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A STUDY ON IMPACT OF ENVIRONMENTAL POLLUTION ON HUMAN HEALTH AND ROLE OF EDUCATION, SCIENCE & TECHNOLOGY TO TACKLE ENVIRONMENTAL DEGRADATION WITH SPECIAL FOCUS ON SUSTAINABLE DEVELOPMENT

Mithun Das

RESEARCH ARTICLE

Author Details:
Assistant Professor,
Department of Political Science,
Sivanath Sastri College. Kolkata,
West Bengal, India

Corresponding Author:
Mithun Das

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Abstract

The introduction of contaminants into the natural environment is referred to as pollution that causes adverse changes. As per Environment Protection Act (EPA), 1986 "Environmental Pollution" is the presence of pollutant; defined as any solid, liquid or gaseous substance present in such a concentration as may be or may tend to be detrimental to the environment. Pollutants are the substances that contaminate the environment. The contaminants are chemical, biological, or physical material that has been unintentionally or purposely released into the environment that endangers people and other living things, either directly or indirectly. The continuous emission of Greenhouse gases is responsible for the increase in earth's temperatures which results in melting glaciers, increased precipitation, and monsoon becoming more erratic and extreme weather events such as droughts, floods, increasing in air temperature, rise in sea level and heat waves are occurring with greater frequency. In due course of time the accelerated pace of climate change, combined with global population and income growth, increasing threatens food security everywhere. Combined with other anthropogenic activities and land use, land cover changes, adverse impacts of Climate change will be aggravated further in the future. Different steps have taken in national as well as in international level to tackle pollution. Science and technology play a very crucial role for the reduction of pollution from the environment. And "Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

Keywords: *Environmental pollution, Climate change, Human health, Role of government, Education and Technology*

Introduction

Hazardous chemicals escape to the environment by a number of natural or anthropogenic activities and may cause adverse effects on human health and the environment. Increased combustion of fossil fuels in the last century is responsible for the progressive change in the atmospheric composition. Although a number of physical activities (volcanoes, fire, Etc.) may release different pollutants in the environment, Anthropogenic activities are the major cause of environmental pollution. Hazardous chemicals can escape to the environment by accident, but a number of air pollutants are releases from industrial facilities and other activities and may cause adverse effects on human health and the environment. By definition, a pollutant is any substance which may harm humans, animals, vegetation or material. As far as humans are concerned about pollutant which may cause or contribute to an increase in mortality or serious illness or may pose a present or potential hazard to human health. The determination of whether or not a substance poses a health risk to humans is based on clinical, epidemiological, and/or animal studies which demonstrate that exposure to a substance is associated with health effects. In the context of human health, 'risk' is the probability that a noxious health effect may occur. (Kampa & Castanas, 2007)

Research Methodology

The methodology adopted for the study would be a thorough analysis of archival materials in the form of government records, files and published records as gazetteers, census reports and published official records, contemporary newspapers. Secondary sources such as books, journals, and local literature will be used. Qualitative data in the form of interviews through questionnaire has been conducted. Proper care has been taken to make an objective assessment of the Environmental Pollution and its impact on human health and Step taken to tackle pollution. And with the changing scenario of the environment, national and state government as well as we, the responsible citizens of a nation and various international organizations related to environmental protection plays a very important role in setting new directions for tackling the environmental pollution.

Environmental Pollutants and Human Diseases

With the increasing concern on environmental health issues, numerous epidemiological studies have been performed to establish the link between environmental pollutant exposure and human health problems, including pulmonary and cardiovascular, nerve system diseases, reproductive, endocrine diseases and some other clinical symptoms.

