



How will climate change affect the health of Filipinos in the next decade?

A PRU LIFE UK COMMISSIONED STUDY
NOVEMBER 2021

Foreword

Pru Life UK is proud to support another pioneering and timely study that aims to deepen Filipinos' understanding of the effects of climate change on their health and wealth and to guide the industry and the government in developing practical preparation and mitigation strategies.

In 2019, Pru Life UK commissioned the independent study "Mobile Digital Health in the Philippines" which looked into the readiness of the country's legal framework to support the integration of mobile health technologies into the healthcare system. The paper has been widely used as an industry reference since then. Early this year, our regional headquarters Prudential Corporation Asia commissioned the inaugural "Pulse of Asia: Health of Asia Barometer" which explored the challenges people across Asia face to improve their health and well-being.

Investing in timely independent studies on important health topics supports our strategy for how we intend to participate in healthcare discussions, by truly understanding the issues and helping find solutions.

As the Philippines' leading life insurance company, Pru Life UK believes it is critical to examine the effects of climate change on the health and wealth of Filipinos.



This supports our effort to build a better future for Filipinos and make healthcare truly accessible and affordable for all Filipinos. This is also aligned with our purpose of helping people get the most out of life alongside one of the three pillars of our environment, social and governance (ESG) strategy which is making health and financial security accessible to all.

Indeed, even as we continue to battle the COVID-19 pandemic, there is no other global challenge more pressing as climate change. Its impacts are global in scope and unprecedented in scale, affecting the world's poorest and most vulnerable sectors the most, and presents the biggest threat to date to sustainable development, according to the United Nations (UN).

We are also proud to have this paper released in time for the UN Climate Change Conference of the Parties (COP26), the global summit that brings all stakeholders together to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change.

With this paper as a guide, we commit to continuing to develop customer-centric products for greater insurance protection that can help improve health and financial protection and reduce future climate-related losses in every Filipino family. We also trust that this can be of use to various stakeholders, from the industry to the government, in developing solutions, policies and regulations to help more Filipinos get better protection, in both health and in their financial wellbeing, from the impacts of climate change.

Eng Teng Wong

President and Chief Executive Officer
Pru Life UK

About the Authors

Renzo R. Guinto, MD DrPH is the Associate Professor of the Practice of Global Public Health and Inaugural Director of the Planetary and Global Health Program of the St. Luke's Medical Center College of Medicine-William H. Quasha Memorial in the Philippines. He is also the Chief Planetary Health Scientist of the Sunway Centre for Planetary Health in Malaysia. Dr. Guinto is a member of the National Panel of Technical Experts of the Climate Change Commission of the Government of the Philippines, and the convener of Planetary Health Philippines.

Katrina C. Ceballos, MD MBA is a general practitioner interested in climate change and health and is a member of Planetary Health Philippines.



EXECUTIVE SUMMARY

How will climate change affect the health of Filipinos in the next decade?

As the world continues to grapple with the global health crisis of COVID-19, another existential crisis is looming – climate change, which is perhaps the defining crisis of our generation. Climate change is not just an environmental issue – it is a matter of human health and survival. At the current rate of human activity, the planet is likely to reach a global average temperature increase of 1.5°C from preindustrial levels. Such change will result in dramatic changes such as hotter temperatures, heavier precipitation, terrible droughts, and continuous sea level rise. In fact, these impacts are already observed in the Philippines – one of the countries in the world that is most vulnerable to the effects of climate change.

As climate change worsens, the health of populations will be in greater danger. Climate change affects health both directly, for instance, among elderly who experience heat stroke due to exposure to extreme heat, or indirectly, when climate change alters the environmental conditions for mosquito-borne diseases like dengue and malaria. In fact, there is no disease group that is immune to the effects of climate change. In the Philippines, the following disease conditions are expected to increase in a world of climate change:

- Injuries and death due to more intense typhoons and flooding
- Heat-related illnesses such as heat cramps, heat exhaustion, and heat stroke
- Vector-borne diseases such as dengue and malaria
- Soil-borne diseases such as hookworm, roundworm, and schistosomiasis
- Water-borne diseases (such as leptospirosis) due to exposure to contaminated water
- Food-borne diseases due to contaminated food and rapid spoilage
- Emerging infectious diseases with pandemic potential such as COVID-19
- Cardiorespiratory diseases due to air and other forms of pollution produced by fossil fuels – the same culprits of the climate crisis
- Water pollution (such as salinization of water) due to sea level rise in coastal areas
- Forced displacement of communities due to typhoons, storm surges, and coastal flooding
- The co-occurrence of undernutrition and obesity resulting from climate-unfriendly food systems
- Mental health conditions emanating from both abrupt disasters and slow-onset environmental change

To protect the Filipinos from the health impacts of climate change, five major actions are urgently needed:

- From now on, climate change must be viewed as a public health issue. Climate change is not anymore just an issue about dehydrated polar bears or melting ice caps – at its very core, it is an issue of human health and survival. COVID-19 is a reminder of the importance of good health and the need for every sector to work together towards improving health for all – including in the context of a changing climate.
- Rapid decarbonization to stabilize the climate will be good not just for the planet but for people's health too. To keep the increase of global average temperature below 2 degrees Celsius, preferably 1.5, accelerated climate mitigation must be pursued by transitioning to clean renewable energy, green and equitable transport, sustainable and healthy food systems – which are beneficial not only for the environment but also for public health.
- Building societal resilience to climate change and its health effects is also an urgent priority since climate change is already happening. The Philippine society, including the national health system, must pursue climate adaptation to enhance resilience to climate change, disasters, and myriad health impacts – while taking advantage of system strengthening measures used for COVID-19. "Climate-smart health care" – which is the convergence of climate-resilient and low-carbon health systems – must be the framework for the health sector's agenda in the coming years.
- Communicate climate and health knowledge to all citizens to raise awareness and equip them with tools to contribute to both mitigation and adaptation. Vulnerable communities, children and young people, leaders and professionals, frontliners such as health professionals – everyone must receive climate and health education that will usher positive behavior change while fighting "fake news."
- Financial security at all levels is a climate adaptation measure. The impacts of climate change on physical and mental health will eventually affect the financial health of individuals, households, and communities. Stable incomes, health insurance, financial aid, and universal health care are all financial solutions to protect Filipinos from shocks related to the climate emergency.

The COVID-19 pandemic gave us a glimpse of how worldwide disruption, disease, and despair will look like if the climate emergency is not averted. The climate clock is ticking fast, and time is running out. The health of people – of ourselves, our children, and future generations – is at stake. We must act now before it is too late.



Table of Contents

The Climate Crisis	1
Climate Vulnerability Of The Philippines	2
Anticipated Health Impacts Of Climate Change	4
Recommendations	11

How will climate change affect the health of Filipinos in the next decade?

Renzo R. Guinto, MD DrPH
Katrina C. Ceballos, MD MBA

The Climate Crisis

As the world continues to grapple with the global health crisis of COVID-19, another existential crisis is looming – climate change, which is perhaps the defining crisis of our generation. Traditionally, climate change is more commonly understood as an environmental issue, but its myriad effects to various aspects of society are also becoming increasingly recognized. Most notably, climate change affects human health in both direct and indirect ways. For example, injuries and even death can be a result of climate-related extreme weather events such as typhoons and extreme flooding. Meanwhile, climate change can affect health by modifying natural and human systems such as in the form of mosquito-borne diseases and climate-driven migration.

