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Health Hazards due to Environmental Impacts

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Abstract

Objective: The main purpose of the study is to understand the negative impact of environmental changes on human health.

Research design and method: Secondary qualitative or thematic analysis has been chosen to the present study.

Result: Maintaining good health necessitates a focus on chemical safety. Climate change and the risks to public health occur simultaneously. Many diseases on a worldwide scale can be attributed to subpar environmental conditions.

Conclusion: Different types of environment factor and their changes causes negative effect to the human health.

Keywords: Environmental factors, health hazards, diseases, chemical and biological changes

INTRODUCTION

Research background

Any agent or circumstance that may be harmful to human health is considered a health hazard. “Physical”, “chemical”, “biological”, and “mental” threats are all included under this. Workplaces, homes, and the natural environment all pose unique dangers to people's health. Toxic substances, temperature extremes, infectious diseases, noise pollution, radiation, and mental stress are all examples of potential health risks. Problems with one's health, both short- and long-term, may result from exposure to these risks [1]. The prevention of injury to individuals or entire populations requires the detection and control of potential health risks. Implementing safety procedures, providing protective equipment, and controlling exposure limits are all viable options for accomplishing this.

Many health risks result from being exposed to environmental elements, hence the two are intrinsically linked. Humans are vulnerable to a wide variety of health risks due to the environments in which they live and work, including those that are physical, chemical, biological, and psychological in nature.

Human health can be negatively impacted by environmental dangers such as air pollution, water pollution, climate change, and harmful chemical or substance exposure. “Asthma”, “chronic obstructive pulmonary disease (COPD)”, and even lung cancer have all been related to long-term exposure to air pollution. Lead poisoning and other environmental hazards can

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cause permanent brain damage, stunted growth, and other issues. Heat-related illness, infectious disease, and mental health problems are all on the rise as a result of climate change. But, there are also ways in which one's surroundings can work to one's advantage in terms of health and well-being [2]. Having access to natural environments, potable water, and nutritious food can improve one's physical and emotional well-being, alleviate stress, and enhance one's quality of life. The public's health must be safeguarded by identifying and mitigating environmental health risks, and the environment must be encouraged as a resource for human health and well-being. This can be done in a number of ways, including through the dissemination of public health information, the control of environmental risks, and the encouragement of environmentally sound practices.

Aim and objective

Aim

The main aim of the study is to determine the impact of different environmental factors of the environment in the health hazards.

Objective

The three objectives of the study are:

- To understand the negative impact of climate change on health of a population
- To evaluate the necessities of chemical safety to maintain proper health
- To study about poor air and water quality and their negative contribution to health

Research rationale

It is challenging to provide an exact assessment of the number of health hazards occurring in the world as a result of environmental effects because of the huge variation that can occur depending on factors such as location, population density, and industrialization levels. The worldwide burden of disease is, nevertheless, largely attributable to environmental influences, as various studies have revealed.

Around 25% of “all deaths and 23%” of the worldwide “burden of illness” can be “attributed to environmental risk factors” such as “air pollution”, contaminated water, and poor sanitation, as reported by the “World Health Organization (WHO)” [3]. Heat-related illnesses, hunger, infectious “diseases, and mental health” difficulties “are just some of the health” problems that are predicted to become more common as a result of climate change. There are two primary kinds of dangers to health from the environment. Poor countries and their inhabitants are particularly vulnerable to the traditional hazards that result from a lack of growth and financial opportunities. In Africa, these are 10 times more damaging than modern health hazards, in Asia they are 5 times more damaging, and in Latin America and the Middle East they are only 2.5 times more damaging. The health consequences of water-related illnesses, which are due primarily to inadequate sanitation and access to water, is hugely

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disproportionate in Africa, Asia, and the Pacific. More than 700,000 kids under the age of five die from diarrhoea every year in India. Over fifty thousand individuals per year pass away from malaria in Africa.