i. Pulmonary and Cardiovascular Diseases

Pulmonary and cardiovascular diseases are currently the most worrying NCDs. According to the WHO Health Statistics report (2021), the global deaths from chronic respiratory diseases (CRDs) and cardiovascular diseases (CVDs) have increased by 10% and 25% since 2000, reaching 4.1 million and 17.9 million, respectively, in 2019 Furthermore, according to the latest Global Cancer Statistics released in 2020, new cases (2.2 million) and deaths (1.8 million) from lung cancer ranked second and first among 36 cancers, respectively Pulmonary and cardiovascular diseases are often closely related, as the lungs are responsible for the gas exchange of the blood circulatory systems. In addition to some undesirable personal habits, such as smoking environmental pollutant exposure is an important risk factor for the development and progression of pulmonary and cardiovascular diseases. Air pollution is commonly blamed for causing cardiopulmonary diseases. A study of COPD cases among railroad workers in the United States showed that exposure to diesel exhaust, a mixture of burning gas and ultrafine PMs containing organic compounds, led to an increase in COPD mortality of the train conductors and engineers, which was correlated with the length of job service. Exposure to ambient air containing PM2.5 (11.65 μg/m3) and nitrogen dioxide (11.97 mg/m3) increased heart rate variability (HRV) in patients with COPD by 8.3% and 7.7%, respectively. Another study on children aged 9 to 14 with asthma revealed that exposure to ambient air containing sulfur dioxide (5.4 mg/m3), nitrogen dioxide (6.8 mg/m3), and PM2.5 (5.4 μg/m3) was associated with the reduced pulmonary function, with 25%–75% drop in lung capacity. By contrast, the increase in the residential area greening has been recently found to be related to a decrease in the incidence of acute myocardial infarction and heart failure among local residents, and the patients with CVD could benefit from the good air quality evidenced by a reduced risk of death (Hanqing et al, 2022).

ii. Nervous System Disease

It is widely known that the harmful effects of fine dust can cause various diseases. Research on the correlation between fine dust and health has been mainly Focused on lung and cardiovascular diseases. By contrast, the effects of air pollution on the central nervous system (CNS) are not broadly recognized. Air pollution can cause diverse neurological disorders as the result of inflammation of the nervous system, oxidative stress, activation of microglial cells, protein condensation, and cerebral vascular-barrier disorders, but uncertainty remains concerning the biological mechanisms by which air pollution produces neurological disease. Neuronal cell damage caused by fine dust, especially in fetuses and infants, can cause permanent brain damage or lead to neurological disease in adulthood. It is necessary to study the air pollution, CNS disease connection with particular care and commitment. Moreover, the epidemiological and experimental study of the association between exposure to air pollution and CNS damage is critical to public health and quality of life. Here, we summarize the correlations between fine dust exposure and neurological disorders reported so far and make suggestions on the direction future research should take.

iii. Environmental Influence on Reproductive Health

The health status of an individual is determined by the interplay of two factors-the internal environment of the body and the surrounding external environment. Clean air, potable water and a toxin-free diet goes a long way in ensuring good health. Unfortunately, the air we breathe, the water we drink and the food we eat are becoming increasingly polluted as more industries are built and more chemicals are used in agriculture to meet the growing needs of society. Until a decade ago, obstetricians were not very aware of the impact of the environment on reproductive health. They were too engrossed in managing problems of infertility, abortions, obstetric hemorrhages, low birth weight babies and malformed babies on an individual basis. They did not realize that some of the obstetric and gynecological problems they were dealing with were the result of environmental influences. The modern obstetrician is now aware of the role of environmental factors on the reproductive process, directly or indirectly. Water pollution can cause dysentery, typhoid, viral hepatitis, etc., which, in turn, can result in preterm birth and low birth weight babies. Occupational pulmonary diseases such as asbestosis or silicosis can also adversely affect reproductive health. Environmental issues are assuming new importance as more and more pregnant women and children are being exposed to increasingly polluted environments. The wave of industrialization, consumer-oriented life styles, abuse of pesticides, disinfectants and insecticides are responsible for disturbance in the ecological balance. Furthermore, the number of women working in hazardous industries is on the increase. Some industries are dealing with hazardous substances like mercury, lead, arsenic and organic solvents. Pregnant women working in such industries are at risk of an adverse obstetric outcome.

Within occupational/environmental medicine, the women's health problems of greatest concern in terms of prevalence or severity are those of reproductive effects of workplace exposures. The entire reproductive cycle may be at risk for exposures to physical and chemical agents in the workplace. Some exposures may also be significant in the home and general environment. Issues of significance include:

a) Infertility and hypo fertility.
b) Spontaneous abortion, including early undetectable abortion.
c) Teratogenesis and congenital malformation.
d) Mutagenesis and hereditable defects.

