ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1193

The Double Burden of Pollution on Human Health and the Destroyed Environmental Conditions: Systematic Literature Review

Marcos Carvalho[1]; Maria de Fátima Soares Bento[2]; Isaura Belo[3]; Gaudencia de Fatima[4]; Manuela Maria Fernandes Amaral[5]; Hernanio Martinho Carvalho Costa[6]

[1,2,3,4,5,6] Master Program of Public Health, Universidade da Paz

Publication Date: 2025/07/05

Abstracts: Human activities, including production, transportation, and agriculture, contribute to environmental problems such as air and water pollution, soil contamination, and biodiversity loss, necessitating immediate public health interventions. The research aimed to assess the burden of pollution on human health and the destroyed environmental conditions. This study used the PRISMA Method to perform a systematic review of 64 papers on the risk of pollution to human health and the destroyed environmental conditions. The research was carried out using databases such as PubMed, BMC, and Google Scholar. This study aims to evaluate, classify, and categorize findings based on evidence from 38 previous studies to ensure an understanding of the risk of pollution to human health and the destroyed environmental conditions. The study found that environmental issues, such as acid rain, haze, and ozone depletion, are damaging water, soil, and buildings. It affects aquatic ecosystems and human health. Air pollution impacts children's development and well-being. Water pollution, caused by pathogens, chemicals, plastics, and heavy metals, poses a significant threat to human health.

Keywords: *Pollution, Environmental, Air Pollution, Water Pollution, Human Health.*

How to Cite: Marcos Carvalho; Maria de Fátima Soares Bento; Isaura Belo; Gaudencia de Fatima; Manuela Maria Fernandes Amaral; Hernanio Martinho Carvalho Costa (2025) The Double Burden of Pollution on Human Health and the Destroyed Environmental Conditions: Systematic Literature Review. *International Journal of Innovative Science and Research Technology*, 10(6), 2570-2577. https://doi.org/10.38124/ijisrt/25jun1193

I. INTRODUCTION

Industrial activities such as transportation and agriculture contribute to environmental conditions, such as air and water pollution, soil contamination, and a lack of biodiversity. Effective strategies like pollution prevention, waste costing, and green initiatives are crucial to mitigate these effects. Organizational culture, environmental management control systems, and dynamic capabilities also influence ecological performance. (Ali et al., 2023).

Air pollution is a significant worldwide health issue, causing many deaths each year potentially hazardous levels. Poverty and air pollution overlap in nations with limited healthcare access, aggravating vulnerability, (Rentschler & Leonova, 2023). Air pollution can cause a variety of health problems, particularly small particles that penetrate deep into the lung airways. These particles represent a substantial hazard to public health, including respiratory infections, cardiovascular disease, stroke, and lung cancer. The danger is especially great for individuals who are already sick, such as youngsters, the elderly, and the impoverished. Poor air quality can increase the likelihood of public health problems. In 2019, air pollution caused 6.7 million deaths, with non -non-communicable diseases contributing 85%, making it the second largest cause in the world behind tobacco. (WHO, 2024).

Air pollution is a global problem that causes 7 million deaths annually, accounting for one in eight of total global deaths. In Europe, air pollution accounts for 20% of all-cause fatalities. Premature deaths from acute respiratory disorders are estimated at 2 million annually, with Italy alone accounting for 45,000. Air pollutants are classified into gases and aerosols, with their solubility determining their reach into airways, leading to respiratory problems. For instance, ground-level ozone and nitrogen oxides are poorly soluble in water, while sulfur dioxide is water-soluble, causing discomfort in the upper airways. (Gendy & Yuce, 2025).

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1193

Climate change and air pollution negatively impact vulnerable populations, including children, the elderly, and those with respiratory illnesses. These issues increase inflammation and oxidative stress, impairing the immune system's effectiveness. Public health programs can minimize these implications by reducing emissions, improving air quality, and enhancing healthcare access and social support. To address such complicated concerns, continued research, policy development, and public health activities are necessary to handle these problems in an integrated manner. (Tran et al., 2023). This risk is higher in certain population groups, such as the prenatal age group, children, the elderly, those with pre-existing medical conditions, low socioeconomic status groups, certain occupational groups, outdoor workers, athletes, people with weakened immune systems, and those with genetic conditions. The influence of air pollution on respiratory health involves oxidative stress, inflammation, and tissue damage. (Krismanuel & Hairunisa, 2024).