Climate change is defined by the United Nations Framework Convention on Climate Change (UNFCCC) as “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.”¹ The most significant driver of climate change is greenhouse gas (GHG) emissions from human activities, hence the term anthropogenic climate change. When GHGs such as carbon dioxide and methane are emitted, they get trapped in increasing concentrations in the atmosphere, which creates a “thickening of the Earth’s blanket,” making the planet much warmer. According to Climate Watch’s breakdown of global GHGs per sector in 2018, the energy sector had the biggest share at 76%, followed by agriculture (12%), industrial processes (5.9%), waste (3.3%), and land-use change and forestry (2.8%)². Ten countries – led by China and the United States of America – contribute two-thirds of the total GHGs, whereas the 100 least-emitting countries collectively contribute less than 3%³.

Since pre-industrial levels, human activities have caused an increase of 1.0°C in global warming. At the current rate of human activity, global warming is likely to reach 1.5°C between 2030 and 2052.⁴ Even very small temperature increases can result in devastating climate conditions not only for humans but also for other non-human species.⁵ Many dramatic changes are expected in a world that is 1.5°C warmer than pre-industrialized levels. Mean temperatures on land in the ocean are expected to increase. Most inhabited regions will experience hot temperature extremes. Heavy precipitation will affect several regions, yet some regions will suffer drought and precipitation deficits. Continuous sea level rise, resulting from the melting of the ice caps and other causes, will result in the inundation of many cities especially in developing countries.

¹United Nations (1992). *United Nations Framework Convention on Climate Change (UNFCCC)*. Retrieved August 4, 2021, from <https://unfccc.int/resource/docs/convkp/conveng.pdf>

²CAIT data: Climate Watch. (2020). *GHG Emissions*. Retrieved August 4, 2021, from <https://www.climatewatchdata.org/ghg-emissions>

³Friedrich, J., Ge, M., & Pickens, A. (2020). *This Interactive Chart Shows Changes in the World's Top 10 Emitters*. Retrieved August 4, 2021, from <https://www.wri.org/insights/interactive-chart-shows-changes-worlds-top-10-emitters>

⁴IPCC (2018). *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

⁵Buis, A. (2019, June 19). *A Degree of Concern: Why Global Temperatures Matter – Climate Change: Vital Signs of the Planet*. NASA: Climate Change and Global Warming. Retrieved from August 4, 2021 <https://climate.nasa.gov/news/2865/a-degree-of-concern-why-global-temperatures-matter/>

Climate change is an all-encompassing threat that affects all of life on Earth. At the center of it all is human health – our health – which is innately sensitive and vulnerable to climate-related shocks and stresses. This vulnerability is further worsened by unprepared health systems struggling to manage climate-sensitive diseases while also responding to chronic health problems as well as the ongoing threat of COVID-19. The World Health Organization (WHO) conservatively estimated that due to climate change alone, there will be 250,000 additional deaths annually between 2030 to 2050 due to climate-sensitive diseases such as undernutrition, infectious diseases, and heat-related illness.⁶ A newer study projected that if business as usual ensues, more than 83 million people will die from excess heat alone by the end of the century.⁷

Climate Vulnerability of the Philippines

Accounting for extreme weather events such as typhoons and flooding alone, the Philippines was ranked by Germanwatch in 2019 as the 4th most vulnerable country to the effects of climate change.⁸ It is important to remember that the Philippines, as a developing country, only contributes approximately 0.33% to the world's GHG emissions.⁹ The energy sector remains to be the country's main source of GHG emissions, contributing 54% of total GHG emissions – largely due to electricity generation from fossil fuels and oil.¹⁰ Agriculture was the second top emitter contributing 33% of GHG emissions, with most of the emissions coming from rice cultivation followed by livestock production.

The biophysical impacts of climate change in the Philippines are wide-ranging. Below are the major changes that are anticipated to worsen in the next decade if climate change is not averted:

- **Continuous surface temperature increase.** In just the last three decades, annual average temperature has risen at a much faster rate – 0.16°C increase per year.¹¹ The average annual temperature will continue to rise, warm seasons will be much warmer, and extreme temperature events will be more frequent. Records for highest temperatures surpass one after the other, with the highest recorded temperature of 53°C in Dagupan City, Pangasinan in May 2021, with 27 other areas in the country recording temperatures higher than 41°C.¹²
- **Increased variability of rainfall.** Throughout the country, the mean annual rainfall varies greatly from 965mm to 4,064mm.¹³ Both the frequency and intensity of rainfall have become more variable, with a trend towards extreme rainfall intensity. Average annual rainfall will continue to rise, while heavy daily rainfall will be more frequent. Meanwhile, there will be increased rainfall during the monsoon season and much reduced rainfall during the summer season.

⁶WHO (2014). *Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s*. Geneva, Switzerland: WHO. Retrieved from <https://www.who.int/globalchange/publications/quantitative-risk-assessment/en/>

⁷Bressler, R.D. *The mortality cost of carbon*. *Nat Commun* 12, 4467 (2021). <https://doi.org/10.1038/s41467-021-24487-w>

⁸Eckstein, D., Künzel, V., & Schäfer, L. (2021). *Global Climate Risk Index 2021 Who Suffers Most from Extreme Weather Events? Weather-Related Loss Events in 2019 and 2000-2019*. Bonn: Germanwatch e.V. Retrieved August 4, 2021, from https://www.germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021_2.pdf.

⁹USAID. (2016, November). *Greenhouse Gas Emissions in the Philippines*. Retrieved August 4, 2021 from <https://www.climatelinks.org/resources/greenhouse-gas-emissions-factsheet-philippines>

¹⁰USAID. (2016, November). *Greenhouse Gas Emissions in the Philippines*. Retrieved August 4, 2021 from <https://www.climatelinks.org/resources/greenhouse-gas-emissions-factsheet-philippines>

¹¹Villarin, J. T., Algo, J. L., Cinco, T. A., Cruz, F. T., de Guzman, R. G., Hilario, F. D., Narisma, G. T., Ortiz, A. M., Siringan, F. P., Tibig, L. V. (2016). *2016 Philippine Climate Change Assessment (PhilCCA): The Physical Science Basis*. The Oscar M. Lopez Center for Climate Change Adaptation and Disaster Risk Management Foundation Inc. and Climate Change Commission.

¹²Yumol, D. T. (2021, May 29). *Sangley Point sizzles to 51°C heat index, 26 other areas in PH hit “danger” level*. CNN Philippines. Retrieved August 4, 2021 from <https://www.cnnphilippines.com/news/2021/5/29/27-areas-PH-hit-danger-heat-index-level.html>

¹³Villarin, J. T., Algo, J. L., Cinco, T. A., Cruz, F. T., de Guzman, R. G., Hilario, F. D., Narisma, G. T., Ortiz, A. M., Siringan, F. P., Tibig, L. V. (2016). *2016 Philippine Climate Change Assessment (PhilCCA): The Physical Science Basis*. The Oscar M. Lopez Center for Climate Change Adaptation and Disaster Risk Management Foundation Inc. and Climate Change Commission.