e) Cancer in offspring (e.g. DES use and cancer).
f) Genital and breast cancer in occupational exposures (Bhatt, 2000)

iv. The Role of Environmental Pollution in Endocrine Diseases

Environmental pollution is able to affect the balance of multiple endocrine axes in humans. This negative outcome occurs because of the effects of artificial chemicals, which are widely diffused. The endocrine-disrupting chemicals (EDCs) are ubiquitous and are able to mimic hormones, to block hormones, or to modulate their synthesis, metabolism, transport, and action. In this scenario, these chemicals represent a threat not only to individual but also to global health. The exposure to EDCs starts very early in life (in utero life), is able to modulate epigenetic mechanisms, and has a lifelong duration. The exposure interacts with other effects on health, which originate from other pollutants, and affect several vital functions of the body, which also include a correct development. Mechanisms of damage can therefore range from intracellular molecular alterations to disrupted multi-organ endocrine homeostasis. The interest for the endocrine-mediated health effects of environmental chemicals (mainly insulin resistance, obesity, type 2 and type 1 diabetes, thyroid diseases, reproductive abnormalities, cancer) is growing. The concern is due to the large and increasing burden of such compounds in the environmental matrices (air, water, soil), in the food chain, and in consumer goods used daily. Additional aspects to consider include the well-documented links with a number of diseases at increasing incidence and the high direct and indirect health costs generated by the exposure to EDCs worldwide. EDCs can act at very low doses and according to nonmonotonic dose-response curves. Relevant aspects also derive from the possible transgenerational effects due to maternal exposure during pregnancy or to paternal preconceptionally exposure, with possible risk of developmental alterations and diseases appearing later in life (Hyunyoung et al., 2020). Further studies are urgently required to explore even better the combined effects of the exposure to multiple EDCs, the effects in individuals characterized by variable susceptibility, the epigenetic mechanisms, and the transgenerational effects, including cancer risk. There are abundant available evidences, however, to promote adequate primary prevention policies. Actions should focus to strongly limit the environmental burden of EDCs and to decrease the epidemic growth of noncommunicable diseases while reducing the relevant health costs secondary to exposure (Ciaula & Portincasa, 2020).

v. Other Diseases

Nonalcoholic fatty liver disease (NAFLD) is a reversible fatty liver disease first characterized in the 1980s. The prevalence of NAFLD is quite common in countries with high-fat diets. For example, the incidence of NAFLD has reached 30% of the total population in the United States. Although poor personal lifestyles, such as over nutrition and lack of exercise, are commonly believed to contribute to NAFLD, some environmental pollutants may also be responsible for the rapid prevalence of this disease. Some epidemiological studies suggested that the serum concentrations of BPA, polychlorinated dibenzo-p-dioxins (PCDD), and polychlorinated dibenzofurans (PCDF) could be associated with the incidence of NAFLD. Some other POPs like PCBs were also found to be associated with the abnormal levels of serum alanine transaminase (ALT) and aspartate transaminase (AST), suggesting the occurrence of liver injury. Regarding the complexity of environmental pollution-involved etiology, more latent deleterious effects induced by chemical exposure on human health are to be explored.

Environmental Pollutions and the Controlling Measures

1) Air Pollution

Air pollution occurs due to the presence of undesirable solid or gaseous particles, particulate matter in the air, in quantities that are harmful to human health and the environment. Unlike pollutants from human activity. naturally occurring pollutants tend to remain in the atmosphere for a short time and do not lead to permanent atmosphere change.

Causes of Air Pollution

Air pollution arises from various human activities and natural events. Identifying these causes is crucial for developing strategies to mitigate pollution levels.

a) Burning of Fossil Fuels
The combustion of fossil fuels such as coal, oil, and natural gas for energy production releases significant amounts of Sulphur dioxide (SO_2) and carbon monoxide (CO) into the atmosphere. Incomplete combustion processes contribute to higher levels of these pollutants, exacerbating air quality issues.

b) Automobiles
Vehicles emit a variety of pollutants, including nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter (PM). The increasing number of vehicles on the road, especially those using diesel engines, intensifies air pollution, contributing to respiratory diseases and environmental degradation.

c) Agricultural Activities
Agricultural practices release ammonia (NH_3) into the atmosphere, primarily from the use of fertilizers and the decomposition of animal waste. Moreover, using pesticides and insecticides releases dangerous chemicals into the air, threatening human health and the environment.

d) Factories and Industries
Industrial processes are major contributors to air pollution, emitting pollutants like Sulphur dioxide (SO_2), nitrogen oxides (NO_x), and volatile organic compounds (VOCs). Factories involved in manufacturing, chemical processing, and energy production release these harmful substances directly into the atmosphere.

e) **Mining Activities**
Mining operations disturb large areas of land and release dust and chemicals into the air. The extraction and processing of minerals involve heavy machinery and the use of explosives, both of which contribute to increased levels of particulate matter and other pollutants.

f) **Domestic Sources**
Household activities also contribute to air pollution. The use of cleaning products, paints, and solvents releases volatile organic compounds (VOCs) into the air. Additionally, burning solid fuels like wood and coal for cooking and heating in homes can significantly degrade indoor and outdoor air quality.

Measures to Control Air Pollution

a) Activated carbon is one of the most popular forms of air pollution control. This type of control involves the use of a pollution filter, carbon, to reduce the number of pollutants that are allowed to escape into the air. When in use, these filters absorb pollutants helping to cleanse the air of any possible toxins.

b) Biofiltration is another effective type of air pollution control. It uses microorganisms, often bacteria and fungi, to dissolve pollutants. Industries that employ biofiltration systems include food and waste plants, pharmaceutical companies, and wastewater management facilities.

c) Change in Fuel technique involves the use of less polluting fuel to reduce air pollution. Use of low sulfur fuel instead of high sulfur fuel by electric utilities is an example of this method. Remember that low sulfur fuel is much more expensive than high sulfur fuel.

d) The other choice for an electric utility can be the use of natural gas as a fuel. Fuel switching based on meteorological conditions or air pollution forecasts have been used to prevent air pollution problem in many areas (Pandey, 2017).

2) Water Pollution

Water pollution has become a global problem now a day's ongoing evaluation of water resource policy is needed to counter this problem. Both developed as well as developing countries are facing water pollution problems. Water quality is influenced by many factors like precipitation, climate, soil type, vegetation, geology, flow conditions, ground water and human activities. The greatest threat to water quality is posed by point sources of industries and municipalities. Activities like mining, Urban development and Agriculture also effect water quality. Non-point source pollution also includes nutrients, sediments and toxic contaminants (Chaudhry & Malik, 2017).

Sources of Water Pollution

a) **Point Sources**
It is directly attributable to one influence. Here, pollutants travel directly from source to water. They are easy to regulate.

b) **Non-Point Source**
It is from various ill-defined and diffuse sources. They vary specially and temporally and are difficult to regulate.

c) **Agricultural Wastes**
Fertilizers contain major plant nutrients such as nitrogen, phosphorus and potassium. Excess fertilizers may reach the groundwater by leaching or may be mixed with surface water of rivers, lakes and ponds by runoff and drainage. Fertilizers, pesticides and animal excreta such as dung, wastes from poultry farms, piggeries, slaughter houses etc are the major agricultural sources of water pollution.

d) **Industrial Wastes**
Industries often use voluble chemicals like solvents and heavy metals like lead in their processes. If water used in industries is not properly cleaned before being released, these chemicals can contaminate ecosystems.

e) **Domestic Wastes**
Domestic sources include discharges from houses; commercial and industrial establishments connected to public sewerage system. The sewerage contains human and animal excreta, food residues, etc. (Pandey, 2017).

The Controlling Measures of Water Pollution

Clean Water Act or other such acts are to regulate how industries and water treatment plants processed their water before releasing it. Communities and industries have come up with solutions for reducing the amount of sediment in water by preventing soil erosion through building dams and planting trees. Utility companies have improved the controls in their treatment plants and fixed broken pipes to reduce the amount of sewage and chemical detergents released into water supplies (Pandey, 2017)

3) Noise Pollution

Causes and Sources

a) **Industrialization**
Industrialization has led to an increase in noise pollution as the use of heavy machinery such as generators, mills, huge exhaust fans are used, resulting in the production of unwanted noise.

b) **Vehicles**
Increased number of vehicles on the roads are the second reason for noise pollution.

c) Events
Weddings, public gatherings involve loudspeakers to play music resulting in the production of unwanted noise in the neighborhood.

d) Construction sites
Mining, construction of buildings, etc. add to the noise pollution. Harmful effects of noise Pollution: Regarding the impact of noise on human efficiency, there are number of experiments, which print out the fact that human efficiency increases with noise reduction. Because of noise pollution, people cannot concentrate on their work. Thus, they have to give their more time for completing the work and they feel tiring. There should be cool and calm atmosphere during the pregnancy. Sudden noise can cause abortion in females. The effect of noise on audition is well recognized. Mechanics, locomotive drivers, telephone operators, etc. all have their hearing impairment as a result of noise at the place of work. Loud noise is very dangerous to buildings, bridges and monuments.