Low-income communities are more vulnerable to air pollution due to outdoor labor jobs and limited healthcare access. Air pollution exposure estimates and subnational poverty data reveal millions in Sub-Saharan Africa are directly exposed to unsafe PM2.5 concentrations. Countries with high poverty and air pollution also struggle with healthcare access and quality. (Rentschler & Leonova, 2023). Urbanization positively impacts health, with green spaces influencing health indicators. However, further investigation is needed to understand the mechanisms linking green spaces and health, especially microorganisms' role in the immune system. Rapid urbanization and changing habits contribute to disease and mortality, (Browning et al., 2022).

Pollution prevention, waste management, and environmental protection are essential to human life. Air pollution is a global health hazard that causes millions of deaths each year and increases susceptibility in nations with limited access to healthcare services. To address this issue, public health measures through prevention are crucial. It is important to implement pollution prevention strategies, integrate environmental management accounting practices, and promote proactive environmental initiatives to enhance environmental sustainability performance. This will ultimately improve business competitiveness, positive environmental impact, and ensure a sustainable future. (Ali et al., 2023). The study aimed to find out the risk of pollution to human health and the destroyed environmental conditions.

II. METHODS

The study conducts a systematic review using a series of article reviews that begin with a study search, followed by screening, data extraction, and analysis. A systematic review is a procedure that systematically gathers, assesses, classifies, and categorizes evidence-based conclusions from prior research (Pullin and Stewart 2006). This study used the PRISMA method for literature research. Articles were collected from the PubMed, BMC, and Google Scholar databases. The keywords were the burden of pollution on human health and the destroyed environmental conditions. A total of 64 articles were obtained, and a selection process will be conducted following the inclusion and exclusion criteria.

➢ *Inclusion and Exclusion*

The criteria use the PICOS framework, as follows:

- Populations is evaluated based on the titles selected in the systematic review.
- Interventions refer to the management of individual or community situations and describe the management of studies based on the titles selected in the systematic review.
- Comparisons are used to compare interventions or management. Control groups may also be included if necessary.
- Outcome are a finding from previous studies that relate to the issue indicated in the systematic review.
- Study design refers to the research design utilized in the paper under examination.

Table 1. Inclusion and exclusion criteria

Criteria	Inclusion	Exclusion
Population	The international article concerns the burden of pollution to human health and the destroyed environmental conditions	The international article is not related to the title, the burden of pollution to human health and the destroyed environmental conditions
Intervention	Don’t use Intervention	Don’t use Intervention
Comparison	Nothing	Nothing
Outcome	Understand the burden of pollution to human health and the destroyed environmental conditions	Don't know or grasp the burden of pollution to human health and the destroyed environmental conditions
Study design	All types of research publications: Open-access research article	Nothing
Publication Year	2020-2024	Before 2020 and after 2024
Language	English	Other Language

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1193

➢ *Article Selection*

Other Language Articles were collected from the following databases: PubMed, BMC, and Google Scholar. The keywords were used: the burden of pollution to human health and the destroyed environmental conditions. The total number of articles obtained is 64. The journals are selected by utilizing PRISMA flow diagrams that select relevant articles based on inclusion and exclusion criteria.

