ways. First, warmer water takes up more space because of thermal expansion. Second, melting ice from glaciers adds water to the oceans. This means that sea levels will keep rising if global temperatures keep going up. Low-lying land is already at risk. Thus, it is important to reduce emissions to slow down global warming, as it directly affects sea level rise.¹⁰

Higher sea levels raise the risk of flooding in low-lying coastal areas, especially during storms and high tides. Coastal cities and communities are facing more frequent flooding events. This can damage infrastructure, disrupt transportation, and threaten homes and businesses.¹¹ Rising seas and increased flooding dissolve coastlines, causing land loss and threatening coastal habitats like swamps and marshes. This can undermine coastal defenses and make communities more vulnerable to future flooding.

This is the case of Dar es Salaam, the largest city in Tanzania. Over 8 percent of the city already lies below sea level, putting more than 143,000 people at risk from flooding. Despite this, the city has seen a population growth of 5.3 percent a year. This substantial increase has resulted in unplanned informal settlements expanding into areas prone to flooding. Impoverished people have been subject to many climate change disasters that have been worsened because of their living conditions, such as inadequate drainage, sewage, and piping systems.¹²

As part of the risks of sea level rise, there is saltwater intrusion. Saltwater can contaminate freshwater supplies, damage agricultural land, and disrupt ecosystems such as mangroves and coral reefs. This especially affects communities and industries that rely on coastal resources like fishing and tourism. It also directly affects marine life.¹³ The impacts of

sea level rise and coastal flooding are wide-ranging, affecting human communities, infrastructure, economies, and natural ecosystems. Millions of people living in coastal regions face increased risks to their homes and livelihoods.

A relevant incident to highlight the economic impacts of such situations is hurricane Katrina in Louisiana, United States. The total damages from Hurricane Katrina and the subsequent flooding were estimated at USD 135 billion. Damages included damage to buildings, infrastructure, vehicles, and other financial losses. Over one million housing units were damaged across the Gulf Coast region, with about half of the destroyed units located in Louisiana. The New Orleans metro region lost over 254,000 people from its population due to displacement after the storms and floods. The population decreased from 484,674 pre-Katrina to just 230,172 after.¹⁴

Because of the displacement of communities due to constant flooding, the economy of these regions takes a big hit. The decrease in population means a loss of economic activity, tax revenue, and demand for local goods and services for years to come. Property damage and loss, business disruptions, and public health impacts make it even more challenging. All of these factors combined make up for a big economic loss in communities affected by floods, especially coastal communities like Venice, New Orleans, The Norfolk Coast of England, and the Pacific Islands.

Food and Water Insecurity

Food and water insecurity are not a recently emerging issue. Natural disasters like floods, earthquakes, and volcanic eruptions have contributed to the destruction of agricultural lands. Wars and conflicts have also disrupted food trade, supply lines and agricultural productions. In the 1880s, Ethiopia saw one of the worst droughts in history. Several consecutive years saw little to no rainfall across wide areas of the country.

9 Amélie Bottollier-Depois, "As oceans rise, are some nations doomed to vanish?" Phys, October 10, 2022. <https://phys.org/news/2022-10-oceans-nations-doomed.html>.

10 "8 Ways the World Is Adapting to Rising Sea Levels," World Economic Forum, December 9, 2022, <https://www.weforum.org/agenda/2022/08/rising-sea-levels-global-adaptation/>.

11 "Coastal flooding," Coastal Hazard Wheel, accessed July 9, 2024, <https://www.coastalhazardwheel.org/coastal-flooding/>.

12 "Sea Level Rise and Coastal Flooding," C40 Cities, 2018, <https://www.c40.org/what-we-do/scaling-up-climate-action/adaptation-water/the-future-we-dont-want/sea-level-rise/>.

13 "Sea Level Rise," Understanding Global Change, March 9, 2022, <https://ugc.berkeley.edu/background-content/sea-level-rise/>.

14 "Facts for Features: Katrina Impact," The Data Center, August 26, 2016, <https://www.datacenterresearch.org/data-resources/katrina/facts-for-impact/>.

Without rain, staple crops like wheat and barley failed to grow. Pastures also dried up, killing large numbers of livestock. Water sources like wells, ponds and streams dried up, creating acute water shortages for both people and livestock. This worsened problems of dehydration and diseases. Estimates suggest as many as 400,000 to 700,000 Ethiopians died from starvation and diseases brought on by the crisis.¹⁵

Wars have also proven to have similar negative effects. Both of the World Wars involved massive mobilization of militaries and industries to support the war efforts. This increased fossil fuel consumption for sectors like transportation or manufacturing. Consequently, it contributed to higher greenhouse gas emissions and global warming. Extensive bombings destroyed forests, farmlands and infrastructure across many countries in Europe. This damaged important carbon absorption and disrupted agricultural production. Environmental destruction from warfare undermined people's livelihoods and access to food. Furthermore, pollution from long-term military activities like munitions testing and disposal infested water resources with toxins.¹⁶

Another major historical event that has caused serious effects on climate change, food and water security is El Niño. El Niño is a natural event that causes shifts in weather patterns globally, bringing drought to some areas and floods to others, frequently disrupting agricultural production. The 1997 El Niño was particularly strong in Indonesia. It stopped the regular rainfall that reached the country, causing unusual forest fires set by logging companies. The fires got out of control, emitting massive amounts of carbon dioxide and other greenhouse gasses into the atmosphere. The drought caused by El Niño drained water resources across Southeast Asia, affecting both peoples access to water and irrigation for crops. Agricultural areas were damaged by the fires as well,

reducing food supplies.¹⁷ El Niño has also affected Southern African countries in 2015 and 2016. Severe droughts during that time took a toll on harvests and livestock, increasing malnutrition.¹⁸

Food and water insecurity is still a growing global challenge in the face of climate change, environmental degradation, and ecosystem loss. Water quality and quantity significantly impact people's ability to produce and access sufficient, nutritious food. Climate change is worsening the effects of droughts and floods, which damage agricultural production and threaten communities' access to clean water sources.¹⁹ Ensuring sustainable water usage and protecting biodiversity is important for building resilience against these challenges.

Water is fundamentally linked to food production and underpins global food security. Every day, vast amounts of water are required to grow the world's food supply. Agricultural activities account for over 70 percent of worldwide freshwater withdrawals, as crops depend on adequate water to thrive.²⁰ As populations and incomes rise, demands on global water resources and food systems will intensify, endangering sustainability if the present risks to water security are left unaddressed. Ensuring water security for all is one of the most urgent challenges we face as a global community today. Water security encompasses having sufficient water resources of adequate quality to meet all essential needs. These needs range from drinking water and sanitation to supporting livelihoods, economic development, and a healthy environment. Much more remains to be done to overcome this issue.

By 2030, global water demand is estimated to overpower supply by 40 percent, leaving 1.6 billion people without access to safe drinking water. Currently, four billion people live in water-scarce areas, while one in four cities face water

15 Steven Kaplan, "KIFU-QEN: THE GREAT FAMINE OF 1888-1892 AND THE BETA ISRAEL (FALASHA)," Paideuma (1990): 67-77, <http://www.jstor.org/stable/40732661>.

16 Joe McCarthy, "How War Impacts Climate Change and the Environment," Global Citizen, April 6, 2022. <https://www.globalcitizen.org/en/content/how-war-impacts-the-environment-and-climate-change/>.

17 "El Nino and Indonesia," Young People's Trust for the Environment, accessed July 18, 2024, https://ypte.org.uk/factsheets/el-nino-and-indonesia/el-nino-in-1997?hide_donation_prompt=1.

18 "The 2015-2016 El Niño Event," Food and Agriculture Organization, accessed July 18, 2024. <https://www.fao.org/family-farming/detail/es/c/383116/>.

19 "WFP And UNEP Bolster Global Food and Water Security," UN Environment, accessed July 9, 2024, <https://www.unep.org/news-and-stories/press-release/wfp-and-unep-bolster-global-food-and-water-security>.

20 David Michel, "Water and Food: How, When, and Why Water Imperils Global Food Security," Centre for Strategic & International Studies, October 27, 2023, <https://www.csis.org/analysis/water-and-food-how-when-and-why-water-imperils-global-food-security>.

insecurity.²¹ Rapidly growing populations further pressure limited freshwater resources needed for other operations.

Enhancing water security requires improving efficiency across sectors like agriculture and industry. It is crucial to strengthen communities themselves against climate risks and water-related disasters. Promoting the concept of rivers as living entities and engaging youth are other key strategies.²² Water insecurity is a profound risk multiplier. This means that if we lack clean water supplies, other forms of living will be harmed. Human health, food and energy production, economic activity, and world peace all have a stake in the issue. Ensuring universal water security and resilience is imperative to uphold the sanctity of life and sustainable development aspirations.²³

The consequences of lack of access to clean water and sanitation are severe and far reaching. This lack causes 850,000 preventable deaths annually, costing USD 260 billion in annual global losses. Children are incredibly vulnerable, with 6,000 dying every day from water-related illnesses. Unsafe water and poor sanitation enables the spread of deadly diseases like cholera, diarrhea, dysentery, hepatitis A, and typhoid.²⁴

Along these same lines, food security and proper nutrition are fundamental for human survival, health and wellbeing. Yet across the world, millions of people continue to suffer from hunger, food insecurity and malnutrition in its various forms. Achieving food security requires boosting agricultural productivity and food supply chains, improving access to sufficient, safe and nutritious food, promoting sustainable agriculture, and providing social protection for the most vulnerable communities.²⁵ Rising temperatures can reduce crop yields, damage crop quality, and transform areas

originally suitable for agriculture. Heat waves can lead to crop failures and livestock losses. On the other hand, excessive rainfall, flooding, and other extreme precipitation events can lead to soil erosion, waterlogged fields, crop losses, and failed harvests.²⁶ For instance, in Nigeria, floods have significantly destroyed farmlands, consequently, this increased the number of food insecure households by 92.8 percent, turning communities into food insecure sites, further delaying human development.²⁷

The effects resonate through the entire food supply chain. Production, transportation, processing, and consumption are all affected. This disruption increases poverty, hunger and malnutrition in many of the world's most vulnerable regions. These areas often depend heavily on agriculture, but lack resources to adapt. Families facing hunger resort to desperate coping measures. Skipping meals, selling remaining livestock assets, taking children out of school, forcing early marriages, or entering exploitative situations are often used as solutions. Apart from loss of life, food insecurity undermines health, education, economic opportunities, and human development overall.²⁸

While hunger refers specifically to an uncomfortable physical sensation caused by lack of dietary energy, food insecurity is a broader concept encompassing uncertain access to sufficient, safe and nutritious food for an active and healthy life. Addressing hunger and food insecurity requires a dynamic approach. Supporting small-scale food producers, enhancing resilience of food systems, encouraging sustainable resource use, and tackling socioeconomic inequalities that deepen vulnerability are all essential to combating the issue fully.²⁹

21 Gim Huay Neo and Saroj Kumar Jha, "Why Water Security Is Our Most Urgent Challenge Today," World Bank Blogs, March 16, 2024, <https://blogs.worldbank.org/en/water/why-water-security-our-most-urgent-challenge-today>.

22 "Water Security & Resilience," World Water Council, accessed July 9, 2024, <https://www.worldwatercouncil.org/en/water-security-resilience>.

23 World Water Council, "Water Security & Resilience."

24 "Clean Water and Sanitation Problems and Solutions: How to Help Nationally and Internationally," Healing Waters International, December 21, 2023, <https://healingwaters.org/how-to-help-clean-water-and-sanitation-nationally-and-internationally/>.

25 "Food Security and Nutrition for All," Food and Agriculture Organization, accessed July 7, 2024, <https://www.fao.org/food-security-and-nutrition-for-all/en/>.

26 "How Climate Change Affects the Food Crisis," U.S. Embassy & Consulates in Italy, October 17, 2022, <https://it.usembassy.gov/how-climate-change-affects-the-food-crisis/>.

27 "Climate Change, Food Insecurity and Human Mobility: Interlinkages, Evidence And Action," International Organization for Migration, accessed September 19, 2024, <https://worldmigrationreport.iom.int/what-we-do/world-migration-report-2024-chapter-7/climate-change-food-insecurity-compounding-and-direct-drivers-human-mobility>.

28 "What Is Food Insecurity and Why It Is a Threat?," British Red Cross, accessed July 9, 2024, <https://www.redcross.org.uk/stories/disasters-and-emergencies/world/what-is-food-insecurity>.

29 "Hunger," Food and Agriculture Organization, accessed July 9, 2024, <https://www.fao.org/hunger/en/>.

Gender Inequities

For centuries, social and cultural norms have dictated gender roles and responsibilities in many societies around the world. Traditionally, women have carried much of the burden for tasks like collecting water, firewood, and achieving food security for their households. At the same time, patriarchal systems have often restricted women's access to resources, education, decision-making power, and opportunities for economic empowerment. Women are more dependent on threatened natural resources for their livelihoods due to their traditional roles. Norms throughout history have dictated that women eat last in families, ensuring others receive before her. Additionally, they are considered to have secondary access to medical care and education compared to men. Cultural practices spanning generations have made women one of the most vulnerable groups to the effects of climate change. These practices include preventing women from migrating, the exclusion of women from positions of political power and decision making, high rates of illiteracy, and legal systems that restrict independent land ownership by women.³⁰ Women around the world have notably less secure access and control over land compared to men. Without secure land rights, women have less ability to directly engage in agricultural activities and adapt to climate impacts. They are less able to recover from crop failures or changes in growing conditions.

These gender roles can be found deeply rooted in the world's history. In many African societies, colonial land seizure in the late 19th and early 20th centuries often displaced female farmers, concentrating control among male settlers and chiefs according to male-centered inheritance customs.³¹ After industrialization in the 19th century, men moved to urban factory jobs, leaving women more reliant on farming for subsistence. At the same time, they were denied autonomy over farming profits. In Latin America, Spanish colonization from 1492 imposed patriarchal land ownership norms that

persisted after independence. Indigenous Maya women were excluded from formal land claims into the 20th century.³² In addition to that, gendered divisions of labor assigned women responsibility for domestic tasks and childcare, limiting options to diversify livelihoods after crop failures.

Gender inequality and climate change are two of the most pressing challenges facing the world today. According to UN Women, climate change impacts and amplifies existing gender inequalities, posing unique threats to women globally.³³ As the effects of the climate crisis intensify, it is clear that addressing gender differences is critical to developing effective climate solutions. Women in many regions play a central role in activities like securing food, water and fuel for their families. As such, they often depend more on natural resources for their livelihoods. The effects of climate change on these resources cause women to take on a heavier burden to meet basic needs. This often forces young girls to leave school prematurely, extending the impacts of climate change across generations. Additionally, when disasters do occur, women also face greater health and safety risks due to gender-based inequalities. They have less access to information, mobility, resources, and training that could help them recover from climate disasters. In fragile regions, climate change further increases tensions, and the vulnerabilities women experience to issues such as gender-based violence, human trafficking, and child marriage.³⁴ Involving women in climate decision-making helps ensure policies benefit the needs of all. Conducting gender analysis to understand how climate change differently impacts women and men is critical to developing equitable, evidence-based solutions. Climate policies and actions must consider women and men's equal access to resources, opportunities, and leadership roles.

For instance, in 2022 a drought heavily affected Kenya. Many men had to leave their wives in search of resources such as pasture. Due to traditional gender roles, many women in

30 Christina Borst, "5 Facts About Gender Equality and Climate Change," United Nations Foundation, July 13, 2023, <https://unfoundation.org/blog/post/five-facts-about-gender-equality-and-climate-change/>.

31 Julian Quan, Su Fei Tan, and Camilla Toulmin, "Land in Africa, Market Asset or Secure Livelihood?" Natural Resources Institute, accessed July 18, 2024, <https://www.iied.org/sites/default/files/pdfs/migrate/12516IIED.pdf>

32 Carmen Diana Deere and Magdalena León, *Empowering Women: Land And Property Rights In Latin America* (Pittsburgh: University of Pittsburgh Press, 2001), <https://doi.org/10.2307/j.ctt5hjpf6>.

33 "Explainer: How Gender Inequality and Climate Change Are Interconnected," UN Women, February 28, 2022, <https://www.unwomen.org/en/news-stories/explainer/2022/02/explainer-how-gender-inequality-and-climate-change-are-interconnected>.

34 Ella Sandrine Parsons, Ashley Jowell, Erika Veidis, Michele Barry, and Sonoo Thadaney Israni, "Climate Change and Inequality," *Pediatric Research*, June 24, 2024, <https://doi.org/10.1038/s41390-024-03153-z>.

Kenya are not economically independent, leaving them vulnerable when natural resources are compromised by climate change. This creates a vicious cycle of poverty and hardship. Additionally, in terms of displacement when there is a climate crisis, women are usually more affected. As villages were empty of men, women started taking on roles that were traditionally held by men. In cases like this, women primarily join the agricultural labor force.³⁵ Nevertheless, they make up only 12.6 percent of landowners. This lack of access and control over key resources means women receive a very small proportion—10 percent—of total aid for agriculture, forestry, and fishing. It also leaves them more vulnerable due to less access to information about adaptation strategies, suitable crops, and weather patterns.³⁶ However, research estimates that giving women farmers equal access to agricultural resources could substantially improve yields, food security, and climate change mitigation. Farm yields could increase between 20 to 30 percent. Furthermore, over 100 million people could be lifted out of hunger, and carbon dioxide emissions could be reduced by 2.1 gigatons per year through improved practices. This would all have been possible by 2050, had such support been allocated.³⁷

Research indicates that climate change will drive 158 million more women and girls into extreme poverty, and 236 million into hunger, by 2050. As disasters increase, women shoulder greater unpaid care burdens, affecting their resilience and limiting mobility. Throughout history, wealthy countries have emitted over 90 percent of excess emissions yet provide inadequate financing for adaptation in vulnerable regions where female poverty rises sharply due to such stressors.³⁸

UN Women puts forth a framework centered on four key strategies. First, it calls for the acknowledgement of women's

rights, labor, and Indigenous knowledge too often excluded from decision-making. Second, it proposes the redistribution of economic resources through taxes to fund welfare, education, and programs empowering women farmers. Third, it supports boosting female representation in policy bodies where women make up just 15 to 20 percent of delegates. Finally, it emphasizes the reparation of climate debt and non-economic harms like gender-based violence through mandatory emissions cuts and damage payments prioritizing frontline communities.³⁹

Women must be involved in the fight against climate change. Nevertheless, this has not been the case. Currently, only 2 percent of all philanthropic dollars go to environmental causes, with women's organizations receiving only 0.2 percent of donations. Considering that women are the most impacted by climate change, it is unreasonable that their organizations are the least funded. Despite these challenges, women have launched important initiatives to fight climate change. For instance, in Honduras, the world's largest dam developer, Auga Zarca, was set to build on the Río Gualcarque. Building the dam would have disrupted access to water, food, and medicine to Indigenous communities. It would have also caused severe damages to the environment. Berta Cáceres, an Indigenous leader and Honduran environmental activist, halted the project, proving it violated international treaties governing Indigenous peoples' rights. In the political realm, New Zealand's Prime Minister Jacinda Ardern and her 40 percent women cabinet declared a "Climate Emergency" and set in motion a plan to make the country's public sector carbon neutral by 2025.⁴⁰ Despite facing significant barriers in funding and representation, women have demonstrated their ability to drive impactful environmental initiatives. As the

35 Christopher Deane, Michelle Buky, Sandra Mutuku, Emma Howard, and Diyora Shadijanova, "How climate change is forcing Kenyan women to leave their homes behind," *Unearthed*, October 27, 2022, <https://unearthed.greenpeace.org/2022/10/27/climate-migration-kenya-displaced-cop27/>.

36 "What Does Gender Equality Have to Do With Climate Change?," UNDP Climate Promise, accessed July 8, 2024, <https://climatepromise.undp.org/news-and-stories/what-does-gender-equality-have-do-climate-change>.

37 "Analytical Study on Gender-responsive Climate Action for the Full and Effective Enjoyment of the Rights of Women : Report of the Office of the United Nations High Commissioner for Human Rights," Office of the High Commissioner for Human Rights, May 1, 2019, <https://digitallibrary.un.org/record/3807177?ln=en&v=pdf>.

38 "As Climate Change Pushes Millions of Women Into Poverty, UN Women Calls for a New Feminist Climate Justice Approach," UN Women, December 4, 2023, <https://www.unwomen.org/en/news-stories/press-release/2023/12/as-climate-changes-pushes-millions-of-women-into-poverty-un-women-calls-for-a-new-feminist-climate-justice-approach>.

39 "Feminist Climate Justice: A Framework for Action," UN Women, March 1, 2024, <https://www.unwomen.org/en/digital-library/publications/2023/11/feminist-climate-justice-a-framework-for-action>.

40 Justin Winters and Lindsey Jean Schueman, "Why women are key to solving the climate crisis," *One Earth*, June 5, 2024, <https://www.oneearth.org/why-women-are-key-to-solving-the-climate-crisis/>.

world suffers the devastating consequences of climate change, it is imperative to empower women's organizations and ensure a more equitable and sustainable future for all.

The strategies to combat climate change and its connection to gender inequality must acknowledge women's vulnerabilities. Climate investments naturally aligned with empowering females hold promise for efficiently tackling climate change and its consequences against vulnerable groups. Renewable energy access programs involving women entrepreneurs serve as a prime example of such support.⁴¹ An integrated approach considering gender at all levels, indicates potential to simultaneously combat climate change while advancing equity.

Effects on Vulnerable Populations

Climate change has been an ongoing and evolving issue throughout history. By examining the shifts in climate that have happened in both the deep past and recent centuries, we can gain a better understanding into how the climate system works, how it changes, and how it affects vulnerable populations the most.⁴²

During disasters, some groups are more vulnerable to malnutrition and disease outbreaks than others. Young children, pregnant and nursing women, and the elderly often struggle the most. Additionally, those displaced or made homeless by the disaster, small-scale farmers, Indigenous people, and marginalized groups are dramatically affected. This is mainly due to factors like income, health care access, housing quality, and location.⁴³ These groups often live in places more exposed to climate hazards, like urban heat islands, floodplains, and wildfire-prone areas. In most cases, they lack resources to cope with impacts. Furthermore, those living in climatically high-risk areas, including floodplains, drylands, steep sloped

areas, and low-lying coastal areas, due to lack of better options also face increased impacts. So, in many ways, these groups are victims of the effects from both the immediate impact of climate change and its variations, in addition to the lingering secondary consequences for livelihoods, health, and recovery potential.⁴⁴

Children are among the group of people that are most affected by climate change. Approximately one billion children are at extremely high risk of the impacts of climate change. They are affected in many ways. For instance, children are less able to regulate their body temperature and more prone to dehydration, making them more vulnerable during extreme heat waves. 40 million children are having their education disrupted every year because of disasters exacerbated by climate change. Additionally, deadly childhood diseases are spreading more because of environmental degradation. Nevertheless, children have been largely disregarded in the response to climate change. Only 2.4 percent of climate finance from key support projects incorporating child-responsive activities.⁴⁵

Similarly, the elderly are another group disproportionately affected by climate change. Around 12,000 people die yearly in the United States due to heat waves. Adults over 60 years old are estimated to account for 80 percent of these deaths. This group is incredibly vulnerable since their capacity for maintaining core body temperature becomes more compromised with age. Additionally, elderly people are more prone to suffer medical conditions impacting physical, sensory, and cognitive abilities harming their ability to care for themselves and respond to climate disasters. Similarly, they may depend on caregivers and medical delivery systems, which can be unavailable during climate disasters.⁴⁶

Pregnant women also face terrible conditions amid climate change. High temperatures are associated with adverse birth

41 "Development Solutions: How to Fight Climate Change With Gender Equality," European Investment Bank, April 28, 2021, <https://www.eib.org/en/essays/climate-change-gender-investment>.

42 "Evidence," NASA, accessed September 19, 2024, <https://science.nasa.gov/climate-change/evidence/>.

43 "Climate Change and the Health of Socially Vulnerable People," US EPA, July 16, 2024, <https://www.epa.gov/climateimpacts/climate-change-and-health-socially-vulnerable-people>.

44 "Inequalities Cause and Exacerbate Climate Impacts on Poor and Vulnerable People," United Nations Department of Economic and Social Affairs, accessed July 18, 2024, <https://www.un.org/hi/desa/new-un-report-inequalities-cause-and-exacerbate-climate-impacts-poor-and>.

45 *The climate-changed child*, (New York: UNICEF, 2023), <https://www.unicef.org/media/147931/file/The%20climate-changed%20child%20-%20Report%20in%20English.pdf>.

46 Robin Cooper, "Climate Change and Older Adults: Planning Ahead to Protect Your Health," NCO, April 21, 2022, <https://www.ncoa.org/article/climate-change-and-older-adults-planning-ahead-to-protect-your-health/>.

outcomes, such as preterm birth, hypertension, and gestational diabetes in pregnancy. Additionally, air pollution increases the likelihood of high blood pressure during pregnancy, low birth weight, preterm birth, and negative impacts on the brain and lungs of the unborn. While climate change affects everyone, the consequences are worse for pregnant women, children, and elderly. These groups face difficulties with temperature regulation and dehydration, as well as having weaker immune systems. Additionally, they are more prone to suffer from the indirect effects of climate change, like food and water shortages and spikes in diseases.⁴⁷

Another vulnerable group severely affected by the effects of climate change are Indigenous people. Indigenous communities often operate with limited financial resources. Therefore, they prioritize investment on health and education, meaning they have limited resources to deal with climate change disasters. Ultimately, whenever they are affected by climate change, they are left with important infrastructure damages that they cannot fix due to economic constraints. Additionally, many Indigenous communities are not near urban spaces, but they are located in remote areas. This poses a large barrier for emergency responders to provide aid in cases of climate disasters.⁴⁸ Indigenous people face yet another important barrier when trying to access the legal system. They often see their cases dismissed on technical grounds before their argument has been made. For instance, in 2021, Indigenous groups in Ecuador presented a case that sought to prevent gas flaring (the burning of the natural gas associated with oil extraction) by a major petrochemical company. Nevertheless, the case was initially dismissed and the court ruled against the Indigenous people. Moreover, in many countries the legal system does not recognize land rights without paper titles - something many groups lack.⁴⁹

Climate change appears to have stressed early hunter-gatherer societies to innovate. This is most evident in the

adoption of agriculture during a period of climatic change following the last ice age. Droughts and floods have severely and disproportionately affected marginalized groups with limited means to adapt. For example, the 1930s Dust Bowl drought displaced many farmers in North America. The economic impacts of the drought, coupled with the Great Depression, hit the farmers extremely hard. Many farmers faced bank foreclosures, leaving their land either voluntarily or involuntarily. Migrant families who lost their farms and livelihoods often faced additional hardships when they went searching for work. As newcomers competing for jobs, they often came into conflict with longer-established residents.⁵⁰ Those who were most dependent on agriculture for substance, without the means to relocate, faced additional crises due to the Dust Bowl conditions, paired with the existing economic collapse. Marginalized communities of migrants and Indigenous people also disproportionately struggled without the same social support and protections that may exist today.

We can also observe the affectations to vulnerable populations in the 1998 floods in Bangladesh. Farming communities were hit the hardest, suffering major losses of crops, livestock, and productive assets. This included losses of over one million hectares of the Aus and Aman rice crops alone. Many of the farmers faced debt and inability to pay land rents. Because of this, prices of rice and other staples rose significantly, reducing food access for impoverished households. The ration provided under government feeding programs only covered 25 percent of the normal intake.⁵¹ With that, the marginalized suffered disproportionate health, income and food access consequences from the floods. These events threatened long-term recovery if not adequately addressed through emergency and rehabilitation programs.

Rural, agricultural, and coastal communities are usually the most impacted by climate change. The devastating consequences of Hurricane Mitch in Central American

47 "Experts warn of serious health impacts from climate change for pregnant women, children, and older people," World Health Organization, June 5, 2024, <https://www.who.int/news/item/05-06-2024-experts-warn-of-serious-health-impacts-from-climate-change-for-pregnant-women--children--and-older-people>.

48 "The Impacts Of Climate Change on Indigenous Communities," Indigenous Climate Hub, accessed September 19, 2024, <https://indigenousclimatehub.ca/effects-on-indigenous-communities/>.

49 "As climate crisis alters their lands, Indigenous Peoples turn to the courts," United Nations Environmental Program, August 8, 2023, <https://www.unep.org/news-and-stories/story/climate-crisis-alters-their-lands-indigenous-peoples-turn-courts>.

50 "The Dust Bowl," National Drought Mitigation Center, accessed July 18, 2024, <https://drought.unl.edu/dustbowl/>.

51 "Special Report on Bangladesh," Food and Agriculture Organization, November 13, 1998, <https://www.fao.org/4/X0619e/X0619e00.htm>.

countries is a prime example of that. Even though hurricanes are not a direct product of climate change, they have worsened because of it. Agricultural laborers lost their sources of income and food because of the hurricane and floods. An estimated 25 to 30 million people across Central America were affected through losses of homes, infrastructure, employment, and access to services like water and sanitation.⁵² Areas with high poverty levels saw deteriorations in health, nutrition and food security. Food prices rose sharply and emergency rations only addressed a fraction of normal caloric needs. Indigenous groups and scattered rural communities faced greater risks from natural disasters and climate change events due to their remote situations. Furthermore, their recovery prospects were poorer without modern protections.⁵³

In the past decade, we find the 2010–2012 Southern Africa drought. This prolonged drought affected over 13 million people across 12 Southern African countries, including Eswatini, Lesotho, Mozambique, and Zimbabwe. It was one of the worst droughts in the region’s history. Small-scale farmers and pastoralists saw their crops and livestock decimated, destroying their livelihoods. Many fell into poverty and food insecurity because of the subsequent famine. Malnutrition rates rose sharply, particularly among young children and the elderly. In Zimbabwe alone, over two million people faced food shortages. Cases of cholera, and other waterborne diseases, increased because of the lack of clean water. Access to education was also disrupted and over 100,000 children in Zimbabwe were forced to drop out of school to help procure water and food for their families.⁵⁴ This drought highlighted how climate change affects certain groups more than others. Concerted international aid was needed in order to help these vulnerable communities to cope with this crisis.

Climate threats to health include heat illness during extreme heat waves, worsening of respiratory illnesses from degraded air quality, greater risk of water-borne diseases from flooding, and infrastructure problems.⁵⁵ Additional impacts involve disruptions to food systems and distribution from climate-fueled disasters, rising potential for insect-borne diseases, and mental health effects from weather events disruptions. Socially vulnerable groups face high risks from pre-existing conditions worsened by climate impacts, like asthma from degraded air quality or kidney problems from the heat stress.⁵⁶ Actions are needed to better protect vulnerable populations through more equitable climate adaptation and resilience policies, programs, and funding at national and international measures.

Climate Fueled Migration

Climate-fueled migration has happened throughout history as early human societies became more vulnerable to changes in local environments and climate conditions that threatened essentials. Over millennia, these disruptions displaced communities and contributed to broader population movements and political instability. Many historical accounts from 3000 BC forward provide some of the earliest written records of such climate change-induced migrations.

The collapse and displacement of the Classic Maya civilization in Central America can be attributed to climate change. The Maya had been able to come back from disruptions in the past, however, the droughts of the 9th–11th centuries were much more severe than anything seen in the last 10,000 years. With less water and worse crop yields due to the drought, it was harder for the Maya to recover from the social, economic, and political crises they were facing.⁵⁷ Rebuilding their populations, infrastructure, and political systems would have

52 Nekeisha Spencer and Mikhail-Ann Urquhart, “Hurricane Strikes and Migration: Evidence From Storms in Central America and the Caribbean.” *Weather, Climate, and Society* 10, no. 3 (July 1, 2018): 569–577, <https://doi.org/10.1175/wcas-d-17-0057.1>.

53 Lois McHugh, “Central America: Reconstruction After Hurricane Mitch,” Congressional Research Service, October 12, 1999, https://www.everycrsreport.com/files/19991012_98-1030_77f43bca8f2a0eaa432ebaa9fcd99a544eeb8a91.pdf.

54 “2012 Sahel Food & Nutrition Crisis: ECHO’s Response at a Glance,” European Commission, February 2013, https://ec.europa.eu/echo/files/aid/countries/ECHO_2012_Response_Sahel_Crisis_en.pdf.

55 “Socially Vulnerable Groups Sensitive to Climate Impacts” Climate Just, accessed July 18, 2024, <https://www.climatejust.org.uk/socially-vulnerable-groups-sensitive-climate-impacts>.

56 Nathaniel Matthews and Deon Nel, “Climate Change Hits Vulnerable Communities First and Hardest,” International Institute for Sustainable Development, accessed July 18, 2024, <https://www.iisd.org/articles/insight/climate-change-hits-vulnerable-communities-first-and-hardest>.

57 Peter M.J. Douglas, Arthur A. Demarest, Mark Brenner, and Marcello A. Canuto, “Impacts of Climate Change on the Collapse of Lowland Maya Civilization,” *Annual Review of Earth and Planetary Sciences* 44, no. 1 (June 29, 2016): 613–645, <https://doi.org/10.1146/annurev-earth-060115-012512>.

required more resources than were available during that period. The exceptionally dry climate made it much more difficult for the Maya civilization to emerge from its regional collapse and return to its previously powerful state.

Returning to the example of the 1930s Dust Bowl, we can observe how this crisis impeded displacement of thousands of Americans. In the 1920s, millions of acres of Great Plains grasslands in the central US were converted to agricultural use as more settlers arrived, disturbing the natural ecosystem. From 1930 to 1936, a severe drought struck the region, worsened by farming practices that depleted the soil of moisture and vegetation that helped it in place.⁵⁸ Hot, dry weather combined with strong winds to create massive dust storms known as “black blizzards.” Essentially, topsoil that should have been anchored by roots blew away in huge dust clouds. In just one storm in 1935, over 300 million tons of soil were lost. The dust storms obscured the sun, creating near darkness during the day and visibility was reduced to feet in some areas. With no means of making a living, over 350,000 people were pushed off the land. Migrant families fled the Dust Bowl, ending up in already overburdened migrant camps in California. Additionally, many of the families suffered from respiratory illnesses due to inhaling dust constantly.⁵⁹ By 1940, over 3.5 million people had been displaced from the Great Plains states (Montana, North Dakota, South Dakota, Wyoming, Nebraska, Kansas, Colorado, Oklahoma, Texas and New Mexico). Entire communities were abandoned as inhabitants migrated, seeking work.

The 1970 Bhola cyclone in Bangladesh is also one of the deadliest tropical cyclones in history; climate change amplified its effects severely. The official death toll was approximately 500,000 people. Still, many believe the exact numbers could be even higher based on the disaster’s severity. The dense population and the lack of adequate warning systems worsened

the death and destruction from the powerful storm surge and winds. Millions of people were displaced from their homes as entire villages were destroyed by flooding and high winds. Approximately 12–17 million people were displaced by the cyclone, a large number of which became long-term refugees dependent on external food aid.⁶⁰ Most of the displaced sheltered in emergency camps set up by the government and aid organizations. Overcrowding and lack of food or water led to disease outbreaks. Years later, some remained homeless, while others settled in new locations, permanently changing demographic patterns in the region.

According to the UNHCR, climate change is recognized as a risk multiplier, meaning that it can worsen natural hazards around the world. For example, the changes in global temperature and precipitation patterns impact earthquake activity. Scientists have discovered the connection between surface and subsurface conditions that allow climate influences to accelerate or intensify seismic activity.⁶¹ The 2010 Haiti earthquake is a perfect example of the catastrophic consequences of such events, including displacement and the death of thousands. The earthquake was a massive 7.0 magnitude quake that struck just outside of the capital Port-au-Prince. It destroyed an estimated 105,000 homes and damaged over 208,000 others. This widespread housing destruction displaced large numbers of the population. Hundreds of thousands of Haitians were forced to seek shelter in camps setup in the emergency response period. Many remained displaced up to a decade later either due to issues with their origins or delays in reconstruction.⁶²

Currently, in Kiribati, Nauru, and Tuvalu, people are experiencing climate incremental sea level rise, saltwater intrusion, and droughts. For instance, 94 percent of the households in Kiribati, 97 percent in Tuvalu and 74 percent in Nauru have been impacted by climate change. Nevertheless,

58 “The Dust Bowl | Great Depression and World War II, 1929-1945,” The Library of Congress, accessed July 30, 2024, <https://www.loc.gov/classroom-materials/united-states-history-primary-source-timeline/great-depression-and-world-war-ii-1929-1945/dust-bowl/>.

59 “Tracking the Dust Bowl Migrants of the 1930s,” NBER, accessed July 30, 2024, <https://www.nber.org/digest/jul16/tracking-dust-bowl-migrants-1930s>.

60 Naom Hossain, “The 1970 Bhola Cyclone, Nationalist Politics and the Subsistence Crisis Contract in Bangladesh,” Research Gate, January 1, 2017, https://www.researchgate.net/publication/317453384_The_1970_Bhola_Cyclone_nationalist_politics_and_the_subsistence_crisis_contract_in_Bangladesh.

61 “Climate Change Could Be Triggering More Earthquakes and Volcanic Eruptions,” World Economic Forum, August 14, 2023, <https://www.weforum.org/agenda/2023/08/climate-change-trigger-earthquakes-volcanoes/>.

62 “Behind the Numbers: The Shadow of 2010’s Earthquake Still Looms Large in Haiti,” Internal Displacement Monitoring Centre, accessed July 18, 2024, <https://www.internal-displacement.org/expert-analysis/behind-the-numbers-the-shadow-of-2010s-earthquake-still-looms-large-in-haiti/>.

only a quarter of households across Kiribati, Nauru, and Tuvalu believe that their households will have the financial means to migrate. Additionally, internal migration is not a durable solution as most people flee to the overpopulated capital cities. Consequently, these cities have high unemployment, limited clean water, and are still incredibly vulnerable to climate change. Ultimately, this means that people are trapped in their countries facing deadly exposures to climate change, but do not have the means to migrate.⁶³

The issue of migration related to climate change is increasingly being recognized as one that requires urgent attention. While climate change has the potential to influence migration both positively and negatively, there is a risk that more frequent or intense climate stresses and shocks may overwhelm the capacity of communities to cope without resorting to migration as an adaptation strategy. Migration is shaped not only by environmental conditions, it is driven by social, economic, political, and cultural aspects as well.⁶⁴ Climate change is increasingly forcing people to flee their homes due to the effects of things like rising sea levels, prolonged droughts, and more frequent natural disasters. Climate change, being a threat multiplier, makes existing vulnerabilities even worse. It can contribute to conflict, economic instability, and food insecurity which can all drive humanitarian emergencies and increase displacement.⁶⁵

As global temperatures rise and extreme weather events become more severe and frequent due to climate change, vulnerable communities are forced to flee their homes to escape sea level rise, floods, droughts, and cyclones. The UNHCR estimates that the number of people likely to be displaced by climate change will grow to over 150 million by 2050 if global warming continues unabated. Climate change poses a major threat to tens of millions of the world's most vulnerable people, undermining progress towards achieving stability

and prosperity.⁶⁶ Climate change also poses security risks by increasing competition over scarce resources and escalating existing conflicts. As certain areas become marginal for living, large populations on the move could overwhelm communities that receive climate migrants, causing further weakness if not properly addressed.⁶⁷

Economic Losses for Farmers

Climate change poses significant economic challenges for farmers around the world. Rising global temperatures and changes in precipitation patterns are making agricultural production more unpredictable and difficult. When climate impacts like drought reduce crop yields even slightly year after year, it can have massive financial implications for farmers' bottom lines. Small family farms that operate on tight margins have little protection against losses. Livestock are also damaged by heat stress and lack of feed during droughts, affecting farmers dependent on animal agriculture. Infrastructure on farms is also very vulnerable to flooding and high winds from intensifying hurricanes and cyclones. The costs of damaged equipment, lost harvests, and unhealthy livestock pile up quickly. When multiple years of poor production hit due to climate stresses, mounting debt takes its toll. For rural families and communities reliant on stable agricultural incomes, climate change poses a major threat to economic stability and well-being. It undermines the viability of farming as livelihood, especially for those with few alternatives, as climate change impacts accelerate.

Starting in the 1970s and 1980s, persistent droughts plagued parts of Africa, destroying crops and livestock. This led to widespread famine and economic hardship for many rural subsistence farmers. The severe lack of rainfall devastated staple crops that most farmers relied on for food and income. The

63 *CLIMATE CHANGE AND MIGRATION IN THE PACIFIC: Links, attitudes, and future scenarios in Nauru, Tuvalu, and Kiribati*, (Thailand: UNESCAP), https://i.unu.edu/media/ehs.unu.edu/news/11747/RZ_Pacific_EHS_ESCAP_151201.pdf.

64 "Climate Change and Migration: Improving Methodologies to Estimate Flows," International Organization for Migration, accessed July 18, 2024, <https://publications.iom.int/system/files/pdf/mrs-33.pdf>.

65 "Climate Change and Disaster Displacement," UNHCR UK, accessed July 18, 2024, <https://www.unhcr.org/uk/what-we-do/build-better-futures/environment-disasters-and-climate-change/climate-change-and-displacement>.

66 The UN Refugee Agency, "Climate Change and Displacement," UNHCR, accessed July 18, 2024, <https://www.unhcr.org/what-we-do/build-better-futures/climate-change-and-displacement>.

67 Lawrence Huang, "Climate Migration 101: An Explainer," Migration Policy Institute, November 16, 2023, <https://www.migrationpolicy.org/article/climate-migration-101-explainer>.

agricultural losses plunged smallholder farmers and pastoralists deep into poverty, as their only source of income collapsed. At the same time, future farming potential was damaged by erosion of soil fertility.⁶⁸ Moreover, prolonged heat waves, like the one that affected Russia in 2010, have ruined crops and threaten the economy of farmers. Conditions were reported to reach over 40 degrees Celsius, posing major health and safety risks for laborers working outdoors. The heat directly contributed to an estimated 55,000 deaths nationwide. The annual crop production dropped by 25 percent, which meant reduced income for farmers. Consequently, the drop in food production drove global food price spikes.⁶⁹

Farmers around the world and throughout history have faced the most difficult economic circumstances as a result of climate change. For example, the 1988 drought in the Yangtze River Basin, China was one of the worst droughts of the 20th century in terms of area affected.⁷⁰ From December 1987 to June 1988, rainfall was between 40 to 70 percent lower than normal levels across the region. Many areas received no

rain for six months straight. Winter wheat yields dropped by over 30 percent, while many areas had complete crop failures. Rice plantings in the summer were devastated when drought continued, yields declined from 21 to 50 percent depending on location, and agricultural production decreased by 23 percent compared to previous years. The economic cost of drought losses was estimated at USD two billion.⁷¹ Millions of farming families faced severe economic hardship. Incomes shrank as they struggled to pay debts and support themselves. Widespread poverty followed in rural communities as agricultural productivity collapsed, it took years for regional agriculture to recover its previous levels of output and for farmer livelihoods to stabilize again.

Rising temperatures, changing rainfall patterns, and extreme weather are making it harder for farmers to maintain profitable operations. These climate impacts have translated to major economic losses for farmers over recent decades. The estimated USD 3.8 trillion in lost agricultural produce to drought alone since 1990 has severely damaged livelihoods.⁷² The threats of

68 Alessandra Giannini, "Sahel Drought and Global Climate Change." International Research Institute for Climate and Society, September 2007, https://www.populationenvironmentresearch.org/pern_files/papers/Giannini_SahelCyberseminar.pdf.

69 "Russian Heat Wave 'had Both Manmade and Natural Causes,'" University of Oxford, February 21, 2012, <https://www.ox.ac.uk/news/2012-02-21-russian-heat-wave-had-both-manmade-and-natural-causes..>

70 Tao Huang, Ligang Xu, and Hongxiang Fan, "Drought Characteristics and Its Response to the Global Climate Variability in the Yangtze River Basin, China," December 21, 2018, <https://doi.org/10.3390/w11010013>.

71 "Final Report on 1998 Floods in the People's Republic of China," UN Office for the Coordination of Humanitarian Affairs, September 29, 1998, <https://reliefweb.int/report/china/final-report-1998-floods-peoples-republic-china>.

72 "Agrifood Sector Faces Growing Threat From Climate Change-induced Loss and Damage," Food and Agriculture Organization, January 12, 2023, <https://www.fao.org/newsroom/detail/fao-report-agrifood-sector-faces-growing-threat-from-climate-change-induced-loss-and->

A maize farmer with his crop destroyed by parrots whose migration patterns have changed

Credit: International Center for Tropical Agriculture



climate change go beyond economic losses for farmers; their very ability to practice their profession is at risk.

Farmers and agricultural laborers are highly vulnerable to the economic impacts of climate change. For farmers living in poverty, even a small loss of productivity can mean financial ruin as they lack the savings to cope. When harvests fail due to hotter temperatures or rainfall changes, impoverished households no longer have excess foods to sell or earnings to pay for necessities. This pushes many deeper into poverty and threatens food insecurity if alternatives are not found.⁷³ The economic losses affect entire rural communities where farming is often the primary livelihood. With few employment options beyond agriculture in such regions, whole populations suffer lowered incomes and purchasing power. On average, farmers estimate that their incomes had reduced by 15.7 percent due to climate change in the past two years. One in six farmers even identifies income losses of over 25 percent during this period.⁷⁴ Limited alternatives deepen their vulnerability, as mobility is restricted by lack of land rights or assets to move elsewhere for work. Those dependent on crops adapted for current climates also struggle to switch rapidly enough to new varieties suited for other conditions.⁷⁵

Some steps have been taken to address this issue. In 2016 during COP22, an initiative named the Adaptation of African Agriculture (AAA) was launched. The AAA initiative is currently supported by 38 African countries AAA aims to contribute to food security in Africa, improve living conditions of vulnerable farmers, and promote adaptation practices to climate change. The AAA Initiative aims to do so by aiding services on the adaptation of African agriculture to climate change, facilitating access to investors, and fostering the emergence of strategic coalitions and partnerships.⁷⁶

Similarly, Ecuador, India, Kenya, Laos, Philippines, Uruguay, and Vietnam have launched a five-year initiative to combat pollution from the use of pesticides and plastics in agriculture. Chemical residues can degrade ecosystems, diminishing soil health and farmers' resilience to climate change. The Financing Agrochemical Reduction and Management Programme (FARM) and the Global Environment Facility (GEF) elaborate business cases for banks and policymakers to reorient policy and financial resources towards farmers to help them adopt to low- and non-chemical alternatives and promote sustainable practices. This initiative aims to prevent 35,000 tons of carbon dioxide emissions and protect over three million hectares of land from degradation.⁷⁷

Without support, farmers and laborers facing repeated economic losses may abandon agriculture altogether over the long run. Furthermore, mass migration from rural areas could overwhelm cities that are not equipped for such quantities. Loss of agricultural livelihoods around the world threatens international food security if productions decline sharply. Investing in climate adaptation for small farms through improved seeds, livestock, water access, and risk management helps build resilience against continued global warming impacts. Greater international action to cut emissions remains crucial to avoid even worse hardship for the world's most impoverished rural communities in the future.⁷⁸

Current Status

Rising Temperatures

Global warming refers to the long-term rise in the average temperature of the Earth's climate system.⁷⁹ The primary driver of the observed temperature increase over the past century has

damage/en.

73 "How Are Agricultural Economies Affected by Climate Change?," Economics Observatory, October 22, 2021, <https://www.economicsobservatory.com/how-are-agricultural-economies-affected-by-climate-change>.

74 "More Than 70% of Farmers Have Already Seen Large Impacts of Climate Change on Their Farm," Bayer, September 21, 2023, <https://www.bayer.com/media/en-us/more-than-70-of-farmers-have-already-seen-large-impacts-of-climate-change-on-their-farm-new-global-research-across-8-countries-reveals/>.

75 Bayer, "More Than 70% of Farmers Have Already Seen Large Impacts of Climate Change on Their Farm."

76 "The solutions AAA," AAA Initiative, accessed September 19, 2024, <https://www.aaainitiative.org/en>.

77 "New initiative aims to curb the toxic impacts of agriculture," press release, United Nations Environmental Program, March 12, 2024, <https://www.unep.org/news-and-stories/press-release/new-initiative-aims-curb-toxic-impacts-agriculture>.

78 "Challenges for Farmers in the Face of Worsening Climate Change," Sustainability For All, accessed July 19, 2024, https://www.activesustainability.com/water/agriculture-climate-change/?_adin=11734293023v.

79 "What Is Climate Change?," United Nations, accessed September 18, 2024, <https://www.un.org/en/climatechange/what-is-climate-change>.

been the human emission of greenhouse gasses such as carbon dioxide and methane into the atmosphere through fossil fuel combustion and deforestation. Global surface temperatures have been rising since the Industrial Revolution, as human activity has increased greenhouse gas emissions. Current climate models project that global temperatures will continue to rise over the 21st century if such emissions are not significantly reduced. This level of warming risks triggering significant sea level rise that threatens coastal regions, irreversible damage to ecosystems, stronger extreme weather events, food and water insecurity, and other serious consequences. Data from NASA's Goddard Institute for Space Studies shows that the average global temperature has increased by at least 1.1 degrees Celsius since 1880. The majority of the warming has occurred since 1975 at a rate of 0.15 to 0.2 degrees Celsius per decade according to NASA's ongoing temperature analysis.⁸⁰ This warming has not occurred evenly worldwide. The Northern Hemisphere has experienced greater heating than the Southern Hemisphere. Warming has also been particularly stronger in polar regions.⁸¹

Global temperatures continue to rise and break records. The 10 years from 2014 to 2023 were the warmest on record. 2023 was the hottest year, and the eight months from May to December 2023 were also the warmest consecutive months. Regions like the Arctic are warming even faster than the global average, with temperatures three times higher than the global mean for extended winter seasons from 2024 to 2028. Additionally, drier conditions attributed to climate change are contributing to worsening drought and heat waves and priming forests to ignite in massive wildfires, causing immense devastation in recent years. As temperatures increase, even more heat is being trapped in the atmosphere and oceans by rising greenhouse gas concentrations. Over 90 percent of trapped heat accumulates in the world's oceans, contributing to sea level.⁸²

A survey of leading climate scientists finds that Earth is on track to warm at least 2.5 degrees Celsius above pre-industrial levels. Nearly 80 percent of respondents from the Intergovernmental Panel on Climate Change (IPCC) foresee over 2.5 degrees Celsius of heating, with almost half concerned about over three degrees Celsius. Only six percent think 1.5 degrees Celsius can be achieved.⁸³

Ocean temperatures have broken records every day for a whole year, factors like greenhouse gasses and El Niño drove rising seas, seriously harming marine life. The ocean absorbs a quarter of human carbon emissions and 90 percent of excess heat.⁸⁴ Warming oceans cause coral bleaching, where stressed corals expel algae living in their tissues, leaving the coral white and vulnerable to diseases. This has devastated reef systems around the world which support thousands of species. Temperature shifts force many species to seek out more hospitable environments, disrupting ecosystems. This has caused declines in populations of species like plankton, which are the foundation of ocean food webs. Warm-water diseases and parasites are also spreading farther as pathogens find new hosts in species stressed by warmer conditions. This has contributed to die-offs of marine mammals, sea turtles, and fish. Ocean warming reduces the mixing of nutrient-rich deeper water to the surface, which depletes oxygen levels and food availability for fish, seabirds, and other marine life.⁸⁵

These extreme changes in the atmosphere, ocean, cryosphere, and biosphere provide clear evidence of human-caused climate change impacting weather and climate extremes in every region of the world. Changes have caused substantial damages and increasingly irreversible losses to nature and humans. Mass mortalities of species have occurred because of heat extremes. Health impacts include increased mortality and morbidity, diseases, and challenges to mental health from extreme events and loss of livelihoods.

80 "World of Change: Global Temperatures," NASA Earth Observatory, accessed July 30, 2024, <https://earthobservatory.nasa.gov/world-of-change/global-temperatures>.

81 Hannah Ritchie, Pablo Rosado, and Max Roser, "CO₂ And Greenhouse Gas Emissions," Our World in Data, December 28, 2023, <https://ourworldindata.org/co2-and-greenhouse-gas-emissions>.

82 "The Effects of Climate Change," NASA, accessed July 30, 2024, <https://science.nasa.gov/climate-change/effects/>.

83 Damian Carrington, "World's Top Climate Scientists Expect Global Heating to Blast Past 1.5C Target," *The Guardian*, May 9, 2024, <https://www.theguardian.com/environment/article/2024/may/08/world-scientists-climate-failure-survey-global-temperature>.

84 "Leading Climate Scientists Expect Global Heating to Exceed 1.5C and Other Nature and Climate Stories You Need to Read This Week," World Economic Forum, May 13, 2024, <https://www.weforum.org/agenda/2024/05/global-temperatures-renewable-energy-nature-climate-news-13052024/>.

85 Phoebe Weston, "Biodiversity Loss Is Biggest Driver of Infectious Disease Outbreaks, Says Study," *The Guardian*, May 9, 2024, <https://www.theguardian.com/environment/article/2024/may/09/biodiversity-loss-is-biggest-driver-of-infectious-disease-outbreaks-says-study>.



Man during a heatwave
Credit: US Air Force

One of the most devastating consequences of rising temperatures seen today are extreme heat waves. According to the World Meteorological Organization (WMO), a heat wave is a period where excess heat accumulates over a sequence of unusually hot days and nights. During this time, maximum and minimum temperatures both exceed normal levels. Heat waves have been increasing in intensity, frequency and duration due to climate change. As global warming continues, we can expect to see more prolonged and intense heat waves affecting new regions around the world. Recent extreme events, such as the massive 70-day heat wave that struck China in 2022, demonstrate the growing risks posed by climate-fueled hazards.⁸⁶ Heat waves endanger both human health and broader societal systems. They can lead to increased mortality, impacts on agriculture and water supply, and heighten wildfire risks. Vulnerable groups like the elderly and outdoor workers face especially high danger. Urban areas also experience amplified heat island effects that worsen associated dangers. For example, heat stress leads to over 350,000 deaths globally each year among outdoor workers. In Africa, nearly 93 percent of the workforce is exposed to extreme heat. In the Arabian Peninsula, over 83 percent of workers face the same. In Europe and Central Asia, the risk to workers from extreme heat is

increasing faster than anywhere else in the world, having risen by more than 17 percent since 2020.⁸⁷

Higher temperatures have increased heat-related illnesses and deaths, especially among vulnerable groups like the elderly, young children, the chronically ill, the homeless, and outdoor workers. Dehydration, heat cramps, heat exhaustion, and potentially deadly heat strokes are some of the health impacts this climate disaster causes. There is also a bigger burden on health services. Heatwaves can overwhelm healthcare systems as admissions for such illnesses rise. The economy is also severely affected due to this. Reduced labor productivity, paired with disruptions to transportation, energy, and other infrastructure all contribute to this strain.⁸⁸

A clear example of this is the heatwave that occurred from March 15 to 18, 2024 across southern Brazil. Rio de Janeiro saw unprecedented high temperatures for early autumn in the southern hemisphere, reaching a scorching 42 degrees Celsius. Eventually, the heat index peaked at a very dangerous 62.3 degrees Celsius. Rio de Janeiro and regions like Guaratiba, closest to the ocean, felt the most intensified effects due to warm northerly winds and proximity to water. The extreme heat posed severe health risks, with authorities advising the

⁸⁶ "Heatwave," World Meteorological Organization, December 10, 2023. <https://wmo.int/topics/heatwave>.

⁸⁷ "More Than 70% of the Global Workforce Is at Risk From Severe Heat – Report," World Economic Forum, August 8, 2024, <https://www.weforum.org/agenda/2024/08/extreme-heat-workers-climate-health/>.

⁸⁸ "Heatwaves," World Health Organization, January 6, 2020, <https://www.who.int/health-topics/heatwaves>.

public on coping strategies to mitigate harm. Power outages and disruptions to transport networks occurred in some areas due to an unprecedented spike in energy demand. Communities without access to air conditioning or the ability to move indoors were especially at risk from the heat impacts.⁸⁹

Unless emissions are urgently reduced, climate projections show warming will exceed the high levels defined by the Paris Agreement.⁹⁰ Even an increase of half a degree Celsius brings substantially worse extreme weather, food and water insecurity, and natural disasters. Rising temperatures also disrupt natural and human systems in many ways. They lengthen fire seasons, fuel more intense hurricanes and melt glaciers or ice sheets essential for billions. Marine and land wildlife find their habitat ranges shifting, placing whole ecosystems at risk. For humans, rising thermal stresses pose growing hazards to health, livelihoods, infrastructure, and national economies.

It is therefore imperative that countries make climate change a global priority. Urgent cooperation is needed this decade to transition to renewable energy sources and build resilience worldwide, especially among vulnerable countries. Failing to limit further global warming will otherwise lead to increasingly severe and widespread consequences.

Greenhouse Gas Emissions

Greenhouse gasses (GHGs), like carbon dioxide, methane, and nitrous oxide, trap heat in the atmosphere and contribute to global warming. Greenhouse gasses occur naturally, but human activities have substantially raised levels in the atmosphere. Emissions come from sources like burning fossil fuels for energy and transportation, agricultural practices, deforestation, waste decomposition, and industrial processes. Rising emissions enhance the greenhouse effect, leading to increased global temperatures and climate change impacts. These include rising seas, extreme weather, and disrupted

ecosystems, as previously discussed.⁹¹

The greenhouse effect refers to the process by which certain gasses in the atmosphere act like a blanket, trapping heat near the surface of the Earth.⁹² These gasses allow sunlight to pass through the atmosphere and warm the Earth's surface, but prevent some of the heat from escaping back out into space. This natural greenhouse effect keeps the Earth's average temperature around 60 degrees Fahrenheit warmer than it would be without these gasses. It makes the planet warm enough to sustain life.⁹³ Greenhouse gasses have maintained a balanced greenhouse effect on Earth for thousands of years, but human activities increased their concentrations in the atmosphere over the past century. This excess greenhouse effect causes the planet to warm to dangerous levels beyond what is natural. Ultimately, Earth's climate patterns and environments are disturbed.

Carbon dioxide concentrations were a full 50 percent higher in 2022 compared to pre-industrial levels. That was the first time exceeding that milestone, and the levels continue to rise each year. There are various ways to reduce greenhouse gas emissions, which is necessary to stop climate change. Reducing energy use, transitioning to renewable energy, reducing transportation and industrial emissions, reducing household waste, and taking carbon dioxide out of the air are all viable solutions. Reducing energy use involves making homes, businesses, and transportation more efficient to use less electricity. This can be done through replacing incandescent bulbs, adding insulation, and setting thermostats lower.⁹⁴

Transitioning to renewable energy like solar, wind, geothermal, and hydropower does not directly emit greenhouse gasses. With that in mind, the share of renewable energy needs to increase globally. Reducing transportation emissions involves shifting to electric vehicles, hybrids, public transit, biking, walking, and carpooling to drive less. Fuel efficiency standards

⁸⁹ "2024/03/15 Brazil Heatwave," Clima Meter, accessed July 31, 2024, <https://www.climameter.org/20240315-18-brazil-heatwave>.

⁹⁰ "Paris Agreement," United Nations Framework Convention on Climate Change, December 12, 2015, https://unfccc.int/sites/default/files/english_paris_agreement.pdf.

⁹¹ "What Are Greenhouse Gas Emissions?," IBM, accessed July 31, 2024, <https://www.ibm.com/topics/greenhouse-gas-emissions>.

⁹² "Greenhouse Effect 101," Natural Resource Defense Council (NRDC), June 5, 2023, <https://www.nrdc.org/stories/greenhouse-effect-101>.

⁹³ "What Is the Greenhouse Effect?," NASA Science, accessed July 31, 2024, <https://science.nasa.gov/climate-change/faq/what-is-the-greenhouse-effect/>.

⁹⁴ "How Do We Reduce Greenhouse Gases?," UCAR, July 30, 2024, <https://scied.ucar.edu/learning-zone/climate-solutions/reduce-greenhouse-gases>.

are also helpful. Additionally, reducing industrial emissions focuses on manufacturing becoming more efficient and switching to renewable energy, it also includes reducing waste in this industry. Finally, taking carbon dioxide out of the air involves natural sinks like forests, coastal wetlands, as well as new technologies like direct air capture.⁹⁵

As of 2023, member states of the G20 are responsible for approximately 78 percent of all territorial GHG emissions.⁹⁶ The average CO₂ emissions per person in G20 countries are around 7.4 to 7.7 tons. According to Oxfam International's research, for G20 to meet the goals to keep the global temperature around 1.5 degrees Celsius, the Group should reduce the CO₂ emissions by at least half by 2030, which is equivalent to around 2.9 to 3.8 tons per person. The G20's current goal to reduce the CO₂ emissions by 6.7 to 6.9 tons per person meets short to the optimal reduction of greenhouse gas emissions to counter the climate change and its consequences.⁹⁷

The Russian invasion of Ukraine caused one of the largest humanitarian crisis of the 21st century and it also had negative consequences in terms of climate change. Russia's invasion has generated at least 175m tonnes of carbon dioxide equivalent (tCO₂e) caused from warfare, landscape fires, rerouted flights, forced migration, and leaks caused by military attacks on fossil fuel infrastructure. 175m tCO₂e is more than the total emissions generated individually by countries like the Netherlands and Kuwait in 2022. The UN General Assembly has said that Russia should compensate Ukraine for the war, which will include climate emissions. The reparations estimates USD 185 for every ton of greenhouse gas emissions.⁹⁸

It is important to recognize the difference between the greenhouse gas emissions in high-income countries and those

in middle-income countries within the G20. The annual CO₂ emissions in high-income countries is approximately more than 12 tons of CO₂ per person on average. Whereas the annual CO₂ emissions in middle-income countries is approximately between 6.1 to 6.3 tons of CO₂ per person on average.⁹⁹ The G20 member states' nationally determined contributions (NDCs) to counter climate change do not meet the goals set by the G20 Leaders Summit nor align with the international agreements, namely the UN Sustainable Development Goals and the 2015 Paris Agreement. The positive correlation between greenhouse gas emissions and the median income level strongly implies that greenhouse gas emissions at the international level would require bridging the gap between high-income countries and middle and low-income countries within the G20. This is to ensure that the multilateral group is on the similar page in relation to the member states' financial capabilities to counter climate change issues and provide support for sustainability projects.

A G20-supported multilateral fund has invested USD 5.4 billion in 64 renewable projects in developing countries since 2008. Some fund-supported initiatives include wind farms in Egypt, solar parks in Morocco, and geothermal energy in Indonesia.¹⁰⁰ The G20 has committed to mobilizing public and private finance for clean energy projects, including mechanisms like the Green Climate Fund.¹⁰¹ This act builds on the list of actions adopted by the G20 in the 2021 summit. One of the action items underline the Sustainable Finance Working Group (SFWG)'s role in analyzing the public policy levers that have significant impact on sustainable investment choices to support the clean energy projects.¹⁰²

The working group's priority to optimize the international climate funds focuses on the international architecture of

95 "Outlook for Emissions Reductions – Global EV Outlook 2024," IEA, accessed July 30, 2024, <https://www.iea.org/reports/global-ev-outlook-2024/outlook-for-emissions-reductions>.

96 Oxfam International, "G20 countries failing by big margins to cut greenhouse gas emissions to below 'catastrophic levels,'" news release, September 7, 2023, <https://www.oxfam.org/en/press-releases/g20-countries-failing-big-margins-cut-greenhouse-gas-emissions-below-catastrophic>.

97 Oxfam International, "G20 countries failing by big margins to cut greenhouse gas emissions to below 'catastrophic levels.'"

98 Nina Lakhani, "Russia's war with Ukraine accelerating global climate emergency, report shows," *The Guardian*, June 13, 2024, <https://www.theguardian.com/environment/article/2024/jun/13/russia-war-with-ukraine-accelerating-global-climate-emergency-report-shows>.

99 Oxfam International, "G20 countries failing by big margins to cut greenhouse gas emissions to below 'catastrophic levels.'"

100 "CLEAN TECHNOLOGIES," Climate Investment Funds, accessed August 11, 2024, <https://www.cif.org/topics/clean-technologies>.

101 Paul Mitchell and Pia Treichel, "The G20 Climate Funds Review Must Help Finance Reach the Local Level," International Institute for Environment and Development, June 17, 2024, <https://www.iied.org/g20-climate-funds-review-must-help-finance-reach-local-level>.

102 "G20 Sustainable Finance Roadmap," G20 Italian Presidency, accessed September 18, 2024, https://g20sfwg.org/wp-content/uploads/2022/01/RoadMap_Final14_12.pdf.

sustainable finance. The working group further recommended the review of climate funds in meeting the goals in streamlining the flow of climate financing and socio-environmental protection.¹⁰³ By mobilizing these public and private finance mechanisms, G20 and the international community could address the lack of sufficient funds and improve the flow of finance for frontline countries to tackle climate change, including the resurgence of greenhouse gas emissions. This reflects that addressing the financial challenges to counter climate change issues, including the greenhouse gas emissions, is as important as tackling climate change issues.

Sustainable Development Goals

The Sustainable Development Goals (SDGs) are a collection of 17 global goals set by the United Nations General Assembly in 2015 for the year 2030. They address many global challenges, including poverty, inequality, climate change, peace, and justice. The goals are integrated and balanced across economic, social and environmental dimensions of development. The SDGs recognize that development must meet the needs of the present without compromising future generations.¹⁰⁴ They aim to address the main global challenges faced by humanity in a comprehensive manner. Essentially, they were set to provide a clear set of targets and indicators to guide policies and measure progress towards sustainable development. This gives governments, organizations and citizens a common framework to work within. To ensure no one is left behind, the SDGs first focus development efforts where they are most needed.

The impacts of climate change are already affecting communities around the world. As such, urgent climate action is needed to reverse these dangerous trends. Due to this, Sustainable Development Goal 13: “Climate Action” calls for urgent action to combat climate change and its impacts, as it recognizes the threat it poses.

Progress on Goal 13 is critical to achieving many other SDGs.

Avoiding this issue threatens progress in the areas of poverty, zero hunger, good health, clean water, sustainable cities, and responsible consumption. Targets under this goal include enhancing climate resilience, integrating climate measures into national policies and planning, improving education and capacity on climate change, mobilizing climate finance, and supporting climate action in developing countries.¹⁰⁵

Achieving Goal 13 requires global cooperation to facilitate access to technology and promote investment in sustainable energy and infrastructure worldwide. These are two key areas where the G20 has also made efforts. It provides a platform for policy coordination, information sharing, and mobilizing climate finance. Through initiatives like the Clean Technology Fund, Scaling Solar program, and Asia Development Bank investments, the G20 has directly supported investments in renewable energy and low-carbon infrastructure projects in developing countries. The G20 mobilized over USD 100 billion annually by 2020 for climate action in developing countries. Much of the funding targets adaptation projects directly benefiting vulnerable communities. Furthermore, the G20 supported creation of a dedicated international fund to help less economically capable countries cope with climate change impacts. This mainly addresses losses and damages from effects they did not cause.¹⁰⁶

With G20 members representing the largest economies, their cooperation is crucial to demonstrate leadership and facilitate international cooperation on a scale needed to achieve this goal. SDG 13 contains five specific targets that guide countries’ climate actions: building resilience to climate impacts, integrating climate measures into policies and planning, improving education and capacity on climate change, mobilizing climate finance including USD 100 billion annually, and supporting climate actions in developing countries. Countries have committed to ambitious climate actions through their Nationally Determined Contributions (NDCs) submitted under the Paris Agreement. As of 2023,

¹⁰³ G20 Sustainable Finance Working Group, *G20 Sustainable Finance Working Group Presidency and Co-chairs Note on Agenda Priorities* (Brasilia: G20, 2024), <https://g20sfwg.org/wp-content/uploads/2024/02/2024-G20-SFWG-NAP.pdf>.

¹⁰⁴ “Sustainable Development Goals,” UNDP, accessed August 1, 2024, <https://www.undp.org/sustainable-development-goals>.

¹⁰⁵ “Goal 13,” UN Department of Economic and Social Affairs, accessed August 1, 2024, <https://sdgs.un.org/goals/goal13>.

¹⁰⁶ “Factsheet on the G7 Partnership for Global Infrastructure and Investment,” G20, May 5, 2023, <https://g20-documents.org/database/document/2023-g7-japan-leaders-miscellaneous-factsheet-on-the-g7-partnership-for-global-infrastructure-and-investment>.

over 190 countries have submitted their first or second NDCs, which outline domestic mitigation and adaptation measures.¹⁰⁷

Countries are implementing carbon pricing, setting renewable energy targets, phasing out fossil fuel, promoting low-carbon transportation and agriculture, and enhancing carbon sinks to battle the issue. They are also strengthening early warning systems, disaster risk reduction strategies, and policies to manage climate risks, with a focus on vulnerable groups.¹⁰⁸

SDG 13 on climate action is vital to mitigating the impacts of climate change worldwide efficiently. Its targets guide ambitious and urgent international efforts. By advocating for change across all sectors within an agreed timeline, SDG 13 establishes an organized framework upon which international coordinated action can result in decisive climate policy, planning, and investment at all levels of governance and society worldwide.

Bloc Analysis

As the most powerful economic bloc, the G20 wields outsized influence on climate policymaking. Dividing into different work blocs helps design more versatile solutions. An important point to keep in mind are vulnerable communities; they often contribute least to climate change but are impacted earliest and hardest by its consequences. A dedicated work bloc helps ensure their needs and voices are central to the discussion and outcomes. Understanding challenging climate risks faced by vulnerable groups is critical to designing more inclusive adaptation solutions and building widespread resilience to impacts. With that in mind, the Resource Watch Climate Risk Index will be used as a guideline for the different blocs.¹⁰⁹

Two indicators are used in this index—the number of deaths

and economic losses from these weather events in each country, adjusted for population and Gross Domestic Product (GDP). Countries receive scores based on the summed value of these two indicators for the analyzed years. A lower score suggests higher risk countries experience. The scores are divided into risk categories for easy comparison: Very High Risk (score ≤ 10), High risk (score ≤ 20), Medium Risk (20-50), and Low Risk (> 50).

Very High and High Risk (score 20 or less)

This bloc represents countries and territories that have experienced the highest impacts from extreme weather events in the last years. They would benefit the most from discussions around loss and damage financing. This bloc could discuss scaling up adaptation efforts, especially for vulnerable groups.¹¹⁰

These countries are disproportionately impacted by climate change due to their geographical, economical, and infrastructural constraints. Forming a bloc allows them to jointly address issues related to loss and damage. Despite low contributions to global emissions, these countries require significant external financing to undertake large-scale climate adaptation projects across sectors like water, agriculture, and infrastructure.

Individual Low Developing Countries and Small Island Developing States have limited influence in global climate talks compared to larger economies. Thus, grouping as a bloc multiplies their convening power to push for more ambitious emissions cuts and support.¹¹¹ Countries this bloc may consist of include Bangladesh, Dominica, Guatemala, Haiti, India, Indonesia, Japan, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, and Vietnam.

¹⁰⁷ “Nationally Determined Contributions (NDCs),” United Nations Framework Convention on Climate Change, accessed August 1, 2024, <https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs>.

¹⁰⁸ “Climate Change,” United Nations Sustainable Development, October 20, 2023, <https://www.un.org/sustainabledevelopment/climate-change/>.

¹⁰⁹ “Resource Watch,” Vizzuality, accessed August 1, 2024, <https://resourcewatch.org/data/explore/soc067rw1-Climate-Risk-Index?section=Discover&selectedCollection=&zoom=1.4315619675974267&lat=3.0222197649513376&lng=19.69673892549276&pitch=0&bearing=0&basemap=dark&labels=light&layers=%255B%257B%2522dataset%2522%253A%2522e98607d-23d8-42f8-9662-5658f349bf0f%2522%252C%2522opacity%2522%253A1%252C%2522layer%2522%253A%25227d9a6588-ff0c-44b0-942f-e0f6e3bf99dc%2522%257D%255D&aoi=&page=1&sort=most-viewed&sortDirection=-1>.

¹¹⁰ “The 8 Countries Most Affected by Climate Change,” World Food Program USA, April 21, 2023, <https://www.wfpusa.org/articles/countries-most-affected-by-climate-change/>.

¹¹¹ “On The Frontline of Climate Crisis, World’s Most Vulnerable Nations Suffer Disproportionately,” Office of the High Representative for the Least Developed Countries, accessed August 1, 2024, <https://www.un.org/ohrls/news/frontline-climate-crisis-worlds-most-vulnerable-nations-suffer-disproportionately>.

Puerto Rico had the highest risk score—above 100—placing it in the top risk category facing the worst impacts from weather events. Puerto Rico’s climate has warmed by more than one degree Fahrenheit since the mid-20th century. Surrounding waters have warmed by nearly two degrees Fahrenheit since 1901. Additionally, tropical storms and hurricanes have become more intense in the past 20 years. Wind speeds and rainfall rates from such storms are expected to increase further with continued warming.¹¹²

A unified bloc can broadcast consistent messaging on their vulnerable circumstances and urgent climate needs, keeping these challenges high on the global agenda. Joint working increases opportunities for innovative cooperation, knowledge exchange, and coordinated climate planning among these countries.

Medium Risk (score 20-50)

This bloc often focuses on building community resilience through initiatives in food and water security, infrastructure, and disaster risk reduction. As these countries are increasingly exposed to climate change patterns, like changing rainfall conditions, droughts and extreme weather events, they face challenges like food insecurity and water scarcity. Agriculture—a key sector in many of these states—is highly vulnerable to drastic changes in environmental conditions, affecting a lot of families’ livelihoods. Droughts are already being felt more intensely in areas such as southwest Africa. Variable or reduced rainfall jeopardizes crop yields and livestock. Other climate hazards, like floods, also impact these countries, with the potential to overwhelm local health systems stressed by both climate stresses and disease outbreaks lack of clean water access.¹¹³ This bloc may consist of countries such as: Chad, China, Democratic Republic of Congo, Ethiopia, Iran, Kenya, Madagascar, Niger, and Uganda.

Niger, for example, is highly dependent on rain-fed agriculture and natural resources for food security and livelihoods.

Recurrent droughts have caused major humanitarian crises. Severe droughts in 2005, 2008, 2010 and 2012 led to over 20 million food insecure people and nearly 6 million malnourished children in the Sahel region. Climate vulnerability is compounded by rapid population growth, averaging three percent per year. This further increases pressure on scarce land and water resources.¹¹⁴

This bloc could work on strengthening agricultural resilience to climate impacts. Information sharing for best practices on climate-smart farming techniques can be of great use. This bloc should also work on building the capacity of vulnerable communities and sectors to anticipate, respond to, and cope with increasing climate hazards through early warning systems and insurance mechanisms. Climate change is progressively undermining development progress in medium risk developing countries through threats to agriculture, water resources, health and the environment. Bearing that in mind, this bloc should promote regional and international cooperation to have a structured plan of action to fight climate change challenges.

Low Risk (score 50 or more)

As developed or emerging economies, this bloc is well placed to discuss transitioning to climate-resilient development pathways through decarbonization policies, sustainable consumption and global climate finance. As the highest per capita emitters, high-income countries have accumulated the largest share of carbon in the atmosphere. As such, they have a historical responsibility to support climate action. Low-income high-risk countries can work with high-income low-risk countries through the United Nations Framework Convention on Climate Change and other platforms to push for stronger emission reduction targets. They can advocate for climate finance from global climate funds to be more accessible and sufficient. This would allow less-able countries to undertake renewable energy transition and build climate-resilient infrastructure.¹¹⁵ This bloc may include Canada,

112 “NiB: Puerto Ricans Are Among the Most Worried About Climate Change,” Yale School of the Environment, accessed August 1, 2024, <https://environment.yale.edu/news-in-brief/nib-puerto-ricans-are-among-most-worried-about-climate-change>.

113 “Climate Change and the Developing World: A Disproportionate Impact,” U.S. Global Leadership Coalition, November 29, 2023, <https://www.usglc.org/blog/climate-change-and-the-developing-world-a-disproportionate-impact/>.

114 “World Bank Climate Change Knowledge Portal,” World Bank, accessed August 1, 2024, <https://climateknowledgeportal.worldbank.org/country/niger/vulnerability>.

115 “Rich Countries Use Six Times More Resources, Generate 10 Times the Climate Impacts Than Low-income Ones,” UN Environment,

France, Germany, Italy, Mexico, Poland, Russia, South Africa, Spain, Turkey, United Kingdom, and the United States of America.

For example, Germany has reduced greenhouse gas emissions by 35.7 percent since 1990. Additionally, they have adopted the Climate Action Program 2030 and Climate Action Law. Through that, they have committed to a 55 percent emission reduction by 2030 compared to 1990 levels. They have boosted renewable energy so that nearly 43 percent of electricity came from wind, solar and other renewable sources.¹¹⁶ Germany has also provided international climate finance through channels like the Green Climate Fund. They have committed over EUR 3.4 billion to this organization. They have also funded research and new climate technologies through initiatives like Mission Innovation that can benefit vulnerable countries seeking adaptation and resilience solutions.¹¹⁷

Their participation in negotiations helps increase pressure on major emitters to accelerate the transition to renewable energy and green technologies. Engagement in global climate discussions keeps the needs of vulnerable communities at the forefront and ensures climate actions factor in poverty reduction, food security and sustainable development. International cooperation between low-income countries on issues of shared importance, like water management, drought-proofing, and finance for “climate-smart” agriculture, can help strengthen adaptive capacity across the developing world.

Committee Mission

The G20 has grown into the platform where member states discuss the most pressing issues in the 21st century politics and economy. Member states, dignitaries, and international organizations convene in the annual conference and adopt the policies and subsequent action plan to solidify the group’s

commitment to achieve the goal.¹¹⁸ The committee’s focus should be directed to build on the G20 New Delhi Leaders’ Declaration on climate change. This means that the group must evaluate the benchmarks they have set in the previous summit when working on this issue.

In 2008, during the global economic and financial crisis, the G20 was upgraded to the level of Heads of State or Government. This was done to expand the forum to address economic and financial issues at the highest level. Furthermore, the environment started gaining prominence within G20 discussions from 2009 onwards with the Pittsburgh Summit.¹¹⁹ Under various presidencies, the G20 adopted commitments and action plans focusing on transitioning to cleaner energy, reducing emissions, phasing out the usage of fossil fuels, and promoting green investments. This reflects the recognition that sustained economic progress needs to be balanced with addressing pressing environmental challenges.

What began as an informal forum for economic cooperation among G7 countries has evolved into the premier platform for global governance, with representation and participation of both advanced and emerging economies. The G20 has played a significant role in coordinating policies worldwide, especially during financial and economic crises. Its agenda is constantly expanding, now also encompassing crucial environmental priorities.¹²⁰ Still, G20’s policies and its implementation does not have legitimacy when a decision is not made according to the consensus. Members of the G20 should take into consideration that various individual states may have different priorities in tackling climate change and its impact on the most impacted populations. Delegates must expect the series of debate and coordination to achieve mutual understanding before taking decisions.

accessed August 1, 2024. <https://www.unep.org/news-and-stories/press-release/rich-countries-use-six-times-more-resources-generate-10-times>.

116 “What the Government Is Doing for the Climate,” The Federal Government of Germany, accessed August 1, 2024, <https://www.bundesregierung.de/breg-en/issues/climate-action/government-climate-policy-1779414>.

117 “Germany,” Mission Innovation, September 23, 2022, <https://mission-innovation.net/our-members/germany/>.

118 “About G20,” G20, accessed August 6, 2024, <https://www.g20.in/en/about-g20/about-g20.html>.

119 “Outcome of the G20 Summit in Pittsburgh (24-25 September 2009),” Greens/EFA, accessed August 6, 2024. <https://www.greens-efa.eu/en/article/document/outcome-of-the-g20-summit-in-pittsburgh-24-25-september-2009>.

120 “Importance of the G20 Summit,” Unacademy, April 14, 2022, <https://unacademy.com/content/railway-exam/study-material/static-gk/importance-of-the-g20-summit/>.

Research and Preparation Questions

Your dais has prepared the following research and preparation questions as a means of providing guidance for your research process. These questions should be carefully considered, as they embody some of the main critical thought and learning objectives surrounding your topic.

Topic A

1. How have different countries historically responded to pandemics, and what lessons can be learned from their successes and failures, including during the Covid-19 pandemic?
2. What is your country's official stance on international cooperation during pandemics, and how has it engaged with global health organizations like the WHO in previous health crises?
3. What policies or measures has your country taken to strengthen global health security, and in what ways does it intend to collaborate with other G20 countries to develop a coordinated pandemic response?
4. How does your country's healthcare infrastructure and pandemic preparedness compare to other nations, and what steps has your government taken domestically to strengthen these systems in the wake of Covid-19?
5. What are the ethical implications of restrictive measures, such as isolation, quarantine, and travel bans, on human rights, and how should countries balance public health and individual freedoms during a pandemic?
6. How can global inequities in access to healthcare, medicine, and technology be addressed in pandemic response efforts to ensure fair treatment for all nations and populations?
7. What alliances or partnerships can your country form in this committee to build a strong, cooperative resolution on global pandemic response, and what compromises are necessary to achieve a diplomatic yet effective solution?

Topic B

1. What is your country's level of vulnerability to sea level rise, and what specific coastal regions or industries are most at risk?
2. What are the potential economic impacts of sea level rise on your country's coastal infrastructure, and what plans are in place to mitigate the risks to property, transportation, and trade?
3. What role can innovation and technology, such as early warning systems, green infrastructure, or carbon capture, play in addressing both the causes and effects of sea level rise?
4. How has your country participated in international efforts to combat climate change and address sea level rise, such as the Paris Agreement, and what are its priorities for future climate negotiations?
5. What steps has your country taken to reduce greenhouse gas emissions, and how effective have these measures been in addressing sea level rise and broader climate change impacts?
6. What measures are being implemented to address the effects of climate change that have disproportionately affected vulnerable populations in your country, especially in industries like forestry, fishing, and agriculture?

Important Documents

Topic A

- Beard, J. Howard. "The Contribution of Cholera to Public Health." *The Scientific Monthly* 43, no. 6 (December 1936): 515–521. <http://www.jstor.org/stable/16267>.
- Frischknecht, Friedrich. *The History of Biological Warfare. Human Experimentation, Modern Nightmares and Lone Madmen in the Twentieth Century*. Heidelberg: EMBO reports, 2003. <https://www.embopress.org/doi/full/10.1038/sj.embor.embor849>.
- Kratochvil, Christopher J., et. al. "The National Ebola Training and Education Center: Preparing the United States for Ebola and Other Special Pathogens." *Health Security* 15, no. 3 (June 2017): <https://doi.org/10.1089/hs.2017.0005>.
- OECD. *Ready for the next Crisis? Investing in Health System Resilience*. Paris: OECD Publishing, 2023. <https://doi.org/10.1787/1e53cf80-en>.
- Rawlings, Arthur, Lea Brandt, Alberto Ferreres, Horacio Asbun, and Phillip Shaddock. "Ethical considerations for allocation of scarce resources and alterations in surgical care during a pandemic." *NIH* 35 (May 2020): 2217–2222. <https://doi.org/10.1007%2Fs00464-020-07629-x>.
- World Health Organization. *COVID-19 and Mandatory Vaccination: Ethical Considerations*. Geneva: WHO, 2022. <https://iris.who.int/bitstream/handle/10665/354585/WHO-2019-nCoV-Policy-brief-Mandatory-vaccination-2022.1-eng.pdf?sequence=1>.
- World Health Organization. *International Health Regulations*. Geneva: WHO, 2005. <https://iris.who.int/bitstream/handle/10665/246107/9789241580496-eng.pdf?sequence=11>.

Topic B

- G20 Climate Sustainability Working Group. "G20 Action Agenda on Adaptation and Resilient Infrastructure." Rome: G20, 2021. <https://www.g20.org/wp-content/uploads/2021/10/G20-Action-Agenda-on-Adaptation-and-Resilient-Infrastructure.pdf>.
- Intergovernmental Panel on Climate Change. "Chapter 13: Livelihoods and Poverty." *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. C.B. Field et al. Cambridge; New York: Cambridge University Press, 2014. <https://www.ipcc.ch/report/ar5/wg2/>.
- Organization for Economic Co-operation and Development. "Enhancing climate resilience in developing countries: A role for the G20." Paris: OECD Publishing, 2021. <https://www.oecd.org/g20/topics/environment-energy/g20-enhancing-climate-resilience-in-developing-countries-efc2f8a3-en.htm>.
- United Nations Development Programme. "Social and Economic Impact of Climate Change." New York: UNDP, 2019. Accessed August 1, 2024. <https://www.undp.org/publications/social-and-economic-impact-climate-change>.
- World Health Organization. "Climate Change and Health." February 1, 2018. <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>.

Works Cited

Topic A

UN Sources

- UNDP. *The G20 Contribution to the 2030 Agenda in Times of Crises 2019-2023*. Geneva: UNDP-OECD, 2023. <https://www.undp.org/publications/g20-contribution-2030-agenda-times-crises-2019-2023>.
- United Nations Office for Disarmament Affairs. "1925 Geneva Protocol." Accessed August 13, 2024. <https://disarmament.unoda.org/wmd/bio/1925-geneva-protocol/>.
- United Nations. "Ensure healthy lives and promote well-being for all at all ages." Accessed August 25, 2024. <https://sdgs.un.org/goals/goal3>.
- United Nations. "Featured Events." Accessed on August 25, 2024. <https://sdgs.un.org/events/>.
- United Nations. "The 17 Goals." Accessed August 25, 2024. <https://sdgs.un.org/goals>.
- UNOCHA. "Global Humanitarian Overview 2024." December 11, 2023. <https://www.unocha.org/publications/report/world/global-humanitarian-overview-2024-enarfres>.
- UNHCR. "Mid-Year Trends." Accessed September 16, 2024. <https://www.unhcr.org/mid-year-trends>.
- World Health Organization. "International Health Regulations." Accessed August 13, 2024. https://www.who.int/health-topics/international-health-regulations#tab=tab_1.
- World Health Organization. "2022-24 Mpox (Monkeypox) Outbreak: Global Trends." September 12, 2024. https://worldhealthorg.shinyapps.io/mpx_global/.
- World Health Organization. "Battling Cholera: WHO's lifesaving efforts in Rohingya Camps amid global resurgence!" July 23, 2024. <https://www.who.int/bangladesh/news/detail/23-07-2024-battling-cholera-who-s-lifesaving-efforts-in-rohingya-camps-amid-global-resurgence>.
- World Health Organization. "Building a Skilled Workforce to Prepare for and Respond to Emergencies." Accessed August 13, 2024. <https://www.who.int/activities/building-a-skilled-workforce-to-respond-to-emergencies>.
- World Health Organization. "Five key themes for improved mental health care for refugees and migrants." *WHO*. October 10, 2023. <https://www.who.int/news/item/10-10-2023-five-key-themes-for-improved-mental-health-care-for-refugees-and-migrants>.
- World Health Organization. "Integrated Health System Strengthening." Accessed August 12, 2024, <https://www.who.int/teams/primary-health-care/health-systems-resilience/integrated-health-system-strengthening>.
- World Health Organization. "Low quality healthcare is increasing the burden of illness and health costs globally." *WHO*. July 5, 2018. <https://www.who.int/news/item/05-07-2018-low-quality-healthcare-is-increasing-the-burden-of-illness-and-health-costs-globally>.
- World Health Organization. "Noncommunicable diseases." Accessed September 16, 2024. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>.
- World Health Organization. "Refugee and Migrant Health Toolkit." Accessed on September 16, 2024. <https://www.who.int/tools/refugee-and-migrant-health-toolkit/essential-knowledge-health-and-migration>.
- World Health Organization. "WHO COVID-19 Dashboard." Accessed September 5, 2024. <https://data.who.int/dashboards/covid19/>.
- World Health Organization. *COVID-19 and Mandatory Vaccination: Ethical Considerations*. Geneva: WHO, 2022. <https://iris.who.int/bitstream/handle/10665/354585/WHO-2019-nCoV-Policy-brief-Mandatory-vaccination-2022.1-eng.pdf?sequence=1>.
- World Health Organization. *ERF Emergency Response Framework*. Geneva: WHO Health Emergencies Programme, 2024. <https://>

www.who.int/publications/i/item/9789240058064/.

World Health Organization. *WHO Guidelines on Ethical Issues in Public Health Surveillance*. (Geneva: WHO, 2017). <https://iris.who.int/bitstream/handle/10665/255721/9789241512657-eng.pdf?sequence=1>.

Non-UN Sources

Al-Oraibi, A., O. Hassan, Kaushik Chattopadhyay, and L.B. Nellums. “The prevalence of non-communicable diseases among Syrian refugees in Syria’s neighbouring host countries: a systematic review and meta-analysis.” *Public Health* 205, (April, 2022): 139-149. <https://www.sciencedirect.com/science/article/abs/pii/S0033350622000415>.

Anderson, Curt. “A Brief History of Ethics in the Presence of a Pandemic.” *Advanced Journal of Social Science* 9, No. 1, (October 2021): 27-35. <https://journals.ajsr.org/index.php/ajss/article/view/4002/425>.

Apostolopoulos, Vasso, et al. “MERS Outbreak in Riyadh: A Current Concern in Saudi Arabia” *Le Infezioni in Medicina*, no. 2, (June 2024): 264-266. <https://doi.org/10.53854/liim-3202-15>.

ASPE. “Impact of the COVID-19 Pandemic on the Hospital and Outpatient Clinician Workforce: Challenges and Policy Responses.” May 3, 2022. <https://aspe.hhs.gov/reports/covid-19-health-care-workforce>.

Assaad, Ragui, et al. *Egypt Covid-19 Country Case Study*. Geneva: International Labour Organization, 2022. https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@africa/@ro-abidjan/@sro-cairo/documents/publication/wcms_838226.pdf.

Associated Press. “China Delayed Releasing Coronavirus Info, Frustrating WHO.” *PBS*, June 2, 2020. <https://www.pbs.org/newshour/health/china-delayed-releasing-coronavirus-info-frustrating-who>.

Barron, Madeline. “Controlling Mpox Requires Inclusive, Global Efforts.” *American Society for Microbiology*. September 6, 2024. <https://asm.org/articles/2024/september/controlling-mpox-requires-inclusive,-global-effort>.

Beard, J. Howard. “The Contribution of Cholera to Public Health.” *The Scientific Monthly* 43, no. 6 (December 1936): 515–521. <http://www.jstor.org/stable/16267>.

Borden Institute. “Medical Aspects of Chemical and Biological Warfare.” Accessed August 13, 2024. <https://medcoe.army.mil/borden-tb-med-aspects-chembio-war>.

CDC. “About Mpox.” Last modified September 3, 2024. <https://www.cdc.gov/poxvirus/mpox/about/index.html/>.

Centers for Disease Control and Prevention. “What We Do.” last modified September 17, 2024. <https://www.cdc.gov/global-health-protection/php/programs-and-institutes/index.html/>.

CEPI, “Manufacturing and Supply Chain”, accessed August 13, 2024, <https://cepi.net/manufacturing-and-supply-chain>.

Chandola, Basu. “Digital health in the G20.” *Observer Research Foundation*. April 5, 2024. <https://www.orfonline.org/expert-speak/digital-health-in-the-g20>.

Cuevas Barron, Gabriela, and Dr Justin Koonin. “A statement from UHC2030’s co-chairs to the G20 health working group.” News release, February 20, 2024. <https://www.uhc2030.org/news-and-events/news/g20-2024-a-chance-to-take-bold-action-towards-equitable-and-resilient-health-systems-for-universal-health-coverage/>.

Cuevas, Gabriela, and Justin Koonin. “A statement from UHC2030’s Co-chairs following the G20 Summit in India.” News release, September 12, 2023. <https://www.uhc2030.org/news-and-events/news/now-is-the-time-for-all-countries-to-take-action-on-universal-health-coverage/>.

Daniel Ogbuabor, Caroline Olwande, Iris Semini, Obinna Onwujekwe, Yewande Olaifa, and Chioma Ukanwa. *Stakeholders’ Perspectives on the Financial Sustainability of the HIV Response in Nigeria: A Qualitative Study*. Maryland: Global Health: Science and Practice, 2023. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10141423/>.

Das, S, and VK Kataria. “Bioterrorism : A Public Health Perspective.” *Med J Armed Forces India*, no. 3, (July 2011): 255-260. [https://doi.org/10.1016/S0377-1237\(10\)80051-6](https://doi.org/10.1016/S0377-1237(10)80051-6).

Djuicy, Delia D., et al. “Concurrent Clade I and Clade II Monkeypox Virus Circulation, Cameroon, 1979–2022.” *CDC* 30, no.

- 3 (March 2024). https://wwwnc.cdc.gov/eid/article/30/3/23-0861_article.
- Doborvidova, Olga. “Russia’s COVID-19 defense may depend on mystery vaccine from former bioweapons lab—but does it work?” *Science*. Last modified April 6, 2021. <https://www.science.org/content/article/russia-s-covid-19-defense-may-depend-mystery-vaccine-former-bioweapons-lab-does-it-work/>.
- Doocy, Shannon, Kathleen R. Page, Fernando de la Hoz, Paul Spiegel, and Chris Beyrer. “Venezuelan Migration and the Border Health Crisis in Colombia and Brazil.” *Journal on Migration and Human Security* 7, no. 3 (2019): 79-91. <https://journals.sagepub.com/doi/pdf/10.1177/2331502419860138>.
- Edemekong Peter F, and Ben Huang. “Epidemiology of Prevention of Communicable Diseases.” Last modified October 24, 2022. <https://www.ncbi.nlm.nih.gov/books/NBK470303/>.
- Fletcher, Elaine Ruth. “WHO Says It Is Trying to Expedite Mpox Vaccination in DRC - but Faces Multiple Hurdles.” *Health Policy Watch*. March 24, 2024. <https://healthpolicy-watch.news/who-says-it-is-trying-to-expedite-mpox-vaccination-in-drc-but-faces-multiple-hurdles/>.
- Foster, Caroline. “Compliance and Accountability Mechanisms in the 2024 Revisions to The Who International Health Regulations (2005).” *EJIL: Talk!* June 21, 2024. <https://www.ejiltalk.org/compliance-and-accountability-mechanisms-in-the-2024-revisions-to-the-who-international-health-regulations-2005/>.
- Frischknecht, Friedrich. *The History of Biological Warfare. Human Experimentation, Modern Nightmares and Lone Madmen in the Twentieth Century*. Heidelberg: EMBO reports, 2003. <https://www.embopress.org/doi/full/10.1038/sj.embor.embor849>.
- G20. “About the G20.” Accessed August 16, 2024. <https://www.g20.org/en/about-the-g20>.
- G20. “Health.” Accessed August 25, 2024. <https://www.g20.org/en/tracks/shepa-track/health>.
- Garamone, Jim. “U.S., Allies Strike Syrian Targets in Response to Regime’s Chemical Attacks.” Joint Chiefs of Staff, April 13, 2018. <https://www.jcs.mil/Media/News/News-Display/Article/1493780/us-allies-strike-syrian-targets-in-response-to-regimes-chemical-attacks/>.
- Gergen, Jessica and Maya Prabhu. “History’s Seven Deadliest Plagues.” *VaccinesWork*. 15 November 2021, 2021. <https://www.gavi.org/vaccineswork/historys-seven-deadliest-plagues/>
- GHS Index. “The 2021 Global Health Security Index.” December 5, 2023. <https://ghsindex.org/>.
- Goldschmidt, Gabriel and Muhammad Ali Pate. “Every Year Nearly 6 Million People Die in Developing Countries from Low-Quality Healthcare - This Is How We Help Them.” *World Economic Forum*. November 25, 2019. <https://www.weforum.org/agenda/2019/11/effects-and-costs-of-poor-quality-healthcare/>.
- Government of Canada. “Public Health Agency of Canada’s COVID-19 Response: Lessons Learned.” November, 2023. <https://www.canada.ca/en/public-health/corporate/transparency/corporate-management-reporting/evaluation/covid-19-response-lessons-learned-summary.html>.
- Guobang Chen, Hua Zhang, Yue Hu, and Chunyan Luo. *Trust as a Catalyst: Revealing the Impact of Government Trust and Professional Trust on Public Health Policy Compliance during a Pandemic*. London: BioMed Central, 2024. <https://doi.org/10.1186/s12889-024-18449-2>.
- Henderson, Lisa. “The Law of Unintended Consequences.” *PharmExec*. November 15, 2020. <https://www.pharmexec.com/view/law-unintended-consequences>.
- Human Rights Watch. *Attacks on Ghouta*. New York: Human Rights Watch, 2023. <https://www.hrw.org/report/2013/09/10/attacks-ghouta/analysis-alleged-use-chemical-weapons-syria>.
- IFRC. *Global Health Security*. Geneva: IFRC, 2021. https://www.ifrc.org/sites/default/files/2021-07/IFRC-GHS_July2021-2.pdf.
- Institute of Medicine (US) Committee on the Survey of the Health Effects of Mustard Gas and Lewisite. “Veterans at Risk: The

- Health Effects of Mustard Gas and Lewisite.” January 1, 1993. <https://www.ncbi.nlm.nih.gov/books/NBK236059/>.
- International Monetary Fund. “Covid-19.” Last modified March 20, 2020. <https://www.imf.org/en/Topics/imf-and-covid19/>.
- James P. Rubin. “Anniversary of the Halabja massacre.” News release, March 16, 1998. <https://1997-2001.state.gov/briefings/statements/1998/ps980316a.html>.
- Jaramillo-Ochoa, Robinson, et al. *Effects of Political Instability in Venezuela on Malaria Resurgence at Ecuador–Peru Border, 2018*. Atlanta: Emerging Infectious Diseases, 2019. <https://doi.org/10.3201%2F eid2504.181355>.
- Johns Hopkins Bloomberg School of Public Health. “Mpox Outbreak - Clade I vs Clade II.” Accessed on September 13, 2024. <https://publichealth.jhu.edu/sites/default/files/2024-06/mpox-clad-i-vs-ii.pdf>.
- Joint Centre for Bioethics. *Ethical Considerations in Preparedness Planning for Pandemic Influenza*. Toronto: University of Toronto, 2005. https://jcb.utoronto.ca/wp-content/uploads/2021/03/stand_on_guard.pdf.
- Karaki, Fatima M., Ola Alani, Maya Tannoury, Farrah L. Ezzeddine, Robert E. Snyder, Arifi N. Waked, and Zouhair Attieh. *Noncommunicable Disease and Health Care-Seeking Behavior Among Urban Camp-Dwelling Syrian Refugees in Lebanon: A Preliminary Investigation*. Utah: Health Equity, 2021. <https://doi.org/10.1089%2Fheq.2020.0106>.
- Kratochvil, Christopher J., et. al. “The National Ebola Training and Education Center: Preparing the United States for Ebola and Other Special Pathogens.” *Health Security* 15, no. 3 (June 2017): <https://doi.org/10.1089/hs.2017.0005>.
- Kuppallia, Krutika, Jake Dunning, Inger Damond, Daniel Mukadi-Bamulekae, Placide Mbalaf, and Dimie Ogoinag. “The worsening mpox outbreak in Africa: a call to action.” September 10, 2024. [https://doi.org/10.1016/S1473-3099\(24\)00577-2](https://doi.org/10.1016/S1473-3099(24)00577-2).
- Lambert, Jessica E., and Elise Denis-Ramirez. *Trauma and Mental Health Difficulties Among Refugee Adults in Kyaka II Settlement in Uganda*, no. 37. Copenhagen: Dignity. <https://dignity.dk/wp-content/uploads/publication-series-37.pdf>.
- Lawal, Shola. “Mpox crisis: Why do African countries struggle to make or buy vaccines?” *Al Jazeera*. September 12, 2024. <https://www.aljazeera.com/news/2024/9/12/why-african-countries-struggle-to-produce-vaccines>.
- McBride, James, Anshu Siripurapu, and Noah Berman. “What Does the G20 Do?” Council on Foreign Relations. Last modified October 11, 2023. <https://www.cfr.org/backgrounder/what-does-g20-do>.
- McCall, Chris. “Disrupted care in Papua New Guinea: the harms of COVID-19.” *Elsevier - PMC Covid-19 Collection* 10321 (January 2022): 226-227. [https://doi.org/10.1016/S0140-6736\(22\)00051-4](https://doi.org/10.1016/S0140-6736(22)00051-4).
- Nancy Berlinger, PhD, et al. *Ethical Framework for Health Care Institutions & Guidelines for Institutional Ethics Services Responding to the Coronavirus Pandemic*. New York: The Hastings Center, 2020. <https://www.thehastingscenter.org/ethicalframeworkcovid19/>.
- Nancy Kass, Jeffrey Kahn, Audrey Buckland, Amy Paul, and the Expert Working Group. *Ethics Guidance for the Public Health Containment of Serious Infectious Disease Outbreaks in Low-Income Settings: Lessons from Ebola*. Maryland: Johns Hopkins Berman Institute of Bioethics, 2019. https://bioethics.jhu.edu/wp-content/uploads/2019/03/Ethics20Guidance20for20Public20Health20Containment20Lessons20from20Ebola_April2019.pdf.
- Neuman, Scott. “Japan Executes Cult Leader Responsible for 1995 Sarin Gas Attack on Tokyo Subway.” *NPR*. July 6, 2018. <https://www.npr.org/2018/07/06/626434965/>.
- OECD. *Ready for the next Crisis? Investing in Health System Resilience*. Paris: OECD Publishing, 2023. <https://doi.org/10.1787/1e53cf80-en>.
- Ole Solvang. *Death By Chemicals*. New York: Human Rights Watch, May 1, 2017. <https://www.hrw.org/report/2017/05/01/death-chemicals/syrian-governments-widespread-and-systematic-use-chemical-weapons>.
- Oliver, Kathryn, Theo Lorenc, Jane Tinkler, and Chris Bonell. *Understanding the Unintended Consequences of Public Health Policies: The Views of Policymakers and Evaluators - BMC Public Health*. London: BioMed Central, 2019. <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-7389-6>.

- Partnership for Health System Sustainability and Resilience. *Building Sustainable and Resilient Health Systems*. London: LSE, 2023. https://www3.weforum.org/docs/WEF_PHSSR_Building_Sustainable_and_Resilient_Health_Systems_2023.pdf.
- Radcliffe, Brent. “How Economic Sanctions Work.” Investopedia. Last modified August 30, 2024, <https://www.investopedia.com/articles/economics/10/economic-sanctions.asp>.
- Ravi, Sanjana, et al., “The value proposition of the Global Health Security Index.” *BMJ Global Health*, no. 5, September 2024. doi:10.1136/bmjgh-2020-003648.
- Rawlings, Arthur, Lea Brandt, Alberto Ferreres, Horacio Asbun, and Phillip Shadduck. “Ethical considerations for allocation of scarce resources and alterations in surgical care during a pandemic.” *NIH 35* (May 2020): 2217–2222. <https://doi.org/10.1007%2Fs00464-020-07629-x>.
- Roos, Robert. “Indonesia Details Reasons for Withholding H5N1 Viruses.” *CIDRAP*. July 15, 2008. <https://www.cidrap.umn.edu/avian-influenza-bird-flu/indonesia-details-reasons-withholding-h5n1-viruses>.
- RT Staff Reporters. “Covid-19 vaccine passport: Where is it mandatory in Brazil?” *The Rio Times*. October 5, 2021. <https://www.riotimesonline.com/brazil-news/nosubscription/vaccine-passport-in-brazil-where-is-it-mandatory/>.
- Searchinger, Chloe. “The New Amendments to the International Health Regulations.” *Think Global Health*. June 4, 2024. <https://www.thinkglobalhealth.org/article/new-amendments-international-health-regulations>.
- Sese, Denise, MD, Mahwish U. Ahmad, MD, MPH and Prabalini Rajendram, MD. *Ethical Considerations during the Covid-19 Pandemic*. Ohio: Cleveland Clinic Journal of Medicine, 2020. <https://doi.org/10.3949/ccjm.87a.ccc038>.
- Singapore Ministry of Health. “Covid-19 Vaccination To Be A Condition For Long-Term Passes, Work Passes And Permanent Residence.” Singapore: Ministry of Health, 2022. <https://www.moh.gov.sg/docs/>.
- Tarantola, Arnaud. “Four Thousand Years of Concepts Relating to Rabies in Animals and Humans, Its Prevention and Its Cure.” *TropicalMed* 2, no. 2 (March 24): <https://www.mdpi.com/2414-6366/2/2/5>.
- The Global Fund. *Results Report 2023: The Global Fund to Fight AIDS, Tuberculosis and Malaria*. Geneva: The Global Fund, 2024. <https://www.theglobalfund.org/en/results/#covid-19>.
- The Pandemic Fund. “Background.” Accessed August 25, 2024. <https://www.thepandemicfund.org/>.
- Tognotti, Eugenia. “Past the Virus - Containing Pandemics Throughout History.” Institut Montaigne. Last modified June 29, 2021. <https://www.institutmontaigne.org/en/expressions/past-virus-containing-pandemics-throughout-history/>.
- U.S. Department of State. “United States Response to the Clade I Mpox Outbreak in Several African Countries.” August 22, 2024. <https://www.state.gov/united-states-response-to-the-clade-i-mpox-outbreak-in-several-african-countries/>.
- Worsely-Tonks, Katherine E L, et al. “Strengthening global health security by improving disease surveillance in remote rural areas of low-income and middle-income countries.” *The Lancet*, no. 4, (April 2022): 582-583. 10.1016/S2214-109X(22)00031-6.

Topic B

UN Sources

- CLIMATE CHANGE AND MIGRATION IN THE PACIFIC: Links, attitudes, and future scenarios in Nauru, Tuvalu, and Kiribati*. Thailand: UNESCAP. https://i.unu.edu/media/ehs.unu.edu/news/11747/RZ_Pacific_EHS_ESCAP_151201.pdf.
- Food and Agriculture Organization of the United Nations. “FAO report: Agrifood sector faces growing threat from climate change-induced loss and damage.” 2023. <https://www.fao.org/newsroom/detail/fao-report-agrifood-sector-faces-growing-threat-from-climate-change-induced-loss-and-damage/en>.
- Food and Agriculture Organization of the United Nations. “Food security and nutrition for all.” Accessed August 5, 2024.