Controlling Measures of Noise Pollution are as Follows

a) The first and simple way to control the noise pollution is insulation. By insulation, noise can be reduced at source.
b) In case of noise produced by a machine, volume reduction can be achieved by the reduction of its speed.
c) Controlling the noise along its transmission, path can do the isolation of every source of noise (Pandey, 2017).

4) Soil Pollution

Soil pollution is a result of dumping garbage, waste and other toxins making the land contaminated or polluted. The source of land pollution comes from the human element such as littering and waste that is washed ashore from boats, oil rigs and sewage outlets. Another factor contributing to this type of pollution is acid rain.

Some of The Problems Caused by Soil Pollution are as Follows

a) Reduction in soil fertility.
b) Loss of the natural nutrients of the soil.
c) Imbalance in the flora and fauna of the soil.
d) Salinity increases in the soil making it unfit for cultivation.
e) Soil pollution creates toxic dust.

Control of Soil Pollution

Some of the main barriers in controlling of soil pollution are as follows:

a) Ban on use of plastic bags below 20 microns thickness.
b) Recycling of plastic wastes.
c) Ban on deforestation.
d) Encouraging plantation programmes.
e) Encouraging social and forestry programmes.
f) Undertaking awareness programmes (Pandey, 2017).

Step Taken to Tackle Pollution

On National Level

a) BS-VI Norms
India has implemented stricter emissions standards for vehicles, known as BS- VI, to reduce air pollution from automobiles. These norms are limiting the emission of harmful pollutants like particulate matter (PM) and nitrogen oxides (NOx).

b) FAME (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) Scheme
This scheme aims to promote the adoption of electric vehicles (EVs) in India by providing subsidies and incentives to EV manufacturers and buyers and reduce dependance on fossil fuels and promote cleaner transportation options.

c) ECBC (Energy Conservation Building Code)
This code sets energy efficiency standards for buildings to reduce energy consumption and associated emissions. The code mandates the use of energy-efficient lighting, appliances and HVAC systems in buildings.

d) Biofuel Policy
India has a national biofuel policy that promotes the production and use of biofuels, such as biodiesel and ethanol, as alternatives to fossil fuels. It can help reduce greenhouse gas emissions and air pollution.

e) Solar - Wind Power
India has made significant strides in promoting solar and wind energy. The government has set ambitious targets and is providing incentive to promote solar and wind power projects.

f) Ujjwala and UJALA Schemes
The Ujjwala scheme provides free LPG connections to poor households, reducing their reliance on traditional biomass fuels. The UJALA scheme promotes the adoption of energy-efficient LED bulbs, reducing electrically consumption and associated emissions. (Yadav, 2022).

International Level

a) The Montreal Protocol is an international treaty that was design to protect the ozone layer. The Montreal protocol was signed by 196 countries in 1987. It has been very successful in reducing the production and use of ozone-depleting substances (ODS), such as chlorofluorocarbons (CFCs). As a result, the ozone layer is now slowly recovering.

b) The Kigali Amendment is an amendment to the Montreal protocol that was signed in 2016. It aims to phase down the production and use of hydro fluorocarbons (HFCs), which are a type of ODS that is used in refrigerants and other applications. HFCs are not as harmful to the ozone layer as CFCs, but they are greenhouse gases.

c) The Basel Convention is an international treaty that controls the trans-boundary movement of hazardous Waste. It was signed in 1989 and has been ratified by 190 countries. The Basel convention prohibits the export of hazardous waste from developed countries to developing countries. It also requires that hazardous waste be managed in an environmentally sound manner.

d) The Rotterdam Conversation is an international treaty that controls the trade in certain hazardous chemicals. It was signed in 1998. The Rotterdam convention requires that countries that export certain hazardous chemicals provides prior informed consent (PIC) to the importing countries.

e) The Stockholm Convention controls the production, use, and release of persistent organic pollutants (POPs). POPs are chemicals that are resistant to degradation and can accumulate in the environment (Yadav, 2022).

Sustainable Development

The sustainable development has been derived from Brundtland's Our Common Future, 1987 report of the World Commission on Environment and Development. "Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

The Objectives of Sustainable Development

(a) Environmentally friendly patterns of activity.
(b) Energy efficiency.
(c) Conservation of natural and man-made resources.
(d) Provision of buildings and areas with lasting quality and character. This relates to design quality, to high standards of comfort and amenity, safety and convenience.
(e) Development of production opportunities.