- **Stronger extreme weather events.** Typhoons are natural occurrences in the Philippines, experiencing an average of 20 typhoons per year.¹⁴ In addition to the increasing frequency of extreme rainfall events, deadly storm surges and strong winds have also recurrently been recorded in the country. The catastrophic super Typhoon Yolanda (Haiyan) which hit central Philippines in 2013, remains to be the strongest recorded cyclone in the Philippines.¹⁵ Typhoon Yolanda affected 12.9 million Filipinos, claimed the lives of over 6,000 people, and left 1,800 people missing. More recently, during the COVID-19 pandemic, the Philippines was struck by five typhoons just in November 2020 alone.
- **Sea level rise.** Since the Philippines is an archipelago, the majority of its over 100-million population lives within 60km of the coast.¹⁶ From 1993-2015, sea level around the country has risen by as much as 4.5-5mm per year, which is some of the fastest rate of sea level rise in the world.¹⁷ Inundation of coastal municipalities can lead to seawater intrusion of drinking water sources and forced displacement of large communities.

¹⁴ PAGASA. (n.d.) Tropical cyclone information overview. GOVPH. Retrieved August 4, 2021 from <https://bagong.pagasa.dost.gov.ph/climate/tropical-cyclone-information>

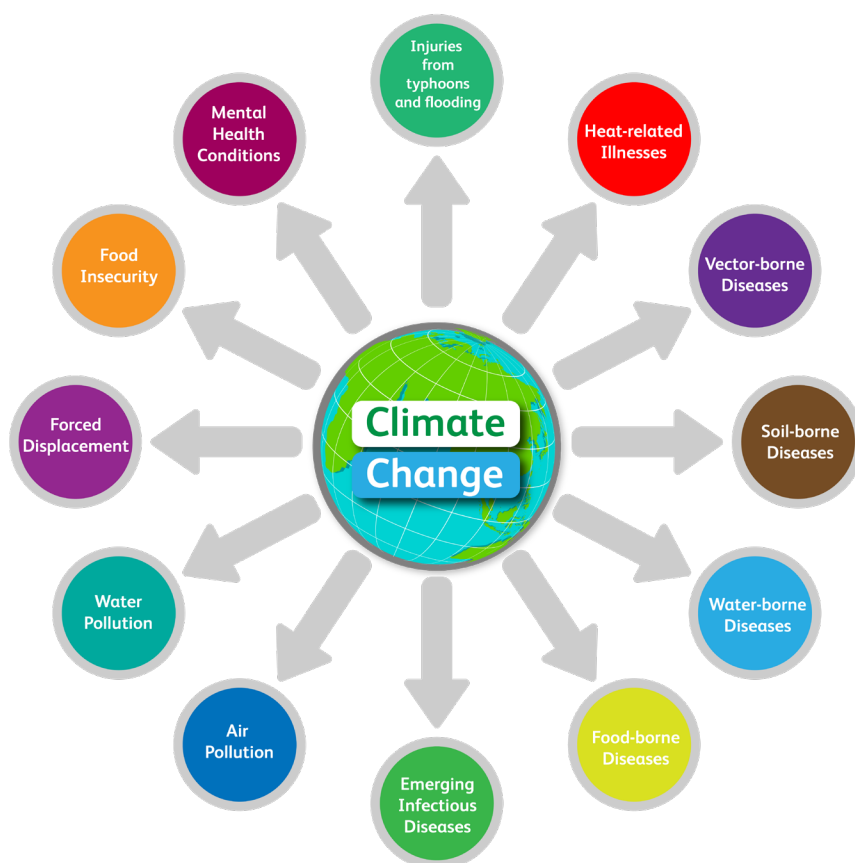
¹⁵ Reid, K. (2018, November 9). 2013 Typhoon Haiyan: Facts, FAQs, and how to help. World Vision. Retrieved August 4, 2021 from <https://www.worldvision.org/disaster-relief-news-stories/2013-typhoon-haiyan-facts>

¹⁶ WEPA (Water Environment Partnership in Asia). (n.d.) State of water environmental issues. WEPA. Retrieved August 4, 2021 from <http://www.wepa-db.net/policies/state/philippines/seaareas.htm>

¹⁷ Kahana, R., Abdon, R., Daron, J., & Scannell, C. (2016). Projections of mean sea level change for the Philippines. UK: Met Office. Retrieved August 4, 2021 from https://www.precisrcm.com/DFID_Philippines_Reporting/Philippines_Sea_Level_Report_Oct_2016.pdf

Anticipated Health Impacts of Climate Change

In the face of climate change, the health of people will undoubtedly be impacted on a grand scale. There is no disease group that is immune to the effects of climate change. Climate change affects health directly, for instance, among elderly who experience heat stroke due to exposure to extreme heat, or indirectly, when climate change alters the environmental conditions for mosquito-borne diseases like dengue and malaria. This section enumerates some of the major health impacts of climate change that can affect the Filipino people in the coming decade.



How will climate change affect the health of Filipinos

Injuries and death due to typhoons and flooding. Extreme weather events such as intense rainfall and super typhoons will continue to affect millions of Filipinos. During a typhoon, extreme rainfall creates massive flooding that cause mild injuries, skin infections, trauma from electrocution, and drowning, and even death.¹⁸ According to the final report of the National Disaster Risk Reduction and Management Council (NDRMMC) on Typhoon Haiyan in 2013, over 6,000 died from drowning and trauma, and the calamity left 28,688 injured and 1,062 missing.¹⁹ Deaths from typhoons were observed at different stages: 9% before, 30% during, and 60% after the impact.²⁰ On a yearly average, there are 740 deaths reported from direct exposure to typhoons, with an additional 11,300 post-typhoon “economic deaths” from the income losses suffered by affected households.²¹

¹⁸ PAGASA. (n.d.) *Tropical cyclone information overview*. GOVPH. Retrieved August 4, 2021 from <https://bagong.pagasa.dost.gov.ph/climate/tropical-cyclone-information>

¹⁹ National Disaster Risk Reduction and Management Council. (2013). *Final Report Re: Effects of Typhoon “Yolanda” (Haiyan)*. https://ndrrmc.gov.ph/attachments/article/1329/FINAL_REPORT_re_Effects_of_Typhoon_YOLANDA_HAIYAN_06-09NOV2013.pdf

²⁰ Jagger, M., Kintziger, K., Dumas, J., & Watkins, S. (2015). *Health effects of tropical storms and hurricanes in Florida*. Florida Department of Health, Division of Disease Control and Health Protection, Bureau of Epidemiology. <https://doi.org/10.13140/RG.2.1.2540.0169>

²¹ Anttila-Hughes, J. K., & Hsiang, S. M. (2013). *Destruction, Disinvestment, and Death: Economic and Human Losses Following Environmental Disaster*. SSRN Electronic Journal. doi:10.2139/ssrn.2220501

Heat-related illnesses. When exposed to temperatures higher than that of the normal body, a person may develop heat-related illnesses which include heat cramps, heat exhaustion, and heat stroke. These health effects emerge when the body is unable to activate its normal reaction to increasing ambient temperature. The most vulnerable to extreme heat are children, persons older than 65 years old, persons with comorbidities and persons working outdoors or without a cooling system.²² Urban dwellers are at increased risk of extreme heat conditions compared to those in the rural areas, as observed in the Urban Heat Island (UHI) phenomenon.²³ Urban landscapes generally have less vegetation, less shade, and less moisture to cool down the area. The built environment of the urban setting intensifies the effects of high temperatures affecting its overall livability. In the Philippines, the city with the highest heat health risk index (HHRI) is its capital, Manila City, while the rest of the cities in Metro Manila were among the top 20 in HHRI.²⁴

Vector-borne diseases. Vector-borne diseases refer to those diseases transmitted to humans by animals such as mosquitoes and rodents. Top vector-borne diseases of concern worldwide, especially in tropical countries such as the Philippines, are dengue and malaria because of their sensitivity to changes in the climate. Dengue outbreaks often occur during flooding and droughts because these create stagnant bodies of water that become breeding grounds for the mosquitoes carrying the dengue virus. One study projected that in the National Capital Region alone, every 1°C increase in minimum temperature will cause 233 more cases, and every unit of increase in relative humidity will cause 31 additional cases.²⁵ Meanwhile, malaria is caused by parasites and spread to humans through the bites of mosquitoes. In the Philippines, malaria is an endemic disease found especially in rural provinces, with a declining incidence of 6,120 cases in 2020 – an 87% reduction from 2003.²⁶ However, this progress may be reversed if climate change continues, as increasing populations of malaria-carrying mosquitoes are observed in places with higher temperatures, rainfall and humidity, and even moving to higher altitudes that previously had no malaria cases.²⁷

Soil-borne diseases. Majority of soil-borne diseases infecting humans are transmitted by parasitic worms (“helminths”) such as hookworm, whipworm, roundworm, and schistosomiasis. In the Philippines, the three major causes of intestinal parasitism are roundworm, whipworm, and hookworm.²⁸ Transmission usually occurs in the context of poor hygiene and sanitation. In the context of climate change, helminths are affected variably. Increasing land surface temperature may cause some species to outlive the others, while some species may become dominant in other parts of the world. Mapping of soil-borne helminths in the Philippines found that higher land temperatures had increased prevalence of roundworm and whipworm infections whereas hookworm infection had decreased prevalence.²⁹ In relation to rainfall, more rainfall was associated with more incidence of whipworm infections.

²² Watts, N., Amann, M., Arnell, N., Ayeb-Karlsson, S., Beagley, J., Belesova, K., Boykoff, M., Byass, P., Cai, W., Campbell-Lendrum, D., Capstick, S., Chambers, J., Coleman, S., Calin, C., Daly, M., Dasandi, N., Dasgupta, S., Davis, M., Di Napoli, C., Dominguez-Salas, P., ... Costello, A. (2020). The 2020 report of The Lancet Countdown on health and climate change: responding to converging crises. *The Lancet*. doi:10.1016/s0140-6736(20)32290-x

²³ U.S. Environmental Protection Agency. (2008). *Reducing urban heat islands: Compendium of strategies*. Draft. Retrieved August 5, 2021 from <https://www.epa.gov/heat-islands/heat-island-compendium>

²⁴ Estoque, R. C., Ooba, M., Seposo, X. T., Togawa, T., Hijioka, Y., Takahashi, K., & Nakamura, S. (2020). Heat health risk assessment in Philippine cities using remotely sensed data and social-ecological indicators. *Nature Communications*, 11(1). doi:10.1038/s41467-020-15218-8

²⁵ Cruz, R. V. O., Aliño, P. M., Cabrera O. C., David, C. P. C., David, L. T., Lansigan, F. P., Lasco, R. D., Licuanan, W. R. Y., Lorenzo, F. M., Mamauag, S. S., Peñaflor, E. L., Perez, R. T., Pulhin, J. M., Rollon, R. N., Samson, M. S., Siringan, F. P., Tibig, L. V., Uy, N. M., Villanoy, C. L. (2017). 2017 Philippine Climate Change Assessment: Impacts, Vulnerabilities and Adaptation. The Oscar M. Lopez Center for Climate Change Adaptation and Disaster Risk Management Foundation, Inc. and Climate Change Commission.

²⁶ Department of Health. (2021). DOH, partners firm on its target to reach zero malaria case by 2030. <https://doh.gov.ph/press-release/DOH-PARTNERS-FIRM-ON-ITS-TARGET-TO-REACH-ZERO-MALARIA-CASE-BY-2030>

²⁷ Fernando, S.D. (2013, June 27). Climate change and malaria - a complex relationship. United Nations. <https://www.un.org/en/chronicle/article/climate-change-and-malaria-complex-relationship>

²⁸ Department of health (n.d.). Soil-transmitted helminthiasis and parasitoses. <https://doh.gov.ph/Health-Advisory/Soil-Transmitted-Helminthiasis-and-Parasitoses>

²⁹ Soares Magalhães, R. J., Salamat, M. S., Leonardo, L., Gray, D. J., Carabin, H., Halton, K., McManus, D. P., Williams, G. M., Rivera, P., Saniel, O., Hernandez, L., Yakob, L., McGarvey, S. T., & Clements, A. C. (2015). Mapping the Risk of Soil-Transmitted Helminthic Infections in the Philippines. *PLoS neglected tropical diseases*, 9(9), e0003915. <https://doi.org/10.1371/journal.pntd.0003915>

Water-borne diseases. Another way by which climate-sensitive pathogens threaten human health is through exposure to water and food, primarily through ingestion. Water- and food-borne diseases are affected by climate change either through: (i) direct contamination of water by pathogens in the event of floods or sea level rise, or (ii) climatic factors such as temperature and precipitation indirectly influencing the survival of pathogens and/or complicating the management of water resources, agriculture, etc.³⁰ Precipitation can facilitate the transmission of pathogens through water systems, while high temperature enables their rapid growth and survival.³¹ Among the water-borne diseases, diarrheal disease caused by bacterial, viral or parasitic pathogens is the most commonly transmitted and has a significant global burden of disease. Globally, diarrhea is the second leading cause of malnutrition and death in children under five years old, despite it being a preventable and treatable disease.³²

Diarrheal diseases are endemic to certain areas in the Philippines, particularly in areas with poor hygiene practices such as open defecation, lack of clean drinking water, and overcrowded living conditions, and during months with high rainfall. Outbreaks of diarrhea have been associated with heavy rainfall as well as dry periods. Pathogens can become concentrated in the limited water supply available during dry periods, and these pathogens can be mobilized during heavy rainfall which can contaminate drinking water sources.³³ This public health concern is further exacerbated during typhoons and floods. The WHO conservatively projects that the impact of climate change will result in an additional 48,000 deaths from diarrheal diseases between 2030 and 2050.³⁴

Another water-borne disease of public health concern is leptospirosis, which is spread through the urine of infected animals (e.g., rodents, dogs, pigs, etc.) that can contaminate soil or water. Humans become infected when urine-contaminated water or soil comes into contact with a break in the person's skin or mucous membranes (i.e., eyes, nose, mouth).³⁵ Swimming or wading in floodwater is the usual culprit for outbreaks of leptospirosis. Leptospirosis is endemic to the Philippines, and outbreaks usually occur in the months of July to October, during the typhoon season.³⁶

Food-borne diseases. Meanwhile, food-borne diseases occur when the food ingested is contaminated with pathogens. Climate change impacts the food system through many pathways and consequently influences the pathogens found in food. Climate change variables such as rainfall, temperature, and extreme events affect food production, distribution, and consumption.³⁷ Heavy rainfall can result in flooding which can contaminate crops, enabling the entry of pathogens into the food chain especially when the produce is eaten raw. Inversely, dry periods can increase the demand of irrigation water resorting to poor quality water that can cause outbreaks. In livestock, the increasing outdoor temperature drives indoor animal farming in order to combat heat stress. The conditions of indoor animal farming increase the risk of animal-to-animal transmission of pathogens which can enter the human food chain. Additionally, the increasing sea surface temperature and changes in salinity have been positively associated with *Vibrio* species.

³⁰ Cissé G. (2019). Food-borne and water-borne diseases under climate change in low- and middle-income countries: Further efforts needed for reducing environmental health exposure risks. *Acta tropica*, 194, 181–188. <https://doi.org/10.1016/j.actatropica.2019.03.012>

³¹ Cissé G. (2019). Food-borne and water-borne diseases under climate change in low- and middle-income countries: Further efforts needed for reducing environmental health exposure risks. *Acta tropica*, 194, 181–188. <https://doi.org/10.1016/j.actatropica.2019.03.012>

³² World Health Organization. (2017, May 2). Diarrhoeal disease. <https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease>

³³ Levy, K., Smith, S. M., & Carlton, E. J. (2018). Climate Change Impacts on Waterborne Diseases: Moving Toward Designing Interventions. *Current environmental health reports*, 5(2), 272–282. <https://doi.org/10.1007/s40572-018-0199-7>

³⁴ World Health Organization (2018, February 1). Climate change and health. <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

³⁵ Centers for Disease Control and Prevention. (n.d.). Leptospirosis. <https://www.cdc.gov/leptospirosis/infection/index.html>

³⁶ Amilasan, A. S., Ujiie, M., Suzuki, M., Salva, E., Belo, M. C., Koizumi, N., Yoshimatsu, K., Schmidt, W. P., Marte, S., Dimaano, E. M., Villarama, J. B., & Ariyoshi, K. (2012). Outbreak of leptospirosis after flood, the Philippines, 2009. *Emerging infectious diseases*, 18(1), 91–94. <https://doi.org/10.3201/eid1801.101892>

³⁷ Lake, I. R., & Barker, G. C. (2018). Climate Change, Foodborne Pathogens, and Illness in Higher-Income Countries. *Current environmental health reports*, 5(1), 187–196. <https://doi.org/10.1007/s40572-018-0189-9>

Food-borne disease with the highest burden is caused by *Salmonella enterica*, considered as one of the four key global causes of diarrheal diseases³⁸ that accounts for around 94 million cases of gastroenteritis each year, leading to approximately 155,000 deaths.³⁹ *Salmonella* is a bacteria that is widely present in domestic and wild animals such as in poultry, pigs, cattle, pet cats, dogs, etc. Warming temperatures favor the growth of *Salmonella*, leading to higher concentration in the food supply. Humans contract salmonellosis upon ingestion of contaminated food such as those in animal origin (e.g., milk, eggs, meat) and vegetables (contaminated by animal manure).⁴⁰ *Salmonella* can become severe and life-threatening in children and elderly due to dehydration. As climate change causes an increase in ambient temperatures, salmonella infection rate is also expected to increase with around 1000 extra cases annually.⁴¹

Emerging infectious diseases with pandemic potential. In addition to the infectious diseases mentioned above, climate change is also anticipated to lead to changes in natural ecosystems where zoonotic pathogens – those that jump from animals to human beings – thrive. An estimated 75% of emerging human infectious diseases are noted to be of zoonotic origin. The conversion of natural animal habitat into agricultural use has brought animals and humans in closer interaction, increasing the chance of exchanging pathogens.⁴² When contracted by humans, these pathogens can be spread quickly due to increased human mobility through travel, trade and migration, and complemented with weak health systems that are ill equipped to control disease transmission.

Climate change is speculated to have contributed to the emergence of the current COVID-19 pandemic, which is caused by the SARS-CoV-2 virus.⁴³ One of the hypotheses is that habitats of bats have been altered by climate change, driving them to move into new areas such as the Chinese Yunnan province which provided a suitable forest environment for these animals. The growing population of bat species in Yunnan has also increased the number of bat-borne coronavirus. Generally, viruses carried by bats do not get directly transmitted to humans. In the case of SARS-CoV-2, the coronavirus carried by bats may have been possibly transmitted to pangolins, which were then sold at the wildlife market in Wuhan where the outbreak of SARS-CoV-2 in humans is believed to have originated.

Air pollution and other effects related to fossil fuels. The health effects mentioned above are generated either through direct exposure to climate-related environmental changes (ex. heat) or indirect causation through changes in the ecosystem. Human activities that emit GHGs and drive climate change also lead to direct health impacts as well. One of the major pathways is through the generation of air pollution which is primarily due to the burning of fossil fuels such as oil, coal, and gas – the leading causes of climate change. Current air pollution exposes 91% of the world's population to poor air quality levels.⁴⁴ Each year, ambient air pollution is estimated to cause 4.2 million deaths due to stroke, heart disease, lung cancer, acute and chronic respiratory diseases.

³⁸ World Health Organization (2018, February 20). *Salmonella (non-typhoidal)*. [https://www.who.int/news-room/fact-sheets/detail/salmonella-\(non-typhoidal\)](https://www.who.int/news-room/fact-sheets/detail/salmonella-(non-typhoidal))

³⁹ Akil, L., Ahmad, H. A., & Reddy, R. S. (2014). Effects of climate change on *Salmonella* infections. *Foodborne pathogens and disease*, 11(12), 974–980. <https://doi.org/10.1089/fpd.2014.1802>

⁴⁰ World Health Organization (2018, February 20). *Salmonella (non-typhoidal)*. [https://www.who.int/news-room/fact-sheets/detail/salmonella-\(non-typhoidal\)](https://www.who.int/news-room/fact-sheets/detail/salmonella-(non-typhoidal))

⁴¹ Akil, L., Ahmad, H. A., & Reddy, R. S. (2014). Effects of climate change on *Salmonella* infections. *Foodborne pathogens and disease*, 11(12), 974–980. <https://doi.org/10.1089/fpd.2014.1802>

⁴² Ness-Edelstein, B. (2009, May 18). Swine flu, climate change, and the future of infectious diseases. *Columbia Climate School Climate, Earth, and Society*. <https://news.climate.columbia.edu/2009/05/18/swine-flu-climate-change-and-the-future-of-infectious-diseases/>

⁴³ University of Cambridge. (2021, February 5). Climate change may have driven the emergence of SARS-CoV-2. *ScienceDaily*. <https://www.sciencedaily.com/releases/2021/02/210205085718.htm>

⁴⁴ World Health Organization. (n.d.). Air pollution. https://www.who.int/health-topics/air-pollution#tab=tab_2

Coal is responsible for nearly half of annual global emissions⁴⁵, but its processing also presents grave threats to human health. Each stage in the life cycle of coal endangers human health through different yet interconnected pathways: (i) coal mining poses occupational health hazards to miners who are at great risk of developing chronic lung diseases; (ii) combustion of coal emits methane, sulfur dioxide, nitrogen oxide, carbon dioxide, and other toxic metals that pollute the air; (iii) coal washing and disposal contaminate the water sources of surrounding communities;⁴⁶ and (iv) deposition of mercury from waste to land and water gets absorbed in rice paddies which then enters the food chain.⁴⁷

Of the pollutants released from coal combustion, particulate matter 2.5 (PM2.5) is the most dangerous pollutant to human health because of its small size that can enter the lungs and the bloodstream. In the context of the current pandemic, those infected with COVID-19 and had long-term exposure to PM2.5 had greater risk of death while those with chronic respiratory disease had 170% higher risk of death.⁴⁸ The country's current roster of operating coal power plants was estimated to cause an annual 960 premature deaths in adults (due to stroke, ischemic heart disease, lung cancer, other cardiovascular and respiratory diseases) and 20 premature deaths in children due to lower respiratory infections.⁴⁹ With the addition of the proposed power plants, premature deaths are estimated to more than double up to 2,410 deaths per year.

