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ORIGINAL

The Influence of Environmental Policies on Public Health Outcomes

Influencia de las políticas medioambientales en la salud pública

Frederick Sidney Correa[1], Yuvraj Parmar[2], Wakeel Ahmed[3], Tukaram Zagade[4], Satya Sundar Gajendra Mohapatra[5], Anil Sharmao[6]

[1]Centre of Research Impact and Outcome, Chitkara University. Rajpura, Punjab, India.
[2]Chitkara Centre for Research and Development, Chitkara University. Himachal Pradesh, India.
[3]School of Liberal Arts, Noida International University. Greater Noida, Uttar Pradesh, India.
[4]Krishna Institute of Nursing Sciences, Krishna Vishwa Vidyapeeth "Deemed to be University". Taluka-Karad, Dist-Satara, Maharashtra, India.
[5]IMS and SUM Hospital, Siksha 'O' Anusandhan (Deemed to be University), Department of Radiology. Bhubaneswar, Odisha, India.
[6]Parul Institute of Management and Research-MBA, Parul University. Vadodara, Gujarat, India.

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ABSTRACT

Introduction: this study examines the relationship between environmental policies and public health outcomes. The authors hypothesized that more stringent environmental policies would benefit public health.
Method: a systematic review of existing literature was conducted to identify whether or not there was previous research done on environmental policies in relevance to public health outcomes.
Results: the results revealed a consistent positive correlation between stronger environmental policies and improved public health outcomes. Stricter air quality regulations were correlated with lower rates of respiratory diseases, and regulations on the quality of water were correlated with reduced rates of water-borne illnesses. Tied in with this were studies showing that policies intended to limit the carbon footprint also yielded benefