



NHSMUN

G20

UPDATE PAPER

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Dear Delegates,

Welcome to the Group of Twenty (G20)! My name is Martin Caceres, and I am so excited to serve as your Assistant Director for NHSMUN 2025 Session I.

Although this is my first year as part of the NHSMUN staff, it is my third time attending the conference. I have had the privilege of participating as a delegate in both the Legal Committee and the International Court of Justice. Since my high school did not offer MUN, I joined Excelsior Chile, an intercollegiate delegation. Two years later, I created PreMUN, a training program that introduced students to MUN, helping them join Excelsior and develop their public speaking skills. Attending NHSMUN was one of the most memorable experiences of my high school years. I hope this session challenges you and inspires you, and that you enjoy it as much as I did.

I live in Chile, and this fall I will be starting as a freshman at Columbia University, where I plan to major in Economics and Political Science. The link between economic challenges and their political consequences fuels my desire to explore both areas. Outside of school, I love traveling, trying out new restaurants with my friends, and watching movies. I am not on Letterboxd (yet!), but if I were, my top four favorites would be *After Hours*, *Cruel Intentions*, *Crazy Rich Asians*, and *The Wedding Banquet*. If you have any recommendations, I would love to hear them!

Our committee's topics are "Strengthening Global Health Security" and "The Disproportionate Effects of Climate Change on Vulnerable Populations." Both topics represent significant global challenges that require innovative solutions and coordinated efforts. I encourage you to fully embrace IMUNA's motto, "Education through simulation." One of your goals as a delegate should be to accurately represent your assigned country. By doing so, you will not only sharpen your research and critical thinking abilities, but also gain valuable insights into the world from another nation's perspective, helping you understand diverse opinions that may differ from your own.

I cannot wait to meet you, and I wish you the best of luck in this conference!

Best,

Martin Caceres

Group of Twenty

Session I

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Renata Venzor

Dear Delegates,

Welcome to NHSMUN 2025 and to G20 Session Two! My name is Abeer Alam, and it's my pleasure to serve as one of your Assistant Directors this session. This is my very first year staffing at NHSMUN, and unlike some of my fellow staffers, I've never attended NHSMUN before - so I'm beyond thrilled to experience it from this side of the table! My goal is to help create a supportive, dynamic environment where you can feel comfortable and ready.

I am currently a first-year Chemistry major at Stevens Institute of Technology in Hoboken, New Jersey. I'm on the pre-med track and hope to become an orthopedic surgeon in the future. Outside of my academic pursuits, I'm an avid racing enthusiast - I own a 2019 Mercedes-AMG C43 that I love taking to the track! I also enjoy skiing (despite having torn my ACL and meniscus once) and playing badminton (but my ACL won't let me play anymore).

I understand that Model UN can be both exhilarating and a bit overwhelming at times, especially if you're new to it. But rest assured, with research and willingness to immerse yourself in the debate, you'll quickly see how rewarding this experience can be. And remember, one of the best parts of MUN is the opportunity to meet new people and make lasting friendships.

My fellow Assistant Director, Martin Caceres, and I look forward to guiding you through our committee sessions. We've prepared an Update Paper that will help you gain insight into our topic and its most recent developments. Used alongside your Background Guide, it should be a valuable starting point for your research.

I wish you all the best as you prepare for the conference, and I can't wait to see you in session!

Best,

Abeer Alam

Group of Twenty

Session II

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G20

NHSMUN 2025



TOPIC A: STRENGTHENING GLOBAL HEALTH SECURITY

Photo Credit: UK Department for International Development

Introduction

Public health is a major priority for the Group of 20 (G20) countries. It has become a crucial part of the group's annual summit agendas.¹ Recent cases, including the COVID-19 pandemic and the Mpox outbreak, highlight how important international collaboration is. These events not only harm global health, but also destabilize the global economy. The COVID-19 lockdowns have affected the supply chain shortages and slowed economic growth. Most of them still affect the economies of many countries until this day. The impacts of public health crises have shown that many countries are significantly unprepared and cannot respond effectively to future health emergencies.

The COVID-19 pandemic infected over 775 million people and claimed more than seven million lives.² Five years after the outbreak, some countries are still recovering from the shutdown's repercussions. Both developed and emerging countries faced financial instability, which led to a global recession.³ Two years later, the Mpox outbreak shows the ongoing unpreparedness of global healthcare systems. Misinformation and stigma complicated and delayed response efforts in both cases, exposing the need for preparedness. These situations revealed major flaws in healthcare systems and showed how hard it was for the international community to address the outbreaks. This highlighted the urgent need for sustainable solutions to strengthening global health security.

Countries cannot predict a pandemic, but they can prepare for it. To face future challenges, members of the G20 must work together. Being aware of the most recent developments is important to create effective solutions. This update paper will address key factors of the issue and recent progress. The findings will focus specifically on digital health technologies, vaccine distribution, and international collaboration. Delegates must understand that this topic impacts various areas. Most importantly, G20 members are responsible for a coordinated and effective response to future health crises.

Advancements in Digital Health Technologies

Public health has developed significantly in the past few decades with public health officials continuing to utilize technology to help them address outbreaks. COVID-19 pandemic increased the awareness about medical technology and accelerated the use of artificial intelligence, telemedicine, mobile health applications, and wearable devices. These tools can close gaps in healthcare access, facilitate remote and contact-less care, and improve diagnoses through predictive analysis.

One of the major improvements in technology during the COVID-19 pandemic is the widespread development of messenger RNA (mRNA) vaccines. mRNA vaccines originally began testing and development in the early 2000s with initial trials in 2013 for a rabies vaccine.⁴ This type of vaccine is unique for its different method in helping the human immune system fight off diseases. A regular vaccine has historically been made of weaker versions of a virus that aim to train the immune system how to fight off infections.⁵ While effective, the regular vaccine often required new versions for diseases that mutated often.⁶ For example, the influenza (flu) vaccine must be given to patients every year due to constant mutations of the influenza virus. What makes mRNA different is that it contains cells that instruct the immune system how to

1 Group of Twenty (G20), "About the G20," G20, accessed December 22, 2024, <https://g20.org/about-g20/>.

2 World Health Organization (WHO), "COVID-19 Epidemiological Update, Edition 169," July 15, 2024, <https://www.who.int/publications/m/item/covid-19-epidemiological-update-edition-169>

3 "The Great Lockdown – Worst Economic Downturn Since the Great Depression," International Monetary Fund, April 14, 2020, <https://www.imf.org/en/Blogs/Articles/2020/04/14/blog-weo-the-great-lockdown-worst-economic-downturn-since-the-great-depression>.

4 "Impact of Monocytic ROS on T Cell Response to SARS-CoV-2 mRNA Vaccine," Physician's Weekly, January 15, 2025, <https://www.physiciansweekly.com/impact-of-monocytic-ros-on-t-cell-response-to-sars-cov-2-mrna-vaccine/>.

5 Lindsey Leake, "Moderna Says It's 'One Step Closer' to a Norovirus Vaccine as the Virus Spreads across the U.S.," Fortune Well, January 11, 2025, <https://fortune.com/well/article/norovirus-stomach-bug-moderna-mrna-vaccine-clinical-trial/>.

6 Leake, "Moderna Says It's 'One Step Closer' to a Norovirus Vaccine as the Virus Spreads across the U.S."

respond to infections.⁷ This improved the immunity and shortened the production time. Not only is mRNA more effective at helping cells fight off infections, but companies could produce the cells for mRNA faster.⁸ This was crucial during the COVID-19 pandemic, as a vaccine needed to be developed, and large quantities needed to be quickly produced. G20 member states played a major role in the development of mRNA vaccines, with the United States and the United Kingdom becoming the main leaders in the race to develop a COVID-19 vaccine.⁹ Through massive amounts of public funding and accelerated approvals, the United States became a primary distributor of mRNA vaccines to other G20 member states.¹⁰ The United States also supplied high numbers of vaccines to developing states as a part of one of the G20's goals of assisting with mRNA vaccine distribution across the world.¹¹ Overall, mRNA helped pave the way for future vaccine development and potentially much stronger vaccines

to tackle other infectious diseases.

Digital technology also played a major role in effectively decreasing COVID-19 infections. This was mainly through offering support, medical consultations, and tracking the spread of the virus.¹² Also, Mpox detection using photographs of the skin lesions has proven highly effective, as the models used can differentiate between Mpox and similar diseases.¹³ Healthcare providers can use these models alongside PCR tests to prevent false negative results. In the case of noncommunicable diseases, the World Health Organization (WHO) and the International Telecommunication Union (ITU) suggest that investing in digital technologies would “improve access to services, increase public health awareness, improve health monitoring and increase health system efficiency, while empowering both patients and health workers.”¹⁴ Recent findings show that using a mobile

7 Alice Park, “Scientists Are Racing to Develop a New Bird Flu Vaccine,” *TIME*, January 2, 2025, <https://time.com/7203820/h5n1-new-bird-flu-vaccine-update/>.

8 Park, “Scientists Are Racing to Develop a New Bird Flu Vaccine,”

9 Physician’s Weekly, “Impact of Monocytic ROS on T Cell Response to SARS-CoV-2 MRNA Vaccine.”

10 U.S. Mission China, “FACT SHEET: Continuing a Legacy of Leadership at the G20,” U.S. Embassy & Consulates in China, November 19, 2024, <https://china.usembassy-china.org.cn/fact-sheet-continuing-a-legacy-of-leadership-at-the-g20/>.

11 U.S. Mission China, “FACT SHEET: Continuing a Legacy of Leadership at the G20.”

12 Noha S. Alghamdi and Saeed M. Alghamdi, “The Role of Digital Technology in Curbing COVID-19,” *International Journal of Environmental Research and Public Health* 19, no. 14 (July 2022): 8287, <https://doi.org/10.3390/ijerph19148287>.

13 Krishnaraj Chadaga et al., “Application of Artificial Intelligence Techniques for Monkeypox: A Systematic Review,” *Diagnostics* 13, no. 5 (2023): 824, <https://doi.org/10.3390/diagnostics13050824>.

14 World Health Organization and International Telecommunication Union, *Going Digital for Noncommunicable Diseases: The Case for Action* (Geneva: World Health Organization, 2024), <https://iris.who.int/handle/10665/378478>.



G20 Summit 2024 hosted in Rio de Janeiro, Brazil

Credit: The White House

application to monitor a patient's blood pressure has had a significant positive effect compared to routine medical care.¹⁵ This demonstrates that remote care can be a viable option to treat infected patients. Technologies like these can be a great asset to strengthen global healthcare systems and to improve each country's ability to respond and encourage innovation.

More recently, the G20 has shifted its attention to looking for ways to leverage artificial intelligence (AI) to help countries more effectively manage public health. As a part of the 2024 G20 summit in Brazil, G20 representatives participated with the Food and Agriculture Organization (FAO), United Nations Environment Programme (UNEP), World Health Organization (WHO), and World Organization for Animal Health to discuss the emergence of new technologies in public health.¹⁶ This summit was coined the "G20 High-Level Meeting on One Health" and focused on sharing effective strategies and methods for countries to collaborate on sharing information and data on infection trends. This is part of a larger effort by WHO to promote an initiative known as One Health.¹⁷ The importance of AI during this summit was clearly seen with many G20 member countries sharing ideas on how AI can be used to help predict infection trends through modeling. Models based on historical infection trends could be used to help generate models on where the next wave of influenza outbreaks would be next.¹⁸ For countries, this data is essential since it allows governments to shift resources to areas that may not have easy access to medical care.

AI is also crucial at the patient level. Advanced technology with AI can be utilized by doctors to help easily identify patient diagnosis. This is especially important in countries

where medical resources are strained and hard to reach. Some doctors may have too many patients to take care of. With AI, doctors would be able to collect data and test results on their patients and have AI assist with faster diagnoses.¹⁹ Genetic information from blood tests could also be utilized by AI to help doctors develop more specific treatment options for their patients.²⁰ As some of the most developed economies in the world, G20 countries have a significant advantage in the development of AI in patient healthcare. For some G20 countries, AI-advanced medical technology could serve as a major source of diplomatic leverage. G20 countries are already leaders in medical technology and are the home to some of the largest biotechnology companies in the world.²¹ By continuing to develop more efficient AI technology, these countries can look for opportunities to sell their technology to other countries in return for stronger diplomatic relations.²² The potential for AI to drastically change how medical treatment is provided is significant and could lead to much more efficient care in regions with developing medical systems.

As medical technology continues to develop with AI promising to drastically change existing medical systems, G20 countries have a significant opportunity to learn from the mistakes of COVID-19. The recent pandemic forced many countries to reflect on their current medical systems. Many governments realized that they were not prepared for a pandemic and had difficulty managing outbreaks within their borders. However, instead of making rapid improvements to medical systems, many countries have begun to consider cutting public health funding.²³ The incoming U.S. administration poses a renewed threat to the World Health Organization's funding.

15 Toshiki Maeda, "Advances in Digital Technology in Healthcare," *Hypertension Research* 48 (November 2024), <https://doi.org/10.1038/s41440-024-02011-z>.

16 World Health Organization, "Quadripartite Partners Organize High-Level One Health Meeting in Collaboration with Brazil's Ministry of Health at the G20 Summit," news release, November 1, 2024, <https://www.who.int/news/item/01-11-2024-quadripartite-partners-organize-high-level-one-health-meeting-in-collaboration-with-the-brazil-s-ministry-of-health-at-the-g20-summit>.

17 World Health Organization, "One Health," accessed January 15, 2025, <https://www.who.int/news-room/questions-and-answers/item/one-health>.

18 "From National and Regional Commitments to Global Impact: Artificial Intelligence for Equitable Public Health at the G20," Pan American Health Organization, accessed January 16, 2025, <https://www.paho.org/en/news/7-8-2024-national-and-regional-commitments-global-impact-artificial-intelligence-equitable>.

19 Pan American Health Organization, "From National and Regional Commitments to Global Impact: Artificial Intelligence for Equitable Public Health at the G20."

20 Pan American Health Organization, "From National and Regional Commitments to Global Impact: Artificial Intelligence for Equitable Public Health at the G20."

21 Nicole Hassoun, Xiaoshun Li, and Marc Fleurbaey, "How the G20 Can Prevent the next Pandemic," CEPR, November 21, 2024, <https://cepr.org/voxeu/columns/how-g20-can-prevent-next-pandemic>.

22 Hassoun, Li, and Fleurbaey, "How the G20 Can Prevent the next Pandemic,"

23 Stephanie Nolen, "Trump's Return May Worsen Financial Woes for Global Health Institutions," *The New York Times*, December 19, 2024, <https://www.nytimes.com/2024/12/19/health/global-health-funding-us-trump.html>.



The United States delivers COVID-19 vaccine doses to Liberia

Credit: U.S. Department of State

Additionally, decreased importance of the COVID-19 pandemic in recent years poses a risk to countries around the world. As people move on and begin to forget about the pandemic, it is essential that governments continue to look for ways to implement the lessons learned from COVID-19. Now is a unique opportunity for the G20 as it looks to protect itself and prevent another catastrophic pandemic.

International Public Health Response

The access and availability of vaccines during the COVID-19 pandemic exposed how unprepared the international community was to address a challenge of that scale. This is not only a health matter but one with economic implications. The demand for vaccines unexpectedly increased in general. Some countries had little to no resources to acquire them, and manufacturers were not able to produce the required amount. The lack of vaccination led to the virus spreading even further and having a more significant impact on those infected.

²⁴ Adolphus T. Clarke, Jonna Jeurlink, and Anderson Uchenna Amaechi, “Learning from Liberia’s COVID-19 Vaccination Program,” Think Global Health, September 19, 2024, <https://www.thinkglobalhealth.org/article/learning-liberias-covid-19-vaccination-program>; “Liberia: Coronavirus Pandemic Country Profile,” Our World in Data, August 14, 2024, <https://ourworldindata.org/coronavirus/country/liberia>.

²⁵ Clarke, Jeurlink, and Amaechi, “Learning from Liberia’s COVID-19 Vaccination Program.”

²⁶ Clarke, Jeurlink, and Amaechi, “Learning from Liberia’s COVID-19 Vaccination Program.”

²⁷ Clarke, Jeurlink, and Amaechi, “Learning from Liberia’s COVID-19 Vaccination Program.”

The case in Liberia offers an example of what a successful pandemic response looks like. The country has vaccinated around 83 percent of its population up to December 2022, despite being one of the world’s least developed countries.²⁴ Their response was successful due to multiple factors, such as boosting public trust by promoting vaccination through local leaders and community networks, and making vaccination accessible to rural areas by using mobile units.²⁵ Additionally, the Liberian government motivated healthcare workers with incentives, linking vaccination targets to funding milestones. They also administered single-dose vaccines, improving completion rates, and relied on data-driven strategies, targeting low-covered areas and adapting efforts accordingly.²⁶ G20 countries could refer from Liberia’s pandemic response system and direct the group’s attention towards enhancing cooperation and response playbook at different levels, ranging from local to global levels.²⁷ Most of the G20 countries already have infrastructure and economic capacity to revise the public health blueprint that aligns with the international health regulations. Having the public health response system flexible to adapt with both international regulations and facts

on the ground would enhance the national government's ability to improve the health security infrastructure, as well as the international standards.²⁸

Trump positioned Robert F. Kennedy, an anti-vaccine activist, as the Secretary of their Department of Health and Human Services.²⁹ According to experts, this may result in a major shift in US policies regarding child vaccination and threaten progress regarding the prevention of contagious diseases.³⁰ This is not an ideal scenario for pandemic preparedness as the US funded multiple initiatives and played a huge role in the distribution of vaccines worldwide. On the first day in office, US President Donald Trump signed an executive order directing the country to withdraw from the World Health Organization (WHO).³¹ The White House justified its decision, saying that the organization did not act independently from the “inappropriate political influence” from other countries, such as China.³² The White House also cited the “unfairly overseas payments” from the US that do not correspond to the sums provided by other larger donors.³³ With the Trump administration's signing of the executive orders, it is possible to expect delays within the WHO and other organizations in addressing global health emergencies and research and development.³⁴

International organizations have been crucial in assisting with global vaccine distribution and coordinating responses to outbreaks. The International Monetary Fund (IMF), World Bank, and WHO established an agreement on the broad

principles of collaboration for pandemic preparedness.³⁵ IMF offers eligible countries access to affordable and long-term support through the Resilience and Sustainability Trust. This aims to address the economic challenges these countries face because of pandemics. Meanwhile, the World Bank supports the most affected regions by providing technical and financial support, encouraging health related investments. Additionally, WHO works to ensure that these initiatives operate according to the reality of public health systems.³⁶ Notably, the agreement's focus on collaboration is to support underserved countries by providing them help and resources.

Actions taken by some of the G20 countries offer an insight towards solidifying the principles of collaboration for pandemic preparedness at the international level.³⁷ On November 27th, 2024, South Korea's Disease Control and Prevention Agency (KDCA) was designated as a WHO Collaborating Center (CC) for future pandemic preparedness and response.³⁸ As a WHO CC, KDCA is responsible to execute global health programs in specific fields as a specialized institution appointed by WHO.³⁹ Given the country's expertise in the COVID-19 pandemic management, countries sharing their knowledge and experience in pandemic preparedness could have a practical impact on the international community's awareness in such areas. The world's top 20 economies could explore areas of cooperation to visualize the international organizations' agreement on the future preparedness. This could spark more opportunities for the international community to provide logistical and financial support for the

28 World Health Organization, “International Health Regulations,” accessed January 20, 2025, <https://www.who.int/health-topics/international-health-regulations>.

29 BBC Verify team, “Fact-checking RFK Jr's views on health policy,” *BBC News*, November 15, 2024, <https://www.bbc.com/news/articles/c0mzk2y41zvo>.

30 Berkeley Lovelace Jr. and Erika Edwards, “As Health Secretary, RFK Jr. Could Hold Enormous Influence over Childhood Vaccines,” *NBC News*, December 18, 2024, 3:45 PM GMT-3, <https://www.nbcnews.com/health/health-news/health-secretary-rfk-jr-hold-enormous-influence-childhood-vaccines-rcna184596>.

31 AFP, “Trump signs order to pull US from WHO, citing funding disparities,” *France 24*, January 21, 2025, <https://www.france24.com/en/live-news/20250121-trump-signs-order-to-pull-us-from-who-citing-funding-disparities>.

32 Patrick Wingrove and Jennifer Rigby, “Trump orders US exit from the World Health Organization,” *Reuters*, January 21, 2025, <https://www.reuters.com/world/us/trump-signs-executive-withdrawing-world-health-organization-2025-01-21/>.

33 Wingrove and Rigby, “Trump orders US exit from the World Health Organization.”

34 Wingrove and Rigby, “Trump orders US exit from the World Health Organization.”

35 International Monetary Fund, “The International Monetary Fund, the World Bank Group, and the World Health Organization Step Up Cooperation on Pandemic Preparedness,” October 4, 2024, <https://www.imf.org/en/News/Articles/2024/10/04/pr24346-imf-wbg-who-step-up-cooperation-on-pandemic-preparedness>.

36 International Monetary Fund, “The International Monetary Fund, the World Bank Group, and the World Health Organization Step Up Cooperation on Pandemic Preparedness.”

37 International Monetary Fund, “The International Monetary Fund, the World Bank Group, and the World Health Organization Step Up Cooperation on Pandemic Preparedness.”

38 Korea Disease Control and Prevention Agency, “KDCA designated as a WHO CC for pandemic preparedness and response,” press release, November 27, 2024, <https://www.kdca.go.kr/board/board.es?mid=a3040200000&bid=0030>.

39 Korea Disease Control and Prevention Agency, “KDCA designated as a WHO CC for pandemic preparedness and response.”

WHO Collaboration Centers like the KDCA to contribute to the research and development of future public health emergencies of international concern.⁴⁰

This builds on the Global Pandemic Preparedness Summit hosted in Brazil in 2024.⁴¹ This development focused on strengthening access to healthcare resources, enhancing global disease surveillance, and the one-hundred-day mission for vaccines, diagnostics, and therapeutics. A recent report revealed that the major outcomes of the summit were the following: the introduction of the WHO pathogen prioritization framework for research and development, emphasis on addressing equity and financing, and recognizing the need for regional collaboration to increase the surveillance and manufacturing capacity.⁴² Countries must acknowledge these recent events when developing new solutions. To move forward, they should focus on creating equitable and collaborative initiatives aiming to improve pandemic preparedness and understanding the economic implications of a pandemic.

To highlight, G20 countries have an advantage to tackle the pending updates for cooperation. Tuning the rules of engagement for public health response is one of the pillars to achieve the objectives of global health security.⁴³ How the affected countries and the international community study the rules and the facts on the ground would talk more about where the G20 stands in the international public health response system. The framework should build on the G20 Joint Finance and Health Ministerial Meeting in which the group codified its support towards a well-coordinated international response.⁴⁴ At length, the committee should further acknowledge that the facts on the ground in international health emergencies and economic development are not separate.

Conclusion

Global health security is a long-term goal that requires a multifaceted approach.⁴⁵ There is, therefore, a definite need for international collaboration and innovation. Countries must adapt their healthcare systems to ensure preparedness for future pandemics. These developments reinforce the idea that collaboration is essential and encourage considering all contributing factors. The lessons learned from past situations like COVID-19 pandemic and the Mpox outbreak expose the need for communication, preparedness, funding, and resources. Advancement in technology and international collaboration, as seen in the summit, are crucial steps towards building more resilient healthcare systems.

G20 seeks to be a global platform for collaboration. Member states play a critical role in addressing the challenges of future crises and should ensure that developed and emerging economies work together. G20 can foster global cooperation, engaging in efforts that address the challenges faced in the past, encourage innovation, and support underserved nations, ultimately, contributing to the economic stability and wellbeing of all nations. How the world's leading 20 economies understand the status of the global health security agenda would generate significant ramifications in research and development of future public health emergencies as well as the technological advancement that supports the relevant health infrastructure.

Ultimately, G20's holistic approach towards the concept of global health security would be essential to support the member states' economic development in the long run. The expectations arise from the international community outside of G20. Perhaps, this could be a genuine chance for the group to identify the first steps towards bridging the gap between health security and economic stability together and not as a separate part of the agenda.⁴⁶

40 Korea Disease Control and Prevention Agency, "KDCA designated as a WHO CC for pandemic preparedness and response."

41 CEPI, "The Global Pandemic Preparedness Summit 2024: Outcomes Report," September 17, 2024, <https://cepi.net/global-pandemic-preparedness-summit-2024-outcomes-report>.

42 CEPI, "The Global Pandemic Preparedness Summit 2024: Outcomes Report."

43 World Health Organization, "Health Security," accessed January 20, 2025, <https://www.who.int/health-topics/health-security>.

44 G20, *G20 Joint Finance and Health Ministers' Statement on Mpox Response* (Rio de Janeiro: G20, 2024), https://www.g20.utoronto.ca/2024/G20_-_Joint_Statement_on_Mpox_Response.pdf.

45 World Health Organization, "Health Security."

46 Anshu Siripurapu, Noah Berman, and James McBride, "What Does the G20 Do?," Council on Foreign Relations, last modified November 15, 2024, <https://www.cfr.org/backgrounder/what-does-g20-do>.



G20

NHSMUN 2025



TOPIC B:
THE DISPROPORTIONATE EFFECTS OF CLIMATE CHANGE

Photo Credit: Gregory Varnum

Introduction

Climate change is the defining challenge of our time. Ecosystems, economies, and societies are being affected rapidly and at large scales. The risk of vanishing coastlines and collapsed food production systems are an incoming reality that should be addressed. Vulnerable populations that are the least responsible for global emissions are bearing the consequences of these crises. The urgency to act is clear, but the international response remains divided and inconsistent. The 2015 Paris Agreement, while groundbreaking, suffers from a lack of proper enforcement, with global greenhouse emissions rising. The G20, the group of the world's largest economies, is responsible for over 75 percent of emissions. Therefore, they hold the responsibility and power to properly steer the international response towards a more sustainable future.

In this paper we will discuss critical issues exacerbated by the climate crisis: rising sea levels and food and water insecurity. These challenges are creating issues for ecosystems and human populations. Coastal regions around the world are under serious threat from rising sea levels. Sea levels will rise by one meter by 2070. This would damage major oil ports in Saudi Arabia, China, and the United States. The Environmental Agency of the United Kingdom warns that by 2050, eight million homes could be at risk of flooding. Wildlife is also in danger. In Florida's Big Pine Key, rising sea levels will affect the endangered Key Deer. Scientists predict that 85 percent of their land will be underwater by 2050, putting their survival at risk. Food systems are also at risk. Climate change is harming crops, especially in areas like Southeast Asia and sub-Saharan Africa. Computer models predict that by 2028, rice harvest in Cambodia, Myanmar, and Viet Nam could drop by 10 percent. Ghana is also at risk of losing 17 percent of its farmland that is suitable for irrigation by 2070.

These challenges that the G20 on more than just policy shifts. Climate change is at a point where reimagined energy systems, new agricultural practices, and international cooperation are a must. Leaders need to address both urgent needs and long-term goals. Overall, what is at stake is clear: stability of food systems, survival of species, and the livelihood of millions of

others.

Sea Level Rise

Rising sea levels pose an imminent threat to coastal regions around the world, resulting in increased flooding, loss of habitable land, and mass displacement of populations. Small island nations, low-lying coastal cities, and flood-prone regions with marginalized communities are especially vulnerable. According to the Natural Resources Defense Council, global sea levels are expected to rise at accelerating rates, intensifying the frequency and severity of coastal storms.¹

The United Nations Development Programme (UNDP) warns that coastal flooding could increase fivefold over this century, highlighting the urgent need for comprehensive adaptation strategies. These strategies include constructing stronger infrastructure, restoring coastal ecosystems, and implementing controlled relocation policies.² Furthermore, the World Meteorological Organization (WMO) confirmed that 2024 was the hottest year on record.³ The year exceeded 1.5 degree Celsius warming for the first time and contributed significantly to rising sea levels worldwide.⁴ However, a recent study led by Dartmouth College showed that the effects of

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

2 "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>.

3 World Meteorological Organization, "WMO confirms 2024 as warmest year on record at about 1.55°C above pre-industrial level," news release, January 10, 2025, <https://wmo.int/news/media-centre/wmo-confirms-2024-warmest-year-record-about-155degc-above-pre-industrial-level/>.

4 World Meteorological Organization, "WMO confirms 2024 as warmest year on record at about 1.55°C above pre-industrial level"; Audrey Garric, "2024 will be hottest year on record and exceed 1.5°C warming for first time," *Le Monde*, November 11, 2024, https://www.lemonde.fr/en-environment/article/2024/11/11/2024-will-be-hottest-year-on-record-and-exceed-1-5-c-warming-for-first-time_6732404_114.html.

ice sheet melting may not be as dramatic as initially predicted.⁵ However, it still impacts coastal communities across the globe. Oceans rising even by 50 feet can result in the submersion of entire areas. An example would be the entire Florida Peninsula. The rapid loss of ice in Antarctica and Greenland also remains a concern. While some estimates show extreme or unlikely rates, the projections still play a big role in urban planning and developing coastal areas to withstand climate change.⁶

Rising sea levels are likely to affect coastal cities with some of the world's biggest oil ports the most.⁷ The burning of fossil fuels used to operate supertankers (large oil transport vessels) in such ports is a contributor to global warming and rising sea levels. 13 ports across countries with the most supertanker traffic are expected to be seriously affected, even by only one meter of sea level rise. Many ports have been designed with the idea that sea levels would remain relatively the same. However, rising sea temperatures would greatly disrupt operations. Many operators of machines at ports would be confused by the different sea levels. Ships would not be properly aligned with machines needed to load and offload oil. However, this is not exclusive to oil shipping. Cargo ships around the world would likely run into difficulties docking at ports. This is especially dangerous for ports that are not in developed countries. If sea levels were to rise, it would disrupt the operations at ports that are not highly developed with technology. Most importantly, many busy ports also use pilots. Pilots are drivers of ships that know how to navigate through crowded ports and places with heavy traffic. They are crucial in making sure ports are not backed up and that collisions are avoided. Rising sea levels would require many pilots to have to adjust to the elevated waters. Pilots could be more prone to mistakes and cause major disruptions in

international shipping. It is important to note that studies have confirmed at least one meter of sea level rise is inevitable by 2070 or sooner if carbon emissions are not reduced.⁸ The Ras Tanura and Yanbu ports in Saudi Arabia—from which 98 percent of the country's oil is exported—are currently the most vulnerable.⁹ Ports in China, the Netherlands, Singapore, the United States, and the United Arab Emirates, make up the remainder of the list. A transition away from fossil fuels is necessary for the safety of many coastlines.¹⁰

Residential areas are also at risk. For example, the United Kingdom's Environment Agency (EA) projected in an assessment in late 2024 that one in four properties—approximately eight million—across England are at risk of flooding by 2050.¹¹ Rising sea levels, paired with heavier rainfall, contribute the most to this risk. Overflow from the rivers, the sea, and surface water overpower drainage systems, resulting in flooding. While an unexpected 6.3 million properties are officially considered at risk, the true number will be higher if more houses are constructed on floodplains.¹² Risk can be decreased if flood defenses and mechanisms are improved. The Thames Barrier flood defense, for example, helps London be less vulnerable to river or sea flooding than many other regions. Such necessary defenses are lacking in development or maintenance in many cities.

Additionally, rising sea levels affect more than just infrastructure. It also affects the survival of several species. The already endangered Key deer species is a prime example.¹³ Despite previously overcoming near extinction after excessive poaching and the spread of a parasite amongst its population, the deer remain at risk. Nearly 800 deer live in the Florida Wetlands—an area at high risk of rising sea levels. By the year 2100, sea levels are projected to increase by 0.5 to two

5 "Study Finds Highest Prediction of Sea-Level Rise Unlikely," Dartmouth College, August 21, 2024, <https://home.dartmouth.edu/news/2024/08/study-finds-highest-prediction-sea-level-rise-unlikely>.

6 Dartmouth College, "Study Finds Highest Prediction of Sea-Level Rise Unlikely."

7 Damian Carrington, "Climate-driven sea level rise will overwhelm major oil ports, study shows," *The Guardian*, January 4, 2025, <https://www.theguardian.com/environment/2025/jan/04/climate-driven-sea-level-rise-set-to-flood-major-oil-ports>.

8 International Cryosphere Climate Initiative, *State of the Cryosphere Report 2024* (Vermont: ICCI, November 2024), <https://iccinet.org/statecryo24/>.

9 Carrington, "Climate-driven sea level rise will overwhelm major oil ports, study shows."

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11 Mark Poynting, "One in four properties at flood risk by 2050 - report," *BBC*, December 17, 2024, <https://www.bbc.com/news/articles/c99x4599gr7o>.

12 Poynting, "One in four properties at flood risk by 2050 - report."

13 Freida Frisaro, Lynne Sladky, and Daniel Kozin, "Florida's iconic Key deer face an uncertain future as seas rise," *AP News*, November 7, 2024, <https://apnews.com/article/key-deer-climate-change-sea-level-rise-0a73bbf1f8e88bcf091f588c92b34997>.

meters in parts of the Florida Keys. The Big Pine Key, where most of the deer are found, is a cause for concern since it is only 2.4 meters above sea level.¹⁴ Climate change has already impacted them, as access to freshwater and certain food has reduced significantly in the area. Even 15 centimeters of sea rise would result in the loss of 16 percent of the Big Pine Key’s freshwater—a likely reality by 2030. At its current rates, sea rise is projected to take over almost 85 percent of the deer’s preferred land by 2050, by which point they are likely to be extinct. Stronger natural disasters due to climate change, though less frequent, are an additional risk.¹⁵

With all these factors in mind, the G20 needs to come up with solutions to address this looming crisis. There are many ways to address rising sea levels. One simple way is to just work on having coastal communities move further inland. This is already happening in some G20 member states where cliffs that are eroding from higher waves have led to residents moving away. More systematic change may be needed. New technologies would have to be explored to help decrease carbon emissions. Physical barriers may need to be built to protect coastlines. Massive engineering projects would need to be taken to protect massive cities that cannot quickly relocate.

14 “Coastal Flooding & the Florida Keys,” National Oceanic and Atmospheric Administration, accessed January 25, 2024, https://www.weather.gov/key/coastal_flooding#SeaLevelRise.

15 Frisaro, Sladky, and Kozin, “Florida’s iconic Key deer face an uncertain future as seas rise.”

16 “Compare Impacts,” *United Nations Development Programme*, July 4, 2024, <https://horizons.hdr.undp.org/#/risk/SSP5-85/globalAverage>; “Food Security and Nutrition for All,” *Food and Agriculture Organization*, accessed July 7, 2024, <https://www.fao.org/home/en>.

Regardless of the choice, the G20 member states need to be prepared for the massive costs that come with tackling rising sea levels.

Disruption of the Global Food Supply

Climate change has a pronounced effect on global food and water systems. Erratic weather patterns, prolonged droughts, and extreme temperatures jeopardize crop yields and diminish freshwater availability. In regions already struggling with limited water resources, such shifts exacerbate socioeconomic disparities and pose a direct threat to public health. The UNDP highlights how these volatile conditions disproportionately affect low-income communities, while the Food and Agriculture Organization (FAO) moves for integrated approaches—emphasizing sustainable agricultural practices, improved irrigation methods, and investments in rural infrastructure.¹⁶ Without these interventions, food and water insecurity will continue to trigger instability across multiple regions.

Farmers, especially those in developing countries, are highly

A female Key deer, grazing
 Credit: Ianaré Sévi



susceptible to the damaging impacts of climate change. Frequent droughts, shifting growing seasons, and extreme temperatures reduce crop yields and degrade soil quality. These challenges harm local economies and inflate food prices, contributing to higher rates of poverty and malnutrition. Data from the UNDP suggests that, with high-emissions, agricultural losses will worsen significantly, particularly in countries already struggling with food insecurity.¹⁷ Moreover, the World Economic Forum (WEF) states the urgency of developing climate-smart agricultural practices, financial safety nets, and technology transfers to protect rural communities.¹⁸ Recent studies with remote sensing technology have produced detailed climate and soil data over many geographic areas. Researchers can now project future climatic conditions up to the year 2100. Through physical modeling and machine learning, several agricultural issues can be addressed.¹⁹

An area at risk of a disrupted global food supply due to climate change is Southeast Asia. The area is known for its substantial agricultural potential but is extremely vulnerable to climate change and is dependent on ideal conditions for food production. A study using the XGBClassifier model, the top-performing machine learning instrument to measure cropland suitability, shows that countries like Viet Nam, Philippines, Lao PDR, and Indonesia are expected to lose a significant total of arable lands.²⁰ Cropland suitability refers to how well a piece of land is suitable for growing crops.²¹ The model forecasts climate conditions in 2028, taking into account rice production, Southeast Asia's crop staple. Cambodia, Myanmar, and Viet Nam are projected to experience a loss of crop yields larger than 10 percent.²²

The impact of climate change has also been assessed in Sub-Saharan Africa (SSA). In Ghana it estimated that 9.5 percent of crop suitable land will not be suitable for irrigation in the 2050s. By the 2070s it is expected to reach 17 percent. Togo and Benin will also face difficulties. 60 percent of these countries' rice is cultivated through inland valley areas. Studies show that there will be a significant loss in suitable inland valley areas for rice production of 37 percent by the 2030s.²³ Countries where temperatures are already significantly high such as the Sahel belt of Africa or South Asia will suffer more immediate negative effects on crops such as wheat that are less tolerant to heat. The World Bank estimates that without measures to mitigate climate change, an estimated 43 million people in Africa could fall below the poverty line.²⁴ That said, there are discussions on the best measures to adapt to climate change. While reducing emissions is the ideal strategy, it requires major social, economic, and technological resources that these affected countries do not have. Suggested strategies include efficient water use and improving soil health.²⁵

On using water more efficiently and effectively, building irrigation infrastructure may not be useful if future water supply is not enough to supply irrigation systems.²⁶ Therefore, better water management solutions are recommended. To truly understand the amount of water available that can be used in irrigation, we need to bridge the data gap on evapotranspiration (ET).²⁷ ET is the process where water evaporates from the land into the atmosphere. With an accurate understanding of ET, countries can determine agricultural water consumption, assess droughts, monitor crops, and create water budgets. Countries such as the Republic of India are piloting satellite-

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

18 "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/>.