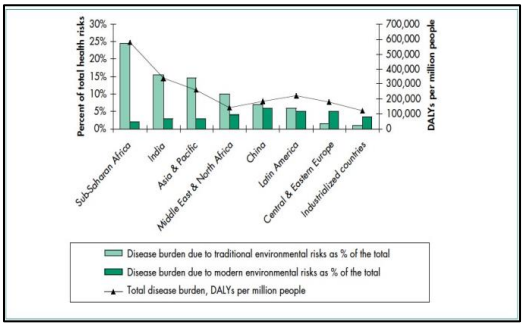

Figure 1: Conventional environmental health risks are more common in developing countries, but other threats are equally important to consider

Low-income communities, indigenous peoples, and people in developing nations with poor healthcare and infrastructure are particularly at risk from environmental health threats. Nonetheless, people of all ages and ways of life are vulnerable to environmental health risks.

Prevention, mitigation, and adaptation are all necessary to lessen the global health burden of environmental health threats [4]. Reducing greenhouse gas emissions, promoting sustainable environmental practices, increasing "access to clean water and sanitation", and providing education and resources to help individuals and communities reduce their exposure to environmental health hazards are all examples of possible actions in this vein.

METHODOLOGY

A research approach refers to the method or strategy used to conduct a research study. It involves the systematic and organised way of "collecting, analysing, and interpreting" data to address a "research question or problem" [5]. "There are various research approaches", and the "choice of approach" will "depend on the nature of the research question", "the type of data" required, and the available resources. ***"Qualitative research approach"*** involves "gathering and analysing" non-numerical data through methods such as "interviews, observations, and case studies".

Figure 2: Concept of qualitative research

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The focus is to "gain an in-depth understanding" of a particular phenomenon or experience. Therefore, the researcher has chosen a qualitative type of research design.

Under "research design", researchers define the overall theme that specifies how the researcher gathers information, evaluates it, and interprets their findings. The purpose of any study research should be to provide an answer to the study's question as completely, accurately, and legitimately as appropriate [6]. Moreover, to evaluate an idea, experts use an "***experimental method"***, in which they modify any combination of the explanatory variables and quantify the results. In time of drawing conclusions regarding the exact nature of the relation between parameters, the scientist might employ the design's facility for implying direction.

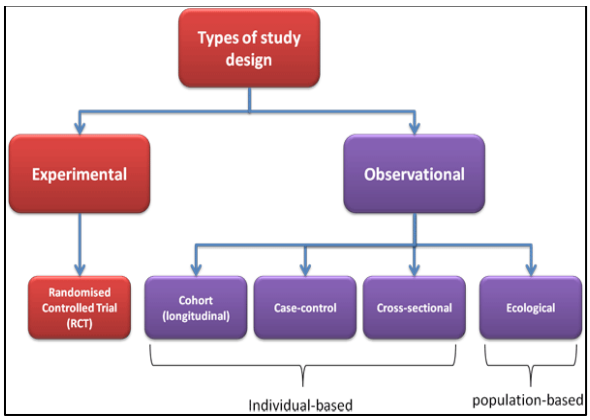

Figure 3: Types of research design

The term "research philosophy" has been employed to describe the general worldview that motivates the researcher throughout the study. It provides as the study's concept, determining how the researcher would proceed with acquiring information and examining it for findings. One must evaluate the research questions, technique, and aims before choosing one specific philosophy of research [8]. The world, in accordance with the "***positivist research philosophy***", is objective and subject to analysis via scientific research and observation. The relevance of mathematical evaluation and measurement is highlighted. Information and facts are obtained through the process of data collecting, which could involve questionnaires, experiments, sightings, and online resources. The data is collected and recorded methodically about a phenomenon or topic for further analysis and inference.

