PROCEEDINGS BOOK
12th ICEEE–2021
"Global Environmental Development & Sustainability: Research, Engineering & Management"
November 18 – 19, 2021 RKK – Óbuda University, Budapest, Hungary
ISBN: 978-963-449-256-6 www.iceee.hu

CLIMATIC CHANGES AND NATURAL DISASTERS AFFECTING THE GLOBAL ENVIRONMENT

Hosam E.A.F. BAYOUMI HAMUDA

Institute of Environmental Engineering and Natural Sciences, Rejtő Sándor Faculty of Light Industry and Environmental Engineering, Óbuda University, Budapest, Hungary Phone: +36303900813, E-mal: Bayoumi.hosam@uni-obuda.hu

Abstract: *Today, there is near universal consensus among the world's professions that human activity is causing climate change. The Intergovernmental Panel on Climate Change (IPCC) cautions that global greenhouse gas emissions should be cut in half by 2030 and reach net zero emissions by mid-century in order to avert the most catastrophic consequences climate change. Climate change in combination with other factors is putting at least one million plant and animal species at risk of extinction around the world. Changes in the global climate exacerbate climate hazards and amplify the risk of extreme weather disasters. Increases of air and water temperatures lead to rising sea levels, supercharged storms and higher wind speeds, more intense and prolonged droughts and wildfire seasons, heavier precipitation and flooding. The evidence is overwhelming and the results devastating: The number of climate-related disasters has tripled in the last 30 years. Between 2006 and 2016, the rate of global sea-level rise was 2.5 times faster than it was for almost all of the 20th century. More than 20 million people a year are forced from their homes by climate change. The United Nations Environment Program estimates that adapting to climate change and coping with damages will cost developing countries $140-300 billion per year by 2030. Extreme weather disasters affect all countries, rich and poor. But as we face a future with enhanced risks, it is critical to face the reality of those who bear the burden of our changing climate. For Oxfam, this is an issue of justice: those living in poverty are the hardest hit by climate change despite being the least responsible for the crisis. Climate change is forcing people from their homes, bringing poverty on top of poverty and increasing hunger. People in poorer countries are at least four times more likely to be displaced by extreme weather than people in rich countries. The world faces a race against time to reduce emissions and help the most vulnerablecope with climate impacts that are already being faced today and will escalate in the years ahead. It's time to act now.*

Keywords:*. climate change, extreme weather disasters, United Nations Environment Program*

INTRODUCTION

- The major public health organizations of the world have said that climate change is a critical public health problem.
- Climate change makes many existing diseases and conditions worse, but it may help introduce new pests and pathogens into new regions or communities.
- As the planet warms, oceans expand and the sea level rises, floods and droughts become more frequent and intense, and heat waves and hurricanes become more severe. (Figure 1)
- The most Climate change stresses our health care infrastructure and delivery systems.

Figure 1. Some of pictures of environmental changes due to climatic changes

Climate change is already damaging the health of the world's population and is set to have lifelong health consequences for future generations.

- We now know that man-made climate change is real and that it poses a great threat to the planet and its inhabitants.
- Current data suggest that we need to reduce greenhouse-gas emissions in developed countries by at least 80% by 2050 in order to have a chance of staying below an average temperature rise of over 2ºC.
- Factory farming is a major contributor to the climate change challenge, releasing vast volumes of greenhouse gases.
- It's not just CO_2 that's the problem: gases including CH_4 and NOx, produced in significant quantities, are released through various sources including animal waste and fertilizer use.
- Livestock farming produces 37% and 65% of our global CH_4 and NOx emissions respectively.
- Both gases are much more potent than CO_2 .
- Climate change is already harming food production and these impacts are projected to increase over time, with potentially devastating effects.
- Higher temperatures, for example, could place further stress on water-scarce regions and make it harder to rear animals and grow food crops.
- According to the Convention on Biological Diversity climate change may affect plant growth and production by promoting the spread of pests and diseases, increasing exposure to heat stress and encouraging soil erosion due to stronger winds.
- The climate crisis is one of the greatest threats to the health of humanity today, but the world has yet to see a response from governments that matches the unprecedented scale of the challenge facing the next generation
- The clinical, global health and research community needs to come together now and challenge our international leaders to protect the imminent threat to childhood and lifelong health.

Climatic Changes

- The climate is the normal weather in a specific area.
- When the normal temperature and the amount of rain in a specific area changes, there is a transition in the normal weather.
- This is climate change. Not only in specific areas climate change is observed, all over the world the consequences of climate change are felt.
- Global climate change is directly affects the main environmental components: water, air, weather, and ecosystems.
- Changes in precipitation, temperatures, and melting of ice caps are already occurred and will create new changes in the availability and quality of water and temperature.
- Health and Climate Change has found that, if carbon emissions and climate change continue at the current rate, a child born today will face a world on average 4˚C warmer by their 71st birthday, threatening their health at every stage of their lives.
- Health and Climate Change makes clear that climate change is taking a heavy toll on people's health, and the toll is heaviest on those who have contributed least to changing our planet's climate.
- For the world to meet its climate goals and protect the health of the next generation, the energy landscape will have to change drastically, and soon, the report warns.
- Nothing short of a 7.4% year-on-year cut in fossil CO_2 emissions from 2019 to 2050 will limit global warming to the more ambitious goal of 1.5°C.

Categories of Human Health

- the categories of human health consequences of global climate change such as
    1. asthma,
    2. respiratory allergies,
    3. air quality diseases,

4. cancer,
5. cardiovascular
6. Disease and stroke,
7. food-, water-borne,
8. vector-borne and
9. zoonotic diseases,
10. nutrition,
11. weather and heat-related morbidity and mortality,
12. human developmental impacts,
13. mental health and stress-related disorders,
14. neurological diseases and disorders,
15. Pesticides and chemical exposure
16. Food safety, distribution, and nutrition
17. Extreme weather event
18. Vulnerable populations, etc.