- <https://www.fao.org/food-security-and-nutrition-for-all/en/>.
- Food and Agriculture Organization of the United Nations. “History of Food Security.” 2012. <https://www.fao.org/fileadmin/templates/ERP/uni/F4D.pdf>.
- International Organization for Migration. “Climate Change, Food Insecurity and Human Mobility: Interlinkages, Evidence And Action.” Accessed September 19, 2024. <https://worldmigrationreport.iom.int/what-we-do/world-migration-report-2024-chapter-7/climate-change-food-insecurity-compounding-and-direct-drivers-human-mobility>.
- International Organization for Migration Publications. “Climate Change and Migration: Improving Methodologies to Estimate Flows.” Accessed July 19, 2024. <https://publications.iom.int/system/files/pdf/mrs-33.pdf>.
- Khan, Bahadur. “Climate change and displacement.” United Nations High Commissioner for Refugees. Accessed July 19, 2024. <https://www.unhcr.org/what-we-do/build-better-futures/climate-change-and-displacement>.
- Office of the High Commissioner for Human Rights. “The impact of climate change on the rights of people in vulnerable situations.” Accessed August 6, 2024. <https://www.ohchr.org/en/climate-change/impact-climate-change-rights-people-vulnerable-situations>.
- Office of the High Representative for the Least Developed Countries. “On the Frontline of the Climate Crisis, the World’s Most Vulnerable Nations Suffer Disproportionately.” Accessed August 1, 2024. <https://www.un.org/ohrlls/news/frontline-climate-crisis-worlds-most-vulnerable-nations-suffer-disproportionately>.
- Sustainable Development Goals. “Goal 13 | Department of Economic and Social Affairs.” Accessed August 1, 2024. <https://sdgs.un.org/goals/goal13>.
- The climate-changed child*. New York: UNICEF, 2023. <https://www.unicef.org/media/147931/file/The%20climate-changed%20child%20-%20Report%20in%20English.pdf>.
- United Nations. “Climate Change - United Nations Sustainable Development.” Accessed August 1, 2024. <https://www.un.org/sustainabledevelopment/climate-change/>.
- United Nations Development Programme. “Sustainable Development Goals.” 2010. <https://www.undp.org/sustainable-development-goals>.
- United Nations Environmental Program. “As climate crisis alters their lands, Indigenous Peoples turn to the courts.” August 8, 2023. <https://www.unep.org/news-and-stories/story/climate-crisis-alters-their-lands-indigenous-peoples-turn-courts>.
- United Nations Environmental Program. “New initiative aims to curb the toxic impacts of agriculture.” Press release, March 12, 2024. <https://www.unep.org/news-and-stories/press-release/new-initiative-aims-curb-toxic-impacts-agriculture>.
- United Nations Environmental Program. “Rich countries use six times more resources, generate 10 times the climate impacts than low-income ones.” 2024. <https://www.unep.org/news-and-stories/press-release/rich-countries-use-six-times-more-resources-generate-10-times>.
- United Nations Environmental Program. “WFP and UNEP bolster global food and water security.” 2023. <https://www.unep.org/news-and-stories/press-release/wfp-and-unep-bolster-global-food-and-water-security>.
- United Nations Framework Convention on Climate Change. “Nationally Determined Contributions (NDCs).” Accessed August 1, 2024. <https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs>.
- United Nations High Commissioner for Refugees. “Climate change and disaster displacement.” Accessed July 19, 2024. <https://www.unhcr.org/uk/what-we-do/build-better-futures/environment-disasters-and-climate-change/climate-change-and>.
- United Nations. “New UN report: Inequalities cause and exacerbate climate impacts on poor and vulnerable people.” Accessed July 19, 2024. <https://www.un.org/hi/desa/new-un-report-inequalities-cause-and-exacerbate-climate-impacts-poor-and>.
- United Nations Office for Disaster Risk Reduction. “Sea Level Rise.” Accessed July 9, 2024. <https://www.undrr.org/understanding-disaster-risk/terminology/hips/en0023>.
- UNDP Climate Promise. “What does gender equality have to do with climate change? | Climate Promise.” 2023. <https://www.undp.org/climate-promise/what-does-gender-equality-have-to-do-with-climate-change>.

climatepromise.undp.org/news-and-stories/what-does-gender-equality-have-do-climate-change.

UN News. "Sea level rise poses 'unthinkable' risks for the planet, Security Council hears." 2023. <https://news.un.org/en/story/2023/02/1133492>.

UN Women. "As climate change pushes millions of women into poverty, UN Women calls for a new feminist climate justice approach." 2023. <https://www.unwomen.org/en/news-stories/press-release/2023/12/as-climate-changes-pushes-millions-of-women-into-poverty-un-women-calls-for-a-new-feminist-climate-justice-approach>.

UN Women. "Explainer: How gender inequality and climate change are interconnected." 2022. <https://www.unwomen.org/en/news-stories/explainer/2022/02/explainer-how-gender-inequality-and-climate-change-are-interconnected>.

World Bank Blogs. "Climate migration - deepening our solutions." 2022. <https://blogs.worldbank.org/en/climatechange/climate-migration-deepening-our-solutions>.

World Bank. "Social Dimensions of Climate Change." Accessed July 19, 2024. <https://www.worldbank.org/en/topic/social-dimensions-of-climate-change>.

World Health Organization. "Experts warn of serious health impacts from climate change for pregnant women, children, and older people." June 5, 2024. <https://www.who.int/news/item/05-06-2024-experts-warn-of-serious-health-impacts-from-climate-change-for-pregnant-women--children--and-older-people>.

World Health Organization "Heatwaves." Accessed August 1, 2024. <https://www.who.int/health-topics/heatwaves>.

World Meteorological Organization. "Heatwave." Accessed August 1, 2024. <https://wmo.int/topics/heatwave>.

Non-UN Sources

AAA Initiative. "The solutions AAA." Accessed September 19, 2024. <https://www.aaainitiative.org/en>.

Bayer. "More than 70% of farmers have already seen large impacts of climate change on their farm." 2023. <https://www.bayer.com/media/en-us/more-than-70-of-farmers-have-already-seen-large-impacts-of-climate-change-on-their-farm-new-global-research-across-8-countries-reveals/>.

Bundesregierung.de. "What the government is doing for the climate." Accessed August 1, 2024. <https://www.bundesregierung.de/breg-en/issues/climate-action/government-climate-policy-1779414>.

Burger, Mia, Hallie Casey, and Naomi Silverman. "Major Moments in Food & Agriculture: 1900's Until Now." Sustainable Food Center. 2020. <https://sustainablefoodcenter.org/latest/blog/major-moments-in-food-agriculture-1900s-until-now>.

C40 Cities. "Sea Level Rise and Coastal Flooding." 2018. <https://www.c40.org/what-we-do/scaling-up-climate-action/adaptation-water/the-future-we-dont-want/sea-level-rise/>.

Carrington, Damian. "World's top climate scientists expect global heating to blast past 1.5C target." The Guardian. 2024. <https://www.theguardian.com/environment/article/2024/may/08/world-scientists-climate-failure-survey-global-temperature>.

Center for Climate and Energy Solutions. "Coastal and Marine Ecosystems & Global Climate Change: Potential Effects on U.S. Resources." Accessed July 9, 2024. <https://www.c2es.org/document/coastal-and-marine-ecosystems-global-climate-change-potential-effects-on-u-s-resources/>.

ClimaMeter. "2024/03/15-18 Brazil Heatwave." 2024. <https://www.climameter.org/20240315-18-brazil-heatwave>.

Climate Change Knowledge Portal. "Niger - Vulnerability." Accessed August 1, 2024. <https://climateknowledgeportal.worldbank.org/country/niger/vulnerability>.

Climate Just. "Socially vulnerable groups sensitive to climate impacts | Climate Just." Accessed July 19, 2024. <https://www.climatejust.org.uk/socially-vulnerable-groups-sensitive-climate-impacts>.

Cooper, Robin. "Climate Change and Older Adults: Planning Ahead to Protect Your Health." NCO. April 21, 2022. <https://www.ncoa.org/article/climate-change-and-older-adults-planning-ahead-to-protect-your-health/>.

Deane, Christopher, Michelle Buky, Sandra Mutuku, Emma Howard, and Diyora Shadijanova. "How climate change is

- forcing Kenyan women to leave their homes behind.” Unearthed. October 27, 2022. <https://unearthed.greenpeace.org/2022/10/27/climate-migration-kenya-displaced-cop27/>.
- Di Liberto, Tom. “India heat wave kills thousands | NOAA Climate.gov.” Climate.gov. 2015. <https://www.climate.gov/news-features/event-tracker/india-heat-wave-kills-thousands>.
- Earth.Org. “How Water Shortages Impact Food Security.” 2023. <https://earth.org/how-water-shortage-impact-food-security/>.
- Environmental Protection Agency (EPA). “Climate Change and the Health of Socially Vulnerable People | US EPA.” Accessed July 19, 2024. <https://www.epa.gov/climateimpacts/climate-change-and-health-socially-vulnerable-people>.
- European Investment Bank. “Development Solutions: How to fight climate change with gender equality.” Accessed July 9, 2024. <https://www.eib.org/en/essays/climate-change-gender-investment>.
- European Economic and Social Committee. “The climate crisis and its effect on vulnerable groups.” 2023. <https://www.eesc.europa.eu/en/news-media/press-summaries/climate-crisis-and-its-effect-vulnerable-groups>.
- G20. “Factsheet on the G7 Partnership for Global Infrastructure and Investment.” May 5, 2023. <https://g7g20-documents.org/database/document/2023-g7-japan-leaders-miscellaneous-factsheet-on-the-g7-partnership-for-global-infrastructure-and-investment>.
- Greens/EFA. “Outcome of the G20 Summit in Pittsburgh.” 2009. <https://www.greens-efa.eu/en/article/document/outcome-of-the-g20-summit-in-pittsburgh-24-25-september-2009>.
- Gróber, Adél. “Farmers and Climate Change: Essential Questions and Answers.” Farm Aid. 2023. <https://www.farmaid.org/issues/soil-water-climate/farmers-and-climate-change-essential-questions-and-answers/>.
- Human Development Reports. “Climate change’s impact on coastal flooding to increase five times over this century | Human Development Reports.” 2023. <https://hdr.undp.org/content/climate-changes-impact-coastal-flooding-increase-five-times-over-century>.
- IBM. “What Are Greenhouse Gas Emissions?” 2023. <https://www.ibm.com/topics/greenhouse-gas-emissions>.
- Indigenous Climate Hub. “The Impacts Of Climate Change on Indigenous Communities.” Accessed September 19, 2024. <https://indigenousclimatehub.ca/effects-on-indigenous-communities/>.
- International Energy Agency. “Outlook for Emissions Reductions.” Accessed August 1, 2024. <https://www.iea.org/reports/global-ev-outlook-2024/outlook-for-emissions-reductions>.
- International Institute for Sustainable Development. “Climate Change Hits Vulnerable Communities First and Hardest.” 2019. <https://www.iisd.org/articles/insight/climate-change-hits-vulnerable-communities-first-and-hardest>.
- Lakhani, Nina. “Russia’s war with Ukraine accelerating global climate emergency, report shows.” *The Guardian*. June 13, 2024. <https://www.theguardian.com/environment/article/2024/jun/13/russia-war-with-ukraine-accelerating-global-climate-emergency-report-shows>.
- Michel, David. “Water and Food: How, When, and Why Water Imperils Global Food Security.” CSIS. 2023. <https://www.csis.org/analysis/water-and-food-how-when-and-why-water-imperils-global-food-security>.
- Mission Innovation. “Germany.” Accessed August 1, 2024. <https://mission-innovation.net/our-members/germany/>.
- NASA Science. “What is the greenhouse effect?” Accessed August 1, 2024. <https://science.nasa.gov/climate-change/faq/what-is-the-greenhouse-effect/>.
- National Institute of Environmental Health Sciences. “People Who Are Vulnerable to Climate Change.” August 30, 2022. https://www.niehs.nih.gov/research/programs/climatechange/health_impacts/vulnerable_people.
- PLOS. “Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding - A Global Assessment.” Accessed August 5, 2024. <https://doi.org/10.1371/journal.pone.0118571>.
- Ritchie, Hannah, Pablo Rosado, and Max Roser. “CO₂ and Greenhouse Gas Emissions.” Our World in Data. Accessed August 1, 2024. <https://ourworldindata.org/co2-and-greenhouse-gas-emissions>.

- Rud, Juan P. "How are agricultural economies affected by climate change?" Economics Observatory. 2021. <https://www.economicsobservatory.com/how-are-agricultural-economies-affected-by-climate-change>.
- Tandon, Ayesha. "In-depth Q&A: How does climate change drive human migration?" Carbon Brief. 2024. <https://interactive.carbonbrief.org/climate-migration/>.
- The Group of 20. "About G20." Accessed August 6, 2024. <https://www.g20.in/en/about-g20/about-g20.html>.
- The World Economic Forum. "Leading climate scientists expect global heating to exceed 1.5C and other nature and climate stories you need to read this week." 2024. <https://www.weforum.org/agenda/2024/05/global-temperatures-renewable-energy-nature-climate-news-13052024/>.
- The World Economic Forum. "Rising sea levels: innovative ways the world is adapting." 2022. <https://www.weforum.org/agenda/2022/08/rising-sea-levels-global-adaptation/>.
- The World Economic Forum. "The climate crisis disproportionately hits the poor. How can we protect them?" 2023. <https://www.weforum.org/agenda/2023/01/climate-crisis-poor-davos2023/>.
- The World Economic Forum. "What affect does climate change have on women and equality?" 2020. <https://www.weforum.org/agenda/2020/07/climate-change-environment-women-equality-inequality-parity/>.
- UCAR Center for Science Education. "How Do We Reduce Greenhouse Gases?" Accessed August 1, 2024. <https://scied.ucar.edu/learning-zone/climate-solutions/reduce-greenhouse-gases>.
- Unacademy. "Importance of the G20 Summit." Accessed August 6, 2024. <https://unacademy.com/content/railway-exam/study-material/static-gk/importance-of-the-g20-summit/>.
- U.S. Embassy and Consulates in Italy. "How climate change affects the food crisis - U.S. Embassy & Consulates in Italy." 2022. <https://it.usembassy.gov/how-climate-change-affects-the-food-crisis/>.
- U.S. Global Leadership Coalition. "Climate Change and the Developing World: A Disproportionate Impact – USGLC." Accessed August 1, 2024. <https://www.usglc.org/blog/climate-change-and-the-developing-world-a-disproportionate-impact/>.
- Weston, Phoebe. "Biodiversity loss is biggest driver of infectious disease outbreaks, says study." The Guardian. 2024. <https://www.theguardian.com/environment/article/2024/may/09/biodiversity-loss-is-biggest-driver-of-infectious-disease-outbreaks-says-study>.
- Winters, Justin and Lindsey Jean Schueman. "Why women are key to solving the climate crisis." One Earth. June 5, 2024. <https://www.oneearth.org/why-women-are-key-to-solving-the-climate-crisis/>.
- World Food Program USA. "The 8 Countries Most Affected by Climate Change." 2023. <https://www.wfpusa.org/articles/countries-most-affected-by-climate-change/>.
- World Migration Report. "From climate change to food insecurity: Compounding and direct." Accessed August 6, 2024. <https://worldmigrationreport.iom.int/what-we-do/world-migration-report-2024-chapter-7/climate-change-food-insecurity-compounding-and-direct-drivers-human-mobility>.
- Yale School of the Environment. "NiB: Puerto Ricans Are Among the Most Worried About Climate Change." Accessed August 1, 2024. <https://environment.yale.edu/news-in-brief/nib-puerto-ricans-are-among-most-worried-about-climate-change>.

The National High School Model United Nations Conference (NHSMUN) is a project of IMUNA, a non-profit organization formally associated with the United Nations Department of Global Communications (UNDGC). IMUNA is dedicated to promoting global issues education through simulation.

Written by Arian Bordbar, Grace Harb, and Alejandra Vargas
Edited by Jordan Baker, Seonghyun (Shawn) Chang, Ana Margarita Gil, Grace Harb, Christian Hernandez, Therese Salomone, and Terry Wang.

© 2024 IMUNA. All Rights Reserved.