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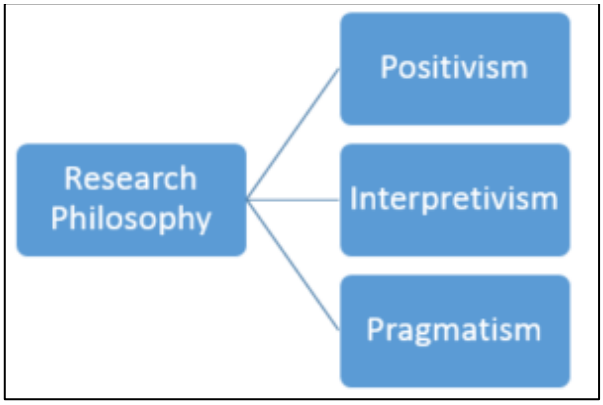

Figure 4: Types of research philosophy

The goal of any information gathering effort should be to result in the collection of honest, trustworthy, and areas that may be used for the objective of arriving at better, more educated decisions, delivery and effectiveness, or upgrading offerings. Steps in data collection include establishing a research question or issue statement, establishing a methodological approach, constructing a data collection device, and ultimately, obtaining and analysing the results [9]. It is important to comply with all relevant data security laws and regulations, collect information legitimately and with respondents' understanding and permission, and properly keep all information obtained.

The reason for data analysis is to provide useful knowledge and understanding which may assist with decision-making throughout a methodical evaluation and interpretation of information. Exploring data, summarising it, finding patterns and links, and drawing conclusions all necessitate the use of statistical and computational methods. Business, healthcare, the social sciences, and engineering are just few of the numerous fields that employ data analysis to make better decisions [10]. “Data visualisation”, “descriptive statistics”, “inferential statistics”, “regression analysis”, “machine learning”, and data mining are all commonplace in the field of data analysis. For meaningful insights to be gleaned from vast and frequently confusing data sets, an analyst needs a blend of technical skills, domain expertise, and critical thinking. “***Secondary thematic type of data analysis”*** has been chosen for the proper analysis of research reports.

DATA ANALYSIS AND RESULT

Chemical safety is important to maintain proper health

For keeping healthy, chemical security is of the utmost importance. Several typical household and business items, as well as suitable for outdoor items, contain ingredients. Toxic substances can have catastrophic effects on human beings, causing skin irritation, respiratory problems, neurological disorders, cancer, and even death. “For reducing the potential for exposure” and “damage to human health and the environment”, it is important to store, use, and dispose of chemicals safely. Working safely with chemicals entails protecting oneself, reading and understanding product labels and data sheets for safety, and dumping of chemicals in line with local regulations [11]. There are a multitude of ways in which

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chemicals can impact a person's wellness, and so many people can develop health problems after being subjected to hazardous or unknown substances.

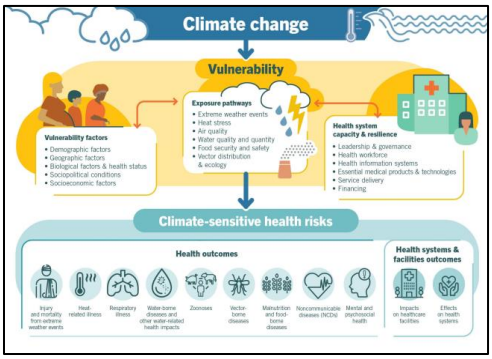

Figure 5: Health risks related to climate sensitivity

Toxicology, the study of chemicals with harmful effects on living things, is a major topic of study for public health professionals with knowledge of chemical safety. Chemicals risk assessment, in which scientists and healthcare professionals interact to ascertain the full range of an agent's physiological activities, is another crucial part of public health. In terms of public health, this is an absolutely crucial area [12]. More than 1.6 million deaths in 2016 are linked to particular exposure to chemicals, according to the "World Health Organization (WHO)". Heavy metals and toxins that get into water supplies and harmful pesticides that make their way into food chains are two examples of harmful chemicals found in the environment. The globe is no stranger to chemical events triggered by events like faulty equipment, natural disasters, terrorism and war, contamination, and poisoned food and drink. Almost 1.85 million people are affected by over a hundred pesticide technical incidents that took place around the world between 2000 and 2020.