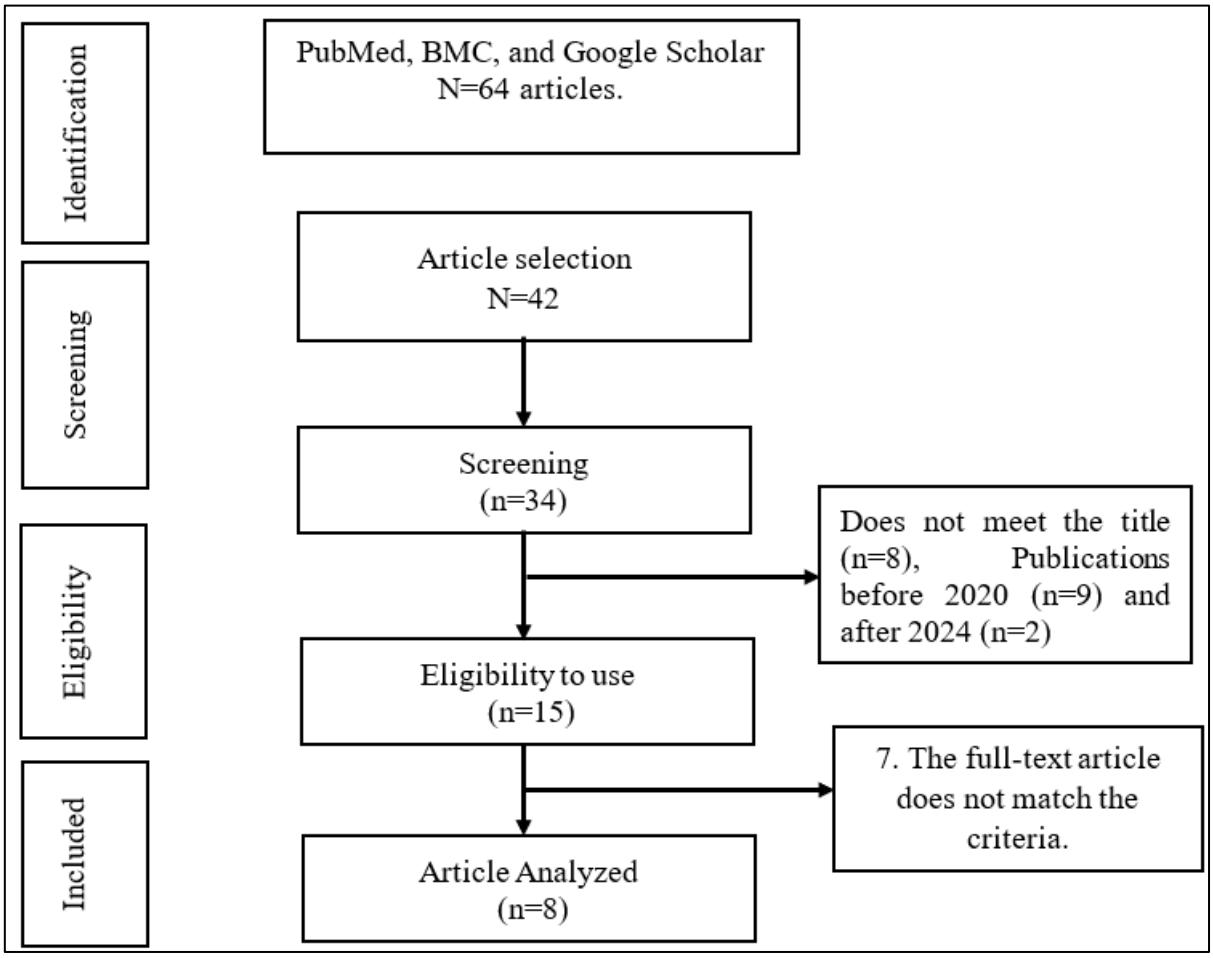

Fig. 1 Article Review Flow Chart

➢ *Relevance of Study*

The relevance of this study is to find articles from databases that can improve the quality of existing research results. This systematic method is used to critically evaluate and present data from various studies with topics similar to this study to provide a broad understanding to the public.

➢ *Quality of Study*

After collecting 64 English-language articles (2020–2024) from the PubMed, BMC, and Google Scholar databases, the articles were evaluated to ensure that they met the inclusion and exclusion criteria. After screening using the PRISMA flow chart, eight articles were selected for further synthesis or analysis.

➢ *Technique Analysis*

Analysis was carried out on articles that met the inclusion criteria (2020-2024) to conclude.