Water pollution from sea level rise. Groundwater resources which are vital sources for human consumption are also threatened by water pollution, particularly salinization due to sea level rise.⁵⁰ This is an emerging public health concern especially for communities living in the coastlines. The effects of increased salinity of groundwater on human health are not yet widely known, but it has been associated with increased rates of high blood pressure in pregnant women of a coastal population in Bangladesh.⁵¹ High blood pressure in pregnant women is dangerous and can become life-threatening to both the mother and the baby; the mother may suffer heavy bleeding, organ damage and/or seizures, while the baby may have slow or decreased growth, and early/premature delivery. The risks of high blood pressure in pregnancy makes it one of the leading causes of maternal and perinatal mortalities in low-income countries.

Forced displacement. Movement has become a human response to hostile living conditions. When homes become dangerous to live in, or even uninhabitable, due to the threat of climate change, residents are forced to move. Forced displacement may be temporary or permanent. Challenging conditions driven by climate change such as extreme weather events (i.e., strong typhoons, floods, and droughts) are the most direct pathway for climate change to displace populations.⁵² During extreme weather events, houses are destroyed, livelihood is disrupted, and resources are scarce which may force the affected population to seek better living conditions, either temporarily or permanently. More than 60% of the Philippine population live in coastal areas, and with sea levels rising, much of these coastal areas may become uninhabitable, forcing permanent displacements. At the other extreme, famines related to droughts also force affected populations to relocate.

⁴⁵Greenpeace. (2016). Coal: A public health crisis. Greenpeace Southeast Asia. https://www.greenpeace.org/static/planet4-philippines-stateless/2019/05/f9425310-f9425310-coal_a_public_health_crisis.pdf

⁴⁶Greenpeace. (2016). Coal: A public health crisis. Greenpeace Southeast Asia. https://www.greenpeace.org/static/planet4-philippines-stateless/2019/05/f9425310-f9425310-coal_a_public_health_crisis.pdf

⁴⁷ Myllyvirta, L. & Suarez, I. (2020). Air quality & health impacts of coal-fired power in the Philippines. Centre for Research on Energy and Clean Air. https://energyandcleanair.org/wp/wp-content/uploads/2021/06/PH-Coal-Health-Report_FINAL.pdf

⁴⁸Myllyvirta, L. & Suarez, I. (2020). Air quality & health impacts of coal-fired power in the Philippines. Centre for Research on Energy and Clean Air. https://energyandcleanair.org/wp/wp-content/uploads/2021/06/PH-Coal-Health-Report_FINAL.pdf

⁴⁹Greenpeace. (2016). Coal: A public health crisis. Greenpeace Southeast Asia. https://www.greenpeace.org/static/planet4-philippines-stateless/2019/05/f9425310-f9425310-coal_a_public_health_crisis.pdf

⁵⁰Castaño-Sánchez, A., Hose, G.C. & Reboleira, A.S. (2020). Salinity and temperature increase impact groundwater crustaceans. *Scientific Reports* 10, 12328 (2020). <https://doi.org/10.1038/s41598-020-69050-7>

⁵¹Khan A.E., Scheelbeek P.F., Shilpi A.B., Chan Q., Mojumder S.K., Rahman A., Haines, A., & Vineis, P. (2014). Salinity in drinking water and the risk of (pre) eclampsia and gestational hypertension in coastal Bangladesh: A case-control study. *PLoS ONE* 9(9): e108715. <https://doi.org/10.1371/journal.pone.0108715>

⁵²IPCC (2014). *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pp.

Typhoons that regularly strike the Philippines displace several people who are evacuated before the typhoon makes landfall or forced to evacuate due to uninhabitable conditions. According to the International Displacement Monitoring Centre (IDMC), there have been 4,439,000 movements worldwide in 2020 alone as a reaction to disasters.⁵³ The annual average of movements from 2011 and 2020 is 3.6 million, most of which were triggered by typhoons and subsequent floods, storm surges, and high winds. Typhoon Haiyan caused the largest single displacement, with over 4 million people displaced. In 2020, Typhoons Ulysses, Rolly, and Quinta forced more than 3 million new displacements. Generally, displaced victims return to their homes as soon as it is safe, but many are forced to remain in evacuation centers due to inadequate housing. Six months after typhoon Yolanda, most displaced people returned to their homes, but more than 2 million people did not have adequate housing.

Food system as a driver and victim of climate change. The current food system is both a driver and a victim of climate change. The global food system feeds the world's population and provides livelihood for over 1 billion people.⁵⁴ While there is sufficient food to meet the global demand, not everybody has access to the right quantity and quality at all times. In the last five decades, food supply has increased to more than 30%.⁵⁵ Paradoxically, while there are approximately 2 billion people who are overweight or obese, there are also 821 million people who are undernourished and 151 million children under 5 years old who are stunted. To worsen the situation, the same food system is responsible for 21-37% of total greenhouse gas emissions with emissions particularly from agriculture and land use, storage, transport, packaging, processing, retail, and consumption, including the livestock sector.

While the food system contributes to climate change, it has also become increasingly vulnerable to the effects of climate change.⁵⁶ A decline in crop productivity was seen in rising temperatures with more frequent floods and prolonged droughts, threatened by increased infestation of pests and diseases, and declining viability of some crop varieties from high ozone concentration. Livestock is most critically affected by rising temperature, as it decreases animal production and reproduction, afflicts animal health due to heat stress, and increases animal disease. A decrease in agricultural productivity will decrease agricultural supply, driving the cost of food prices up, making it less accessible. Higher food prices will cause a decline in consumer demand pushing them to reduce the quantity (i.e., calorie intake) and quality (i.e. nutrient content) of their food. Food accessibility is also threatened in those who depend on the environment for food and nutrition, particularly those in mountain regions, coastal and low-lying areas, in the Pacific Islands, and in the Arctic – places that are significantly affected by climate change. Climate change also threatens food safety, mainly from contaminants entering the food chain at various stages (ex: Salmonella from contaminated pastures). If not anticipated and addressed, all these food system impacts of climate change may threaten the general nutritional status of Filipinos in the coming decade.

Mental health conditions. The wide-ranging effects listed above all pertain to the physical health impacts of climate change. It is important to also remember that climate change will also affect the mental health of Filipinos in the next decade. Mental health refers to positive well-being, not merely the absence of illness or disorder. While the physical destruction from the impacts of climate change is hard to ignore, the impacts on mental health of those affected are much less evident hence often neglected. Mental health suffers from being directly affected by climate change-related events and/or from having deep concern about climate change and its consequences.

⁵³International Displacement Monitoring Centre. (n.d.). Philippines: Country information. <https://www.internal-displacement.org/countries/philippines>

⁵⁴Food and Agriculture Organization (2016). *Climate change and food security: risks and responses*. Rome, Italy: FAO.

⁵⁵ Mbow, C., C.Rosenzweig, L.G.Barioni, T.G.Benton, M.Herrero, M.Krishnapillai, E.Liwenga, P.Pradhan, M.G.Rivera-Ferre, T. Sapkota, F.N. Tubiello, Y. Xu, 2019: Food Security. In: *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems* [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D.C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press.