- Climate science has concluded that the rise in average temperatures will lead into more frequent and severe **acute hazards**, such as floods and heat waves, and the **intensifying of chronic hazards**, such as rising sea levels and drought.

By definition

- Climate risk is a term referring to risk assessment based on formal analysis on the consequences, likelihoods and responses to the effects of climate change and how societal constraints shape adaptation options.
- But what does this mean for finance?
- In close connection to live-ability and work-ability are the conditions of food systems.
- Every corner of the World has at some point experienced events that have led to difficulties in food production.
- This kind of situation developing in many areas simultaneously could prove to be devastating.
- Climate change is already shifting ecosystems and as the phenomenon continues, more of them are lost to unfavourable conditions.
- On the other hand a change can mean that even if conditions worsen somewhere, they might become favourable in someplace else.
- Extreme conditions put under strain the manmade physical assets such as buildings and infrastructure.
- Damage and destruction in this area is prone to have knock-on effects, such as disruption of certain services or an increase in the costs of some others.
- This can create distrust that in turn further shakes the foundations of the whole socioeconomic structure.
- Climate Change is arguably the greatest challenge facing mankind today.
- Every walk of life is affected and will become more so over time if serious action is not taken.
- Climate Change introduces great risk to every aspect of our world, and especially **Financial Risk in the banking sector**.

OVERVIEW OF THE POTENTIAL HEALTH IMPACTS OF CLIMATE CHANGE

Drivers of Health Issues

1. Population density
2. Urbanization
3. Public health infrastructure
4. Economic and technologic development
5. Environmental conditions

6. Populations at risk:
    1. Poor
    2. Children
    3. Increasing population of elderly residents
    4. Immunocompromised

Attention

- **Today, we need a global cooperation to maximize the potential for discovery of new information and opportunities for success in providing key information to support responsive and effective decisions on climate change and health**.

Health Impacts of Floods (Figure 2)

- Immediate deaths and injuries
- Nonspecific increases in mortality
- Infectious diseases – leptospirosis, hepatitis, diarrheal, respiratory, and vector-borne diseases
- Exposure to toxic substances
- Mental health effects
- Increased demands on health systems

Figure 2. Impacts of Floods

HEALTH DATA TO DETERMINE THE CURRENT BURDEN OF CLIMATE-SENSITIVE DISEASES

Questions to be addressed

- What climate-sensitive diseases are important in the country or region?
- What is the current burden of these diseases?
- What factors other than climate should be considered?
- Water, sanitation, etc.
- Where are data available?
- Are health services able to satisfy current demands?

METHODS OF ASSESSING HUMAN HEALTH VULNERABILITY AND PUBLIC HEALTH ADAPTATION TO CLIMATE CHANGE

Methods for:

- Estimating the current distribution and burden of climate-sensitive diseases
- Estimating future health impacts attributable to climate change
- Identifying current and future adaptation options to reduce the burden of disease

Estimate Potential Future Health Impacts

- Requires using climate scenarios
- Can use top-down or bottom-up approaches
- Models can be complex spatial models or be based on a simple exposure-response relationship
- Should include projections of how other relevant factors may change
- Uncertainty must be addressed explicitly

Risk of Vector-Borne Diseases

- Four qualitative scenarios developed of changes in climate and in vector populations
    1. Vector not present
    2. Local distribution of vector
    3. Widespread distribution of vector
    4. Change from local to potentially regional distribution
- Expert judgment determined likely risk under each scenario for 5 vector-borne diseases

Estimating the Global Health Impacts of Climate Change

- What will be the total potential health impact caused by climate change (2020 to 2030)?
- How much of this could be avoided by reducing the risk factor (i.e. stabilizing greenhouse gas (GHG) emissions)?

Questions for Designing Adaptation Policies and Measures

- Adaptation to what?
- Is additional intervention needed?
- What are the future projections for the outcome? Who is vulnerable?
- On scale relevant for adaptation
- Who adapts? How does adaptation occur?
- When should interventions be implemented?
- How good or likely is the adaptation?

Current and Future Adaptation Options

- What is being done now to reduce the burden of disease? How effective are these policies and measures?
- What measures should begin to be implemented to increase the range of possible future interventions?
- When and where should new policies be implemented?
- Identify strengths and weaknesses, as well as threats and opportunities to implementation

Public Health Adaptation to Climate Change

- **Existing risks**
    - Modifying existing prevention strategies
    - Reinstitute effective prevention programs that have been neglected or abandoned
    - Apply win/win or no-regrets strategies
- **New risks**

Options for Adaptations to Reduce the Health Impacts of Climate Change (Table 1)

Health Outcome	Legislative	Technical	Educational-advisory	Cultural & Behavioral
Thermal stress	Building guidelines	Housing, public buildings, urban planning, air conditioning	Early warning systems	Clothing, siesta
Extreme weather events	Planning laws, economic incentives for building	Urban planning, storm shelters	Early warning systems	Use of storm shelters
Vector-borne diseases		Vector control, vaccination, impregnated bednets, sustainable surveillance, prevention & control programmes	Health education	Water storage practices
Water-borne diseases	Watershed protection laws, water quality regulation	Screening for pathogens, improved water treatment & sanitation	Boil water alerts	Washing hands and other behavior, use of pit latrines

CONCLUSIONS

- Climate change may already be causing a significant burden in developing countries
- Unmitigated climate change is likely to cause significant public health impacts out to 2030
  - Largest impacts from diarrhea, malnutrition, and vector-borne diseases
- Uncertainties include:
  - Uncertainties in projections
  - Effectiveness of interventions
  - Changes in nonclimatic factors