III. RESULTS

➢ *The Characteristics of the Study*

A systematic review with information retrieval on articles that use or work with internet tools and access various websites as data sources. Articles were searched based on databases such as PubMed, BMC, and Google Scholar. After the articles were collected, they were analyzed according to the PRISMA diagram to obtain articles that met the following criteria.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1193

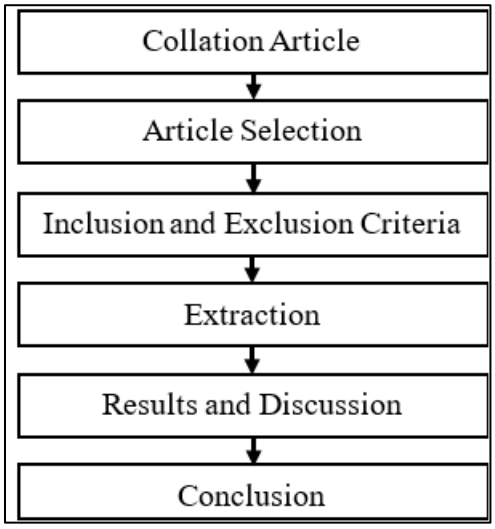

Fig 2. The Characteristics of the Stud

➢ *The Search Process*

This systematic review is an in-depth assessment of various research studies compiled around the issue of the Impact of Pollution on the Environment and Health. The process of searching for or collecting articles began in February 2025, and 64 articles were found.

➢ *Data Extraction*

From 2020 to 2024, informational articles were collected that included researchers, year of research, title, techniques, results, and publications. This data extraction was essential in producing articles that could be evaluated and developed in the future. The data was entered into a data extraction form, which displayed in the following table format:

Table 2. Data Extraction

Author and Years	Title	Methods	Results
(Wang & Liu, 2024)	Climate change, ambient air pollution, and students' mental health	Article review	The study supports collaborative efforts to minimize pollutant emissions, enhance energy infrastructure, boost environmental monitoring, address student mental health concerns, and increase resilience. It recommends enacting governmental policies, increasing social support, and modifying lifestyles to assist pupils in adapting to changing settings.
(Roche et al., 2024)	The health-related and learning performance effects of air pollution and other urban-related environmental factors on school-age children and adolescents—a scoping review of systematic reviews	A Scoping Review of Systematic Reviews	This study underlines the significance of urban environmental exposure for children's physical and mental development, highlighting negative health repercussions that can persist into adulthood, restricting academic possibilities and well-being. To promote long-term health, the assessment recommends legislative change and urban planning strategies including decreasing air pollution and traffic noise and enhancing urban green space.
(Godyń et al., 2023)	Determination of pollution and environmental risk assessment of stormwater and the receiving river, case study of the sudół river catchment,	SCS–CN method and the Snyder Unit Hydrograph Model.	The study discovered a rise in sealing and surface runoff, presumably as a result of stormwater pollutants and loadings from stormwater outlets. The aquatic ecology is under threat, with high risk factors for N-NO3, Zn, and Cu, indicating possible negative environmental consequences.
(Manisalidis et al., 2020)	Environmental and health impacts of air pollution: A review	A Review	Air pollution is particularly ground-level ozone and particulate matter, can result in illness symptoms and significant health problems. Susceptible groups include

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1193

			the elderly, children, diabetics, and those with underlying heart or lung illnesses, notably asthma. Awareness of health-protection measures is critical. Environmental Effects of Air Pollution. Air pollution harms both human health and the ecosystem, resulting in acid rain, smog, and ozone depletion. Acid rain degrades water, soil, and structures, whereas haze diminishes air transparency. Ozone, which protects humans from dangerous UV rays, is being depleted by ozone-depleting compounds.
(Lin et al., 2022)	Effects of water pollution on human health and disease heterogeneity: A Review	A review	Water contamination has a major influence on human health, albeit the extent varies by geography, age, gender, and other factors. The most prevalent illness induced by water pollution is diarrhea, which is mostly transmitted by enteroviruses in aquatic environments.
(Zhang et al., 2022)	Effects of air pollution on cardiovascular health in patients with type 2 diabetes mellitus: Evidence from a large tertiary hospital in Shandong Province, China	Used Secondary data (Empirically Test)	Air pollution negatively impacts T2DM patients' cardiovascular health, particularly in males and older patients. Improved environmental regulation and public health conditions reduce these effects.
(Gul & Das, 2023)	The impacts of air pollution on human health and well-being	A Comprehensive Review	This research paper examines air pollution, its sources, and its impact on health. It identifies various pollutants, their origins, and mechanisms of health harm. The paper highlights the global burden of air pollution and the need for effective mitigation strategies.
(Mananga et al., 2023)	The impact of air pollution on health in New York City	Review Article Journal	According to the study, air pollution is closely linked to a variety of potentially deadly disorders, including respiratory, circulatory, neurological, gastrointestinal, and urinary problems. This review article will focus on how air pollution impacts respiratory disorders like asthma in children.

IV. DISCUSSION

➢ *The Burden of Pollution Destroyed Environment Conditions*

The study shows that air pollution negatively impacts the environment, causing acid rain, haze, and ozone depletion. Acid rain damages water, soil, and buildings, while haze reduces atmospheric transparency. Ozone, which protects us from harmful UV rays, is gradually damaged by ozone-depleting substances. The study from (Godyń et al., 2023) found an increase in sealing and surface runoff, possibly due to stormwater pollution and loadings from stormwater outlets. Comparison of the study from (Manisalidis et al., 2020) and (Godyń et al., 2023) explores different environmental impacts—air pollution's effect on the atmosphere vs. water pollution from runoff. The aquatic ecosystem is at risk, with high-risk factors for N-NO3, Zn, and Cu, indicating potential adverse environmental effects. The study (Zhivkov & Kesarovski, 2024) found that empirical analysis focuses on nitrogen dioxides (NO2) and particulate matter (PM2.5 and PM10) as critical pollutants in urban areas to verify whether their concentrations are affected by the increase in population densities for individual municipalities. In addition, we also correlate the data on air pollutants with different natural indicators such as temperature, air pressure, humidity, wind, and the rate of motorization in the cities of interest. According to (Lin et al., 2023), Ambient air pollution remains an important public health issue worldwide, especially in low—and middle-income countries. Even low-level air pollution will still produce acute and chronic effects on human health. We still have a long way to go, and a call for action is still necessary to reduce ambient air pollution.

The comparison of the study from (Zhivkov & Kesarovski, 2024) and (Lin et al., 2023)Examine air pollution in urban settings, linking it to human activities and health consequences. According to the (Awewomom et al., 2024) The research highlights the potential of environmental control approaches in combating global pollution, emphasizing the need for robust legislation and proactive measures to reduce pollution and promote sustainable development. It also underscores the significance of collaboration among stakeholders for successful pollution control and environmental management. The report encourages joint efforts to reduce pollutant emissions, improve energy infrastructure, strengthen environmental monitoring, address student mental health problems, and promote resilience. It

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1193

advocates establishing governmental regulations, improving social support, and adjusting lifestyles to help students adapt to new surroundings**.** (Wang & Liu, 2024).

The study reveals a bidirectional Granger causal relationship between environmental regulation and pollution emissions, as well as pollution emissions and HQED. Environmental policy is a one-way cause of HQED, with the potential to increase over time. Pollution emission intensity and HQED have a mutually inhibitive effect, with pollution emissions influencing regulation severity and environmental regulation affecting other variables.

That's what we link to the Timor-Leste regulations in (Claudio, 2010)Penal Code Section II Environmental Crimes Article nu. 215 Environmental Protection; 1. Whoever does not comply with legal or regulatory provisions that protect the environment, causing or directly or indirectly emitting, releasing, radiating, discharging, leaking, contaminating, vibrating, injecting or depositing substances into the atmosphere, soil, subsoil or in terrestrial, maritime or underground water, including areas close to land, or capturing water that could harm the natural system equilibrium, shall be punished with imprisonment of up to 3 years or fines. 2. When a person commits a violation to liberate, release, or emit ionizing radiation or other substances into the atmosphere, land, seawater, continental, superficial, or underground resources in quantities that may endanger others or cause severe bodily harm requiring medical or surgical treatment and resulting in irreversible consequences, shall be punished with imprisonment from 2 to 8 years or fines. And continue to the article nu. 217, Against wildlife or flora and fauna 1. Whoever causes serious harm to the environment by logging, burning, clearing, or engaging in illegal trafficking of wild plants or animals classified as threatened or at risk of extinction will be punished with imprisonment for up to 3 years or a fine.