Food contaminants	Possible hazards
	Metals/metalloids
Lead	Complications in the nervous system and red blood cells Reduction in cognitive development and intellectual performance Death among children
Cadmium	Renal tubular dysfunction, associated with high risk of lung and breast cancer Osteomalacia and osteoporosis
Arsenic	Associated with dermal, respiratory, nervous, mutagenic, and carcinogenic effects
Nickel	Associated with dermatotoxicity, lower body weight, and fetotoxicity among pregnant women
Mercury	Linked to cardiovascular, reproductive, and developmental toxicity, neurotoxicity, nephrotoxicity, immunotoxicity, and carcinogenicity

Table 1: Chemical contaminants present in foods

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Being a manganese oxide element, arsenic can be combined with other chemicals to create a wide variety of toxic substances. It can be emitted into the atmosphere and water by both human and natural processes, and it is present in significant amounts throughout the Earth's crust.

Intake of groundwater natural source high levels of arsenic, food made with this water, and food sources watered with high-arsenic sources of water are the order to facilitate access of human exposure to excessive levels of this metal. One study concluded that long-term long term exposure has contributed to approximately 43,000 deaths per year in Bangladesh [14]. Screening sources of drinking water and clearly identifying those delivery water that outstrips the “World Health Organization's” temporary guidance of 10 micrograms arsenic per litre or nationwide permissible restrictions can help reduce people's exposure to arsenic, particularly when coupled with awareness-raising candidatures. Alternative groundwater sources, microbiologically safe sources like rain and treated surface water, arsenic removal technologies, and dilution of elevated source water with lesser, microbiologically safe source water are all viable mitigation strategies.

There is a simultaneous relationship between climate change and health hazards

Climate change, in addition to the rise in natural catastrophes that has accompanied it, is yet another environmental issue with significant effects on human health. According to the National Environmental Health Association, global warming represents the biggest danger to human well-being in the twenty-first century [15]. Increased global temperatures and more regular heavy rainfalls and flow are only two examples of how climate change is affecting the natural surroundings in ways that can have adverse impacts on people's health. Possible health consequences involve higher vulnerability to respiratory and neurological number of weaknesses, as well as diarrhoea and other gastrointestinal problems.

Furthermore, natural disasters are getting worse as a consequence of global warming, causing chaos on houses and neighbourhoods and even claiming lives. Such examples include floods, landslides, and earthquakes. “Extreme weather events” like “heat waves”, “storms, and floods” already are having an adverse influence on human health, as is the disturbance of food systems, the rise of zoonotic diseases and other “food, water, and vector-borne diseases”, and even issues with “mental health” [11]. Additionally, “many of the social” determinants for health, “such as livelihoods”, “equality, and access to health care” and social support networks, are being weakened by climate change. For a larger extent than others, “women”, “children”, “ethnic minorities”, “low-income communities”, “migrants” or “displaced persons”, the elderly, and those with existing health conditions are vulnerable to the health hazards linked to climate change.

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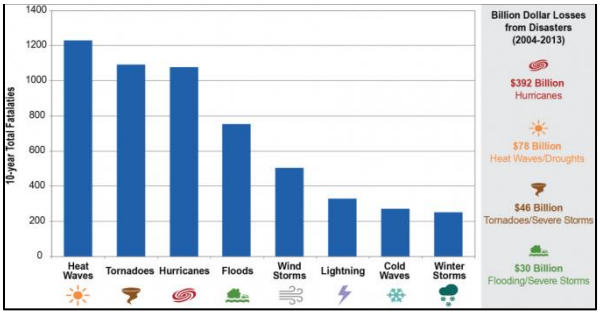

Figure 6: Negative contribution of climate change on Human health

It is clear that climate change has an effect on human health, but many climate-sensitive health risks remain hard to measure with any accuracy. The severity of the long-term effects is increasingly influenced by the extent to which drastic measures are taken right now to cut carbon emissions and avoid the crossing of potentially devastating temperature thresholds.

Poor water and air quality causes several diseases in a global level

More than 780 million individuals worldwide do not have any source of clean water to drink, according to Verywell Health, approximately a third of the world's population has not had the necessary sanitation services. The consequences on health are significant, more than 2,200 children under the age of 5 die every day from liquid illnesses [15]. Industrial pollution and waste, difficulty getting to adequate water and wastewater and sanitation facilities, and outdated plumbing infrastructure are all factors to poor water quality. A report on the risks associated with drinking unclean water, issued by the “Centers for Disease Control and Prevention (CDC)”. The “World Health Organization” has an information sheet on the significance of having water that is safe to drink.

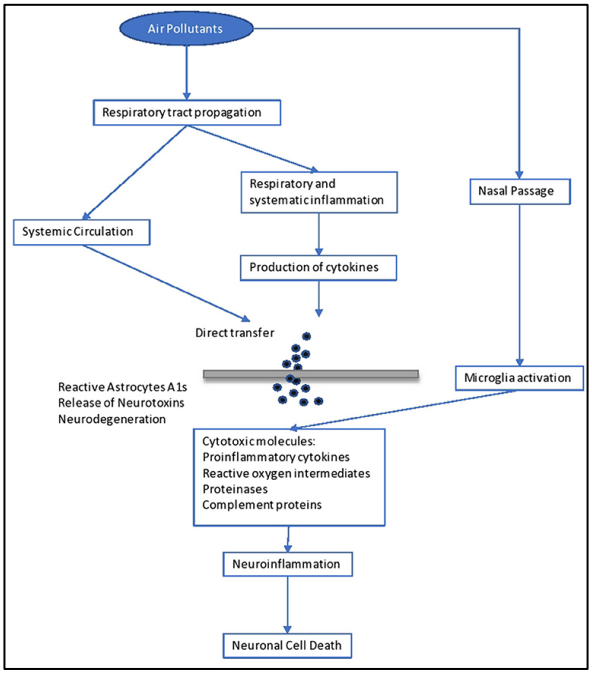

Figure 7: Brain affecting by the air pollutants

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Air pollution is an important issue in the modern world for many reasons, such as its impact on climate change and the rise in associated diseases and fatalities. Several kinds of pollution contribute substantially to human disease. “Particulate Matter (PM)”, bits of varying but very tiny diameter, are breathed into the system and have been associated with a variety of medical conditions, including “asthma”, “cardiovascular disease”, “reproductive problems”, “neurological conditions”, and even cancer [16]. “Furthermore, air pollutants” that are harmful to people include “nitrogen oxide”, “sulphur dioxide”, “volatile organic compounds (VOCs)”, “dioxins”, and “polycyclic aromatic hydrocarbons (PAHs)”.

Particle size	Penetration degree in human respiratory system
>11 μm	Passage into nostrils and upper respiratory tract
7–11 μm	Passage into nasal cavity
4.7–7 μm	Passage into larynx
3.3–4.7 μm	Passage into trachea-bronchial area
2.1–3.3 μm	Secondary bronchial area passage
1.1–2.1 μm	Terminal bronchial area passage
0.65–1.1 μm	Bronchioles penetrability
0.43–0.65 μm	Alveolar penetrability

Table 2: Penetrability of PM according to the size of the particle

In the case “when inhaled” in large levels, “carbon monoxide can produce rapid” poisoning. “Chronic obstructive pulmonary disease (COPD)”, “asthma”, “bronchiolitis”, “lung cancer”, “cardiovascular incidents”, “central nervous system dysfunctions”, and “cutaneous diseases” “are only a few of the diseases” that might develop as a result of exposure to the aforementioned substances. “Short-term (acute)” and “long-term (chronic)” “studies have linked” exposure to “particulate matter (PM)” with adverse health effects [17]. Usually, oxidation processes between various air pollutants generate “particulate matter (PM)” in the atmosphere. Particles of different sizes have various degrees of penetrability. “The United States Environmental Protection Agency (EPA)” developed the term “Particulate Matter” to refer to particles. The PM10 standardisation refers to particles with a diameter of 10 m or less, while the PM2.5 standardisation refers to particles with a length of 2.5 m or less.