⁵⁶ Mbow, C., C.Rosenzweig, L.G.Barioni, T.G.Benton, M.Herrero, M.Krishnapillai, E.Liwenga, P.Pradhan, M.G.Rivera-Ferre, T. Sapkota, F.N. Tubiello, Y. Xu, 2019: Food Security. In: *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems* [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D.C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press.

Climate change events have been linked to a range of poor mental health outcomes. Mental health problems suffered by survivors of disasters include stress-related reactions, post-traumatic stress disorder (PTSD), depression, and anxiety in the context of disrupted social relations, economic stress, and displacement.⁵⁷ In a disaster-stricken population, it is estimated that approximately 30-40% are found to have psychological morbidity within the first year of the event. This situation may improve after two years, but it is also expected to become a chronic disease burden.⁵⁸ Years after Typhoon Haiyan in 2013, survivors still suffer mentally and emotionally. The shock of Haiyan's impact overwhelmed the disaster response which was more focused on providing basic needs such as food and shelter, setting mental health aside.⁵⁹ Meanwhile, extreme high temperatures and heatwaves have been linked with higher rates of suicide, increased mental stress, and more hospital visits for mental health conditions.⁶⁰ A 1°C temperature increase past the threshold of a location has also been shown to result in a 1% increase in suicide rates.

Witnesses to climate change also experience mental health problems without being directly affected. They experience the impact of climate change vicariously, for instance through media exposure. Awareness of the climate crisis triggers “eco-emotion” – a strong emotional response and/or distress regarded as a non-pathological “rational response to the facts.”⁶¹ “Climate grief” is the grief related to an experienced or anticipated ecological loss as a result of acute or chronic environmental change. Climate grief was felt by those whose environment had been destroyed such as the indigenous peoples, farmers, and other frontline communities. “Solastalgia” is the distress caused by environmental change perceived as an attack on someone’s sense of home, as in the stripping of mountains for mining or a volcanic eruption, events that have similarities with climate-related extreme weather events. “Eco-anxiety” is rooted in feelings of uncertainty, unpredictability, and uncontrollability brought about by the climate crisis. Eco-anxiety is not to be regarded as a pathological anxiety but is actually a moral emotion as an “accurate appraisal of the severity of the ecological crisis.”⁶² These new terms reflect the growing attention towards the psychological impacts of climate change.

Although the Philippines is one of the most vulnerable countries to climate change, the damage on people’s mental health is expected to be great but remains poorly understood. With the Philippine health system already struggling to meet the demands of “more urgent” patient needs, mental health has not been among the top priorities. Mental health receives only 2.65% of the health budget, most of which go to hospitals.⁶³ In a population of over 110 million people, there are less than 600 psychiatrists (0.5 psychiatrist per 100,000 population), 500 psychiatric nurses (0.5 psychiatric nurse per 100,000) and 133,000 psychologists (0.1 per 100,000) working in the country. Mental health service provision at both local and national levels remains poorly organized, as reflected especially during disaster response. On top of these, the social stigma and shame against the notion of mental health perpetuate poor mental health-seeking behavior of Filipinos to health professionals. The country’s new Mental Health Act⁶⁴ is hoped to address these gaps, which will be vital for enhancing the country’s mental health resilience to the climate crisis.

⁵⁷Hugelius, K., Gifford, M., Örtengren, P., & Adolfsson, A. (2017). Health among disaster survivors and health professionals after the Haiyan Typhoon: A self-selected internet-based web survey. *International Journal of Emergency Medicine*, 10(13). <https://doi.org/10.1186/s12245-017-0139-6>

⁵⁸Rataj, E., Kunzweiler, K., & Garthus-Niegel, S. (2016). Extreme weather events in developing countries and related injuries and mental health disorders - a systematic review. *BMC Public Health*, 16(1020), 1-12. DOI 10.1186/s12889-016-3692-7

⁵⁹Enano, J. (2019, November 8). Six years after ‘Yolanda,’ mental scars linger. *Inquirer.net*. <https://newsinfo.inquirer.net/1187193/6-years-after-yolanda-mental-scars-linger#ixzz6zNu6taCV>

⁶⁰Lawrance, E., Thompson, R., Fontana, G., & Jennings, N. (2021). The impact of climate change on mental health and emotional wellbeing: current evidence and implications for policy and practice. *Grantham Institute*, 36. DOI: 10.25561/88568

⁶¹Lawrance, E., Thompson, R., Fontana, G., & Jennings, N. (2021). The impact of climate change on mental health and emotional wellbeing: current evidence and implications for policy and practice. *Grantham Institute*, 36. DOI: 10.25561/88568

⁶²Panu, P. (2020). Anxiety and the ecological crisis: An analysis of eco-anxiety and climate anxiety. *Sustainability* 12(19), 7836. <https://doi.org/10.3390/su12197836>

⁶³World Health Organization. (2020). Philippines: WHO special initiative for mental health situational assessment. https://www.who.int/docs/default-source/mental-health/special-initiative/who-special-initiative-country-report---philippines--2020.pdf?sfvrsn=4b4ec2ee_8

⁶⁴World Health Organization. (2020). Philippines: WHO special initiative for mental health situational assessment. https://www.who.int/docs/default-source/mental-health/special-initiative/who-special-initiative-country-report---philippines--2020.pdf?sfvrsn=4b4ec2ee_8

What can Filipinos do to protect health from climate change?

The health impacts of climate change are vast and diverse, affecting every human being, but most especially the most vulnerable such as children, women, the elderly, and the poor. Unfortunately, as the climate emergency continues to worsen, COVID-19 is not the last health crisis of its kind that the Philippines and the world will be encountering in the future. Hence, climate action is needed not tomorrow but now. There are five major actions that Filipinos and the global community must urgently do to protect the health of every human being now and in the years and decades to come.

From now on, climate change must be viewed as a public health issue. This report summarized the growing evidence on the public health impacts of climate change especially in the Philippine context. Climate change is not anymore just an issue about dehydrated polar bears or melting ice caps – at its very core, it is an issue of human health and survival. It affects not only our wellbeing but also that of the future children of the Philippines and the world. The COVID-19 pandemic, which is a global health crisis, made every citizen and sector realize the importance of good health and the need for every sector to work together towards improving health for all. The climate crisis, which certainly has similarities with COVID-19 but also has much broader and longer-term impacts worldwide, will also require the same health-oriented mindset and collaborative action across all sectors. From now on, when climate change is discussed, its deep connection with human health must be clearly articulated as well. Such reframing is aligned with the emerging concept of “planetary health” – that the health of people and that of the planet are inextricably intertwined, and the care for both must be deeply integrated.⁶⁵

Rapid decarbonization to stabilize the climate will be good not just for the planet but for people’s health too. The Paris Agreement, which was signed in 2015 by the world’s countries including the Philippines, set a global target of keeping the increase of global average temperature below 2 degrees Celsius, preferably 1.5, and the deadline given is the year 2030.⁶⁶ This means that the global community only has nine years remaining to pursue **climate mitigation** and protect the climate system from irreversible catastrophe. Hence, the Philippine government must sustain the advocacy for accelerated worldwide decarbonization as it also reduces its own GHG emissions, negligible they may be compared with those coming from highly industrialized countries. Beyond the 2021 United Nations climate change negotiations (COP26), the government must continue in demanding high-emitting countries to honor their emission reduction commitments as well as their pledges for extending financial assistance and technology transfer to developing countries, which will enable countries like the Philippines to quickly transition towards a greener economy. The Philippines’ Nationally Determined Contributions (NDC), which articulates the country’s commitment to reduce its emissions by 70% by 2030 relative to its Business-As-Usual (BAU) scenario, must guide investments in the rapid transition to clean renewable energy, green and equitable transport, sustainable and healthy food systems.⁶⁷ These climate mitigation actions will not only be beneficial for the environment but also for public health – cleaner air will be good for people’s hearts and lungs, and nutritious food will combat both undernutrition and obesity while not emitting carbon.