Environmental pollution is the substances into the environment, lowering its quality and threatening the protection of living things. It includes chemicals, dust, heat, and sound, which affect the environment and humans. The most crucial natural resources are land, water, and air, which are essential for human survival. Pollution threatens environmental sustainability, but the environment is an asset that enhances human well-being. According to (Pacheco et al., 2025), sanitation facilities are one of the environmental health criteria that every household must address since, according to health standards, sanitation is a minimum necessity for producing a healthy atmosphere. Therefore, it is necessary to care for and protect the environment according to the (KRDTL, 2002), Law No. 61 "1. Everyone has the right to a humane, healthy, and ecologically balanced environment and the duty to protect it and improve it for the benefit of future generations. 2. The State shall recognize the need to preserve and rationalize natural resources. 3. The State should promote actions aimed at protecting the environment and safeguarding the sustainable development of the economy.

- *The Burden of Air Pollution on Human Health*

The study from (Mananga et al., 2023) This review article explores the impact of air pollution on children, particularly asthma, and its effects on respiratory diseases. It highlights the global impact of air pollution and the need for effective mitigation strategies. The study emphasizes the importance of air pollution exposure in urban environments for children's physical and mental development, as negative health impacts can persist into adulthood, limiting academic opportunities and well-being. The report emphasizes the need for effective mitigation strategies to combat the global health crisis.

Air pollution has a significant impact on the cardiovascular health of patients, especially men and the elderly. Improved environmental management and public health conditions can help reduce these negative impacts. This encourages legislative reform and improvements in urban design, such as reducing air pollution and traffic noise and increasing urban green spaces, to improve long-term health. Link with a study from (Bikis, 2023) The study's findings suggest health hazards for city inhabitants, notably drivers, street sellers, and industrial workers. According to medical data, 57.92% of the 480 respondents reported health difficulties as a result of air pollution. The high health risks posed by outdated industrial facilities and motor vehicles in this city must be addressed by implementing low-carbon policies and strategies, shortening travel distances, encouraging the use of public transportation, and leaving a green legacy through green infrastructure networks and structures.

Air pollution is defined as the presence of foreign materials or compounds in the air that change its composition from its native state. Foreign substances in the air can cause irritation to humans, animals, and plants if breathed in significant quantities over time. All studies concur that air pollution has considerable negative health effects. While Mananga et al. and Gul & Das give information on the environmental and medical processes of harm, Roche et al. and Bikis' findings highlight the need for improvements in urban design and transportation.

Air pollution has been related to a number of illnesses, including respiratory sickness, blood circulation issues, and neurological abnormalities. Research has shown that air pollution affects children's respiratory diseases, physical and mental development, and cardiovascular health. To mitigate this impact, the environment must be regulated, and public health conditions improved. Long-term health benefits can be derived from city planning measures such as lowering air pollution and traffic noise, and increasing urban vegetation.

- *The Burden of Water Pollution on Human Health*

The study from (Lin et al., 2022)The impact of water pollution on human health is significant, although there may be regional, age, gender, and other differences in degree. The most common disease caused by water pollution is diarrhea, which is mainly transmitted by enterovirus in the aquatic environment.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1193

According to the impact of poor wastewater management showed that most of the children in these communities have suffered from diarrhea (73.8%), and in the rainy season, there is a high possibility of infection with waterborne diseases. According to a study, improvements in air quality management, including international coordination and SDS priority, as well as an update (or development) of NAAQSs, were identified to be critical aspects for reducing air pollution and its health consequences in the EMR. Most EMR nations must develop or update air quality monitoring, which should be undertaken using credible methodologies and provide freely available data to aid in the identification of pollution sources.

Comparison with Water Pollution Studies: Faridi et al. (2023) focused on improving air quality strategies rather than the direct health impacts of water contamination, in contrast to Lin et al. (2022) and Ximenes et al. (2024), who discussed the impact of water pollution on health. To reduce health problems, both forms of pollution must be managed systematically. Impact of health on water pollution, especially diarrhea, was highlighted in the first two studies; Ximenes et al. (2024) offered more detailed information on children and seasonal fluctuations. Rather than describing direct health impacts, Faridi et al. (2023) shifted their attention to air pollution and emphasized the need for better monitoring and regulatory solutions.

Water pollution is defined as the contamination of water sources caused by human or natural activity, such as home wastewater, agricultural runoff, and industrial discharge. Pollutant Types: Pathogens, chemicals, plastics, heavy metals. Water pollution becomes a deviation from the normal state properties of water, not from its purity. Non-unpleasant substances can reduce water quality; therefore, their existence is dangerous to humans. Water pollution is caused by the presence of chemical substances that do not meet the requirements of clean water.

V. CONCLUSION

Pollution, causing acid rain, smog, and ozone depletion, harms water, soil, and structures. Control measures are crucial to combat global pollution. Air pollution affects children's physical and mental development and health. Water pollution, caused by germs, chemicals, plastics, and heavy metals, deviates from natural qualities and poses health risks. Strong regulations and proactive actions are needed to reduce pollution and promote sustainable development, while better monitoring and regulatory measures are necessary to alleviate health issues.

REFERENCES

[1]. Ali, K., Kausar, N., & Amir, M. (2023). Impact of pollution prevention strategies on environmental sustainability: role of environmental management accounting and environmental proactivity. Environmental Science and Pollution Research, 30(38). https://doi.org/10.1007/s11356-023-28724-1

[2]. Awewomom, J., Dzeble, F., Takyi, Y. D., Ashie, W. B., Ettey, E. N. Y. O., Afua, P. E., Sackey, L. N. A., Opoku, F., & Akoto, O. (2024). Addressing global environmental pollution using environmental control techniques: a focus on environmental policy and preventive environmental management. Discover Environment, 2(1). https://doi.org/10.1007/s44274-024-00033-5

[3]. Bikis, A. (2023). Urban Air Pollution and Greenness in Relation to Public Health. Journal of Environmental and Public Health, 2023(X), 1–18. https://doi.org/10.1155/2023/8516622

[4]. Browning, M. H. E. M., Rigolon, A., McAnirlin, O., & Yoon, H. (Violet). (2022). Where greenspace matters most: A systematic review of urbanicity, greenspace, and physical health. Landscape and Urban Planning, 217. https://doi.org/10.1016/j.landurbplan.2021.104233

[5]. Claudio, X. (2010). Código Penal Timor-Leste.

[6]. Faridi, S., Krzyzanowski, M., Cohen, A. J., Malkawi, M., Moh'd Safi, H. A., Yousefian, F., Azimi, F., Naddafi, K., Momeniha, F., Niazi, S., Amini, H., Künzli, N., Shamsipour, M., Mokammel, A., Roostaei, V., & Hassanvand, M. S. (2023). Ambient Air Quality Standards and Policies in Eastern Mediterranean Countries: A Review. International Journal of Public Health, 68(February), 1–10. https://doi.org/10.3389/ijph.2023.1605352

[7]. Gendy, M. E. G., & Yuce, M. R. (2025). Impact of exposure to air pollutants on the spread, severity, and mortality of viral infections: a systematic review. International Journal of Environmental Studies, 00(00), 1–28. https://doi.org/10.1080/00207233.2025.2464470

[8]. Godyń, I., Bodziony, M., Grela, A., Muszyński, K., & Pamuła, J. (2023). Determination of Pollution and Environmental Risk Assessment of Stormwater and the Receiving River, Case Study of the Sudół River Catchment, Poland. International Journal of Environmental Research and Public Health, 20(1). https://doi.org/10.3390/ijerph20010504

[9]. Gul, H., & Das, B. K. (2023). The Impacts of Air Pollution on Human Health and Well-Being: A Comprehensive Review. Journal of Environmental Impact and Management Policy, 36, 1–11. https://doi.org/10.55529/jeimp.36.1.11

[10]. KRDTL. (2002). Constitution of the Democratic Republic of Timor-Leste. 27. http://timor-leste.gov.tl/wp-content/uploads/2010/03/Constitution_RDTL_ENG.pdf