Type		PM diameter [μm]
Particulate contaminants	Smog	0.01–1
	Soot	0.01–0.8
	Tobacco smoke	0.01–1
	Fly ash	1–100
	Cement Dust	8–100
Biological Contaminants	Bacteria and bacterial spores	0.7–10
	Viruses	0.01–1
	Fungi and molds	2–12
	Allergens (dogs, cats, pollen, household dust)	0.1–100
Types of Dust	Atmospheric dust	0.01–1
	Heavy dust	100–1000
	Settling dust	1–100
Gases	Different gaseous contaminants	0.0001–0.01

Table 3: Size and type of PM

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Inhaling particulates, which comprises tiny liquid or solid particles, can have serious repercussions for one's health. A particle with a diameter that is smaller than ten micrometres (PM10) can pass through the lungs and go to the bloodstream if inhaled. PM2.5 particles, which are tiny, are more harmful to human beings.

DISCUSSION

Public health is already being affected by global warming, and these effects are only predicted to get worse. Among the numerous adverse effects that climate change is having on health and environmental such as—

More intense heat waves, floods, and storms are happening as a consequence of human-caused climate change. Some of the health effects of these incidents are obvious, like injuries and deaths, while others are more subtle, such issues with mental health and an increased risk of communicable infections. Asthma, COPD, and heart disease are just some of the health issues that can be exacerbated by the increased air pollution caused by climate change. Dengue fever, Lyme disease, and malaria are just a few of the vector-borne diseases that could become more common as a result of climate change's effects on the distribution and behaviour of disease-carrying insects like mosquitoes and ticks.

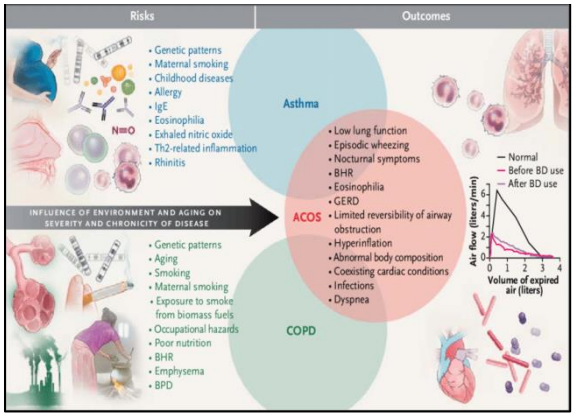

Figure 8: Risk factor of COPD and Asthma

Droughts and floods are becoming more common as a result of shifts in precipitation patterns brought on by climate change. Due to these shifts, water-borne diseases including cholera and typhoid may become more common [18]. Reduced crop yields and food shortages are a result of climate change's effects on agriculture. Deficiency in nutrition and its related health concerns may result. The overall “effects of climate change on human health are” intricate and varied. Moreover, to combat both the “short- and long-term impacts of climate change on human health”, a concerted effort from public health organisations, policymakers, and communities is necessary.

Through a three-year period, ozone levels had information sessions from several European cities and linked to the daily number of deaths. During the hotter months, an increase of 0.33% in daily deaths, respiratory deaths of 1.13%, and cardiovascular deaths of 0.4% has been reported in connection with an elevation in ozone levels. As a consequence of improper

burning, carbon monoxide is released from fossil fuels. Carbon monoxide poisoning presents with a variety of severe physical and mental symptoms, including but not limited to “headache, dizziness, weakness”, “nausea, vomiting”, and “ultimately loss of consciousness”.

CONCLUSION

Now it can be concluded that degradation of the environment is a major global health risk. To reflect the interrelated nature of the health of humans and the environment, government policy should also prioritise both. Improved air condition and water that is safe to drink are among the top two variables for guaranteeing the health and well-being of the world population. The societal benefits of improved bathing water quality are substantial, and they more than cover the cost of pollution control policies. The public health benefits of reducing the impacts of climate change are significant. Further strengthening collaboration among economists and epidemiologists to demonstrate more educated dose-response features and accordingly establish the valuation situations is usually required if people are to offer accurate monetary forecasts of the advantages of fewer symptoms associated with environmental hazards.

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