Fundamental Ideas of Sustainable Development

a) Renewability
The rate of utilization of renewable resource should be lower than or equal to the rate of regeneration of the resource. The resources that have already depleted due to 'over use' should be given complete protection.

b) Adaptability
A sustainable developing society has ability to adapt in changing environment. It is also capable of creating opportunities for survival and recreation through innovation, manifested in Research and Development (R & D) activities.

c) Interdependence
A sustainable society neither imports resources from outside through deprivation of other communities, nor it exports its own wastes to create pollution in other societies.

d) Substitution
Sustainable development ensures substitution of use of non-renewable natural resources by the use of renewable natural resources. Although, it is the extreme case of sustainable development to substitute non-renewable resources completely. Complete substitution of the use of fossil fuels by the use of wind/solar/tidal energy is difficult to attain.

e) Institutional Commitment
Institutional commitment includes political support, constitutional provisions, legal framework, coordination between legal institutions and above all the ability to understand the need of sustainable development in a society. To ensure sustainable development's achievement, proper education needs to be imported at all levels of the society to accept the values and practices of sustainable development (Pandey, 2017).

Conclusion and Suggestions

As we navigate the challenges of pollution and environmental degradation, adopting a 4R approach- reduce, reuse, recycle and refuse- alongside the Bhil tribal wisdom that we are merely guardians of The Earth for future generations, stands as a powerful road map for a sustainable future. By minimizing our consumption, embracing circularity, and making conscious choices, we can walk the path of "prakriti rakshati rakshita", ensuring that nature continuous to nature and sustain us for generations to come. Genetically modified crops resistant to pests and diseases require fewer pesticides, reducing pollution from chemical use e.g. BT- Cotton, BT- brinjal etc. Environmental monitoring robots can monitor air quality and water pollution levels, providing data for targeted intervention. By the water purification process Nano-materials can remove contaminants from water providing

cleaning water even in polluted areas. On-demand manufacturing-3D printing allows for producing items locally, reducing transportation emissions and waste from mass production and precise production. Monitoring pollution levels and environmental changes from space provide valuable data for informed to decision-making. Generating clean energy in space and transmitting it to Earth can help reduce reliance on fossil fuels and air pollution. Remember, our actions today will leave a lasting impact on the world we borrow for our children. Let us choose wisely and collectively strive towards a cleaner, greener tomorrow.

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References

1. Bhtt, R. V. (2000). Environmental influence on reproductive health. *International Journal of Gynecology & Obstetrics (Science Direct), 70*(1). https://doi.org/10.1016/S0020-7292(00)00221-6.
2. Chaudhry, F.N., Malik, M.F. (2017). Factors Affecting Water Pollution: A Review. *Journal of Ecosystem & Ecography, J Ecosyst Ecography, an open access journal, Volume 7* (1), doi: 10.4172/2157-7625.1000225.
3. Ciaula,D.A., & Portincasa, P. (2020). *Endocrinology and Systemic Diseases, abstract,* Springer Nature. https://link.springer.com/10.1007/978-3-319-68729-2_7.
4. Hanqing, X., Yang, J., Zhendong, S., Jiahui,S., Qian, S. L., Qunfang, Z., & Guibin, J, September. (2022). Environmental pollution, a hidden culprit for health issues. *Eco-Environment & Health, 1*(1)*:31–45,* doi: 10.1016/j.eehl.2022.04.003.
5. Hyunyoung, K., Won-H. K., Young-Y. K., & Hyun-Y. P. (2020). Air Pollution and Central Nervous System Disease: A Review of the Impact of Fine Particulate Matter on Neurological Disorders, *Frontiers in public health. 8*:575330, DOI:10.3389/fpubh.2020.575330
6. Kampa, M., Castanas, E. (2027). Human health effects of air pollution. *Environmental Pollution (Science Direct) 151* (2008) 362-367 doi: 10.1016/j.envpol.2007.06.012.
7. Pandey, M., (Goyel, P. Edited). (2017). *General Studies for Civil Service Preliminary examination.* Arihant publication. Kolkata.
8. Yadav, A. (2022). *For UPSC & State PSC, Civil services, general studies paper (3) prelims & mains.* Disha Publication, New Delhi.