[11]. Krismanuel, H., & Hairunisa, N. (2024). The Effects of Air Pollution on Respiratory Problems : A Systematic Review Department of Surgery, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia Department of Occupational Medicine, Faculty of Medicine, Universitas Trisakti, Jakarta. Poltekita: Jurnal Ilmu Kesehatan, 18(1), 1–15.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1193

[12]. Lin, Chen, J. H., Yu, Y. J., & Dong, G. H. (2023). Ambient air pollution and infant health: a narrative review. EBioMedicine, 93, 104609. https://doi.org/10.1016/j.ebiom.2023.104609
[13]. Lin, L., Yang, H., & Xu, X. (2022). Effects of Water Pollution on Human Health and Disease Heterogeneity: A Review. Frontiers in Environmental Science, 10(June). https://doi.org/10.3389/fenvs.2022.880246
[14]. Mananga, E. S., Lopez, E., Diop, A., Dongomale, P. J. T., & Diane, F. (2023). The impact of air pollution on health in New York City. Journal of Public Health Research, 12(4). https://doi.org/10.1177/22799036231205870
[15]. Manisalidis, I., Stavropoulou, E., Stavropoulos, A., & Bezirtzoglou, E. (2020). Environmental and Health Impacts of Air Pollution: A Review. Frontiers in Public Health, 8(February), 1–13. https://doi.org/10.3389/fpubh.2020.00014
[16]. Pacheco, C., Carvalho, M., & Fatima, T. E. (2025). Improving Basic Sanitation: Focus on House Conditions, Clean Water, and Toilets in Dom Aleixo Post Administrative, Dili City, Timor-Leste, 2024. Asian Journal of Healthy and Science, 4(4), 165–173.
[17]. Rentschler, J., & Leonova, N. (2023). Global air pollution exposure and poverty. Nature Communications, 14(1), 1–11. https://doi.org/10.1038/s41467-023-39797-4
[18]. Roche, I. V., Ubalde-Lopez, M., Daher, C., Nieuwenhuijsen, M., & Gascon, M. (2024). The Health-Related and Learning Performance Effects of Air Pollution and Other Urban-Related Environmental Factors on School-Age Children and Adolescents—A Scoping Review of Systematic Reviews. Current Environmental Health Reports, 11(2), 300–316. https://doi.org/10.1007/s40572-024-00431-0
[19]. Tran, H. M., Tsai, F. J., Lee, Y. L., Chang, J. H., Chang, L. Te, Chang, T. Y., Chung, K. F., Kuo, H. P., Lee, K. Y., Chuang, K. J., & Chuang, H. C. (2023). The impact of air pollution on respiratory diseases in an era of climate change: A review of the current evidence. Science of the Total Environment, 898. https://doi.org/10.1016/j.scitotenv.2023.166340
[20]. Wang, J.-X., & Liu, X.-Q. (2024). Climate change, ambient air pollution, and students' mental health. World Journal of Psychiatry, 14(2), 204–209. https://doi.org/10.5498/wjp.v14.i2.204
[21]. WHO. (2024). Health consequences of air pollution on populations. In WHO Geneva, Switzerland, Reading (Issue 6).
[22]. Ximenes, Z., Boogaard, F. C., Ferreira, V., & Tamura, S. (2024). Wastewater Management Strategy for Resilient Cities — Case Study : Challenges and Opportunities for Planning a Sustainable Timor-Leste.
[23]. Zhang, J., Ren, D., Wang, S., Zhu, S., Qu, K., & Yuan, Y. (2022). Effects of air pollution on cardiovascular health
[24]. In patients with type 2 diabetes mellitus: Evidence from a large tertiary hospital in Shandong Province, China. Frontiers in Public Health, 10. https://doi.org/10.3389/fpubh.2022.1050676
[25]. Zhivkov, P., & Kesarovski, T. (2024). Dynamic Relationship Between Population Densities and Air Quality in the Four Largest Norwegian Cities. Annals of Computer Science and Intelligence Systems, 39(2024), 713–718. https://doi.org/10.15439/2024F838
[26]. Zhong, Z., & Chen, Z. (2024). Exploring the emission reduction and economic impacts of environmental regulation from a dynamic endogenous perspective: evidence based on the PVAR and threshold models. Humanities and Social Sciences Communications. https://doi.org/10.1057/s41599-024-04230-8