19 Daria Tanuiskina, et al., "Case Study on Climate Change Effects and Food Security in Southeast Asia," *Scientific Reports* 14 (2024): 16150, <https://doi.org/10.1038/s41598-024-65140-y>.

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21 Mosisa Tujuba Wakjira, Nadav Peleg, Johan Six, and Peter Molnar, "Current and Future Cropland Suitability for Cereal Production Across the Rainfed Agricultural Landscapes of Ethiopia," *Agricultural and Forest Meteorology* 358 (2024): 110262, <https://doi.org/10.1016/j.agrformet.2024.110262>.

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23 Komlavi Akpoti, Thomas Groen, Elliott Dossou-Yovo, Amos T. Kabo-bah, and Sander J. Zwart, "Climate Change-Induced Reduction in Agricultural Land Suitability of West-Africa's Inland Valley Landscapes," *Agricultural Systems* 200 (2022): 103429, <https://doi.org/10.1016/j.agry.2022.103429>.

24 "What You Need to Know About Food Security and Climate Change," World Bank, last modified October 17, 2022, <https://www.worldbank.org/en/news/feature/2022/10/17/what-you-need-to-know-about-food-security-and-climate-change>.

25 World Bank, "What You Need to Know About Food Security and Climate Change."

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27 Diego Rodriguez, "Thin Air and Seen from Space: Estimating Evapotranspiration Using Satellites," World Bank, last modified March 7, 2019, <https://blogs.worldbank.org/en/water/thin-air-and-seen-space-estimating-evapotranspiration-using-satellites>.

based rainfall data projects through their Provision for Advisory for Necessary Irrigation (PANI). The large water project captures data and can notify farmers through text about when, where, and how much to irrigate.²⁸

Improving soil health can help it better retain water, allowing plants to access water more readily and making them more resistant to drought.²⁹ By increasing the organic carbon reserves, soil health can be improved. It also provides more nutrients without using as much chemical fertilizers, a major source of emissions. Researchers from the Italian Center for River Restoration (CIRF) have found that 26.9 percent of the European Union (EU) is in a warning condition of drought and 10 percent in a state of alert. Additionally, the Italian Institute of Environmental Protection and Research (ISPRA) states that 70 percent of soils in the EU are degraded, with several countries showing signs of desertification.³⁰ Farmers can play a significant role in safeguarding these water sources. Small changes such as lightly working the soil and cover cropping help the soil retain more water. Other solutions include early sowing, mulching, traditional terracing, and intercropping.³¹

Nevertheless, the international community should work to invest in safeguarding nature. An estimated USD 44 trillion of global value is added, more than half of the world's GDP is generated through industries that depend on nature.³² Outlined in *The Future of Nature and Business Report*, USD 3.5 trillion in business revenues and 87 million new jobs by 2030 will stem from the energy and extractives sector. To reach climate goals, wind and solar must be capacitated to provide all new electricity generation by 2024.³³ Therefore, there is room for several international corporations to enter the model of 'eco-restoration and wealth creation.'³⁴ Delegates must take note of the several potential strategies when drafting solutions in the G20. There is not a single solution to the climate crisis and the preventative measures to reduce the disruption of the

global food supply. Understanding that progress depends on synchronized efforts between large corporations and detailed government projects, but also on micro-interventions from the farmers that work the land, is a crucial step. We recommend delegates to adopt this broad approach when representing their policies at the G20.

Conclusion

The crises of rising sea levels, food insecurity, and an affected ecosystem demand urgent action from the G20. As delegates, your role is to create a bridge between global projects and localized impacts. Climate change is disproportionately challenging vulnerable populations—from coastal communities to farmers battling erratic crop yields. Therefore, the committee's solutions should aim to prioritize equity alongside innovation. Adaptive and equitable strategies such as the United Kingdom's Thames Barrier offer insight to potential solutions your delegation could bring to the discussion. Efforts to protect economic hubs like the oil ports of Saudi Arabia or any other country should also be considered. Would it be more important to focus on the short-term by protecting the infrastructure? Or would it be more worthwhile to accelerate the transition to renewable energy to mitigate climate change effects?

The international community is also debating whether reinventing food production systems should be enabled in their agendas. Countries such as the Republic of India are leveraging technology to optimize water use and empower farmers with low-cost practices. Moreover, delegations should aim to address the regional disparities. Countries in Southeast Asia are projected to lose 10 percent of their rice yield in the future. Sub-Saharan Africa's land for agriculture is shrinking. Therefore, targeted aid is a matter that needs to be

28 Rodriguez, "Thin Air and Seen from Space: Estimating Evapotranspiration Using Satellites."

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30 Ylenia Granitto, "Promoting Biodiversity, Improving Soil Health Are Key to Tackling the Global Water Crisis," *Olive Oil Times*, last modified July 5, 2023, <https://www.oliveoiltimes.com/world/promoting-biodiversity-improving-soil-health-are-key-to-tackling-the-global-water-crisis/121608>

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33 Marie Quinney, Kimberly Pope and Amy Kirby, "How investing in nature can help tackle the biodiversity and climate crises," *World Economic Forum*, last modified September 30, 2020, <https://www.weforum.org/stories/2020/09/how-investing-in-nature-can-help-tackle-the-biodiversity-and-climate-crises/>.

34 Quinney, Pope, and Kirby, "How investing in nature can help tackle the biodiversity and climate crises."

addressed by the G20—whether it be through investments or knowledge-sharing. Renewable energy is also at the forefront. Nature-positive policies are estimated to generate USD 3.5 trillion and 87 million jobs by 2030. Partnering with industries to scale economic progress through nature-positive solutions requires action from G20 members. Whether it be through infrastructure development, supporting small farmers, or completely renovating the world’s energy system, success is dependent on the G20s ability to collaborate.

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