⁶⁵Whitmee, S., Haines, A., Beyrer, C., Boltz, F., Capon, A. G., de Souza Dias, B. F., Ezeh, A., Frumkin, H., Gong, P., Head, P., Horton, R., Mace, G. M., Marten, R., Myers, S. S., Nishtar, S., Osofsky, S. A., Pattanayak, S. K., Pongsiri, M. J., Romanelli, C., Soucat, A., ... Yach, D. (2015). *Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation-Lancet Commission on planetary health*. *Lancet*, 386(10007), 1973–2028. [https://doi.org/10.1016/S0140-6736\(15\)60901-1](https://doi.org/10.1016/S0140-6736(15)60901-1)

⁶⁶United Nations Framework Convention on Climate Change. *The Paris Agreement*. <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

⁶⁷Ranada, P. (2021, April 15). *Philippines vows to reduce emissions by 75%, mostly conditioned on aid*. *Rappler*. <https://www.rappler.com/nation/philippines-vows-reduce-greenhouse-gas-emissions-nationally-determined-contributions>

Building societal resilience to climate change and its health effects is also an urgent priority since climate change is already happening. While pursuing more ambitious GHG reductions to stop climate change, leaders and other stakeholders must also recognize that climate change is already impacting the health of communities in the Philippines and around the world. Hence, in addition to climate mitigation, climate adaptation cannot be further delayed as well. The Philippine society, including the national health system, must develop its adaptive capacity and implement measures to enhance its resilience to climate change, disasters, and myriad health impacts. This is no easy task, especially since the country is far from recovering from the ongoing COVID-19 pandemic, but efforts to strengthen systems for pandemic response can also be harness for climate resilience. Unfortunately, the climate crisis is beginning to wreak havoc in the most marginalized of communities, and so climate adaptive responses must be mounted as soon as possible. The National Climate Change Action Plan (NCCAP) must be updated and implemented, ensuring that climate change is mainstreamed in all sectors including the health sector.⁶⁸ Moreover, since communities are in the frontlines of climate change, resilience building must be localized. The Local Climate Change Action Plan (LCCAP) of municipalities across the country must not only be updated to align with emerging realities, but also adequately resources so that local efforts are effectively implemented. Since significant health impacts will be anticipated as climate change worsens, hospitals and health facilities must be strengthened to ensure that they are the last building standing in the face of climate disasters. More broadly, “climate-smart health care” – which is the convergence of climate-resilient and low-carbon health systems – must be the framework for the health sector’s agenda in the coming years.⁶⁹ The preparedness of households, communities and workplaces cannot be ignored as they are the first line of health protection, as demonstrated by the COVID-19 pandemic.

Communicate climate and health knowledge to all citizens to raise awareness and equip them with tools to contribute to both mitigation and adaptation. Climate and health literacy must be expanded to ensure that households and communities are deeply aware of climate change and its links to human health. Moreover, people from all walks of life must be equipped with knowledge and skills to enable them to make mitigation actions and also prepare for and adapt to the long-term impacts. Compared with people from other countries, Filipinos are more familiar with the problem of climate change, as unfortunately this is not anymore a future scenario but a current reality already experienced by many. Disaster victims have experienced first-hand the devastation created by climate-related extreme weather events, while farmers and fisherfolk are already witnessing the impacts of climate change on agriculture and fisheries. Such lived experience must be complemented with knowledge on how to cope with the consequences brought about by a warming planet. Children and young people, who will be the generation that will bear the brunt of climate change in the coming decades, must also receive climate and health education in school. But such education must be provided to adults too, including leaders, policymakers, decision makers, and professionals who have the power to make urgent decisions that can change the trajectory of the climate emergency. Frontliners such as health professionals must be equipped with knowledge and skills to manage the harms of climate change, for instance on how to treat climate-sensitive diseases. As shown by the COVID-19 experience, digital platforms have become an important vehicle for information dissemination and public education, but significant effort must be made to fight “fake news” and other forms of misinformation, including messages that deny the existence of human-induced climate change or offer false solutions. Larger systemic change, for instance in the economic, energy, transport, and food systems, must be coupled by everyday behavioral change by all citizens – hence climate and health education is necessary.

⁶⁸National Climate Change Action Plan 2011-2028. <http://climate.emb.gov.ph/wp-content/uploads/2016/06/NCCAP-1.pdf>

⁶⁹Bouley, T., Roschnik, S., Karliner, J., Wilburn, S., Slotterback, S., Guenther, R., Orris, P., Kapser, T., Platzer, B.L., Torgeson, K. (2017). *Climate-Smart Healthcare: Low-Carbon and Resilience Strategies for the Health Sector*. Washington, DC: World Bank. <http://documents.worldbank.org/curated/en/322251495434571418/Climate-smart-healthcare-low-carbon-and-resilience-strategies-for-the-health-sector>.

Financial security at all levels is a climate adaptation measure. The impacts of climate change on physical and mental health will eventually affect the financial health of individuals, households, and communities. While it is hard to calculate the actual cost of climate-sensitive diseases, it is known that healthcare needs lead to depletion of savings resulting from hospitalization and loss of incomes due to absenteeism. Therefore, financial security in anticipation of a warming planet is an urgent priority. The COVID-19 pandemic has revealed the importance of a good baseline of financial security to cushion from the negative impacts of external shocks such as pandemics and climate-related disasters. Financial security must be embedded at all levels. Individuals and households must have access to stable jobs, steady income streams, and health insurance, for instance for climate-sensitive diseases such as dengue. Specific climate-sensitive sectors such as agriculture must also be provided with financial protection, for instance through crop insurance, as well as subsidies and grants to enable farmers to access climate-resilient farming technologies. Local governments as well as the national government must also allocate adequate financing for climate adaptation and preparedness. For instance, the Philippine government's People's Survival Fund, which is a special fund dedicated to climate resilience amounting to PhP 1 billion annually, has been largely underutilized since its creation in 2011.⁷⁰ Moving forward, it must be made more accessible to communities across the country. After being derailed by the ongoing pandemic, the country's Universal Health Care agenda, which guarantees access to quality healthcare for all Filipinos to protect them from financial hardship, must be revitalized immediately.⁷¹

The COVID-19 pandemic gave us a glimpse of how worldwide disruption, disease, and despair will look like if the climate emergency is not averted. The climate clock is ticking fast, and time is running out. The health of people – of ourselves, our children, and future generations – is at stake. We must act now before it is too late.

⁷⁰De Vera, B.O. (2020, November 26) DOF: Annual fund to combat climate change underutilized. *Philippine Daily Inquirer*, <https://business.inquirer.net/312493/dof-annual-fund-to-combat-climate-change-underutilized>

⁷¹World Health Organization (2019, March 14). UHC Act in the Philippines: a new dawn for health care. <https://www.who.int/philippines/news/feature-stories/detail/uhc-act-in-the-philippines-a-new-dawn-for-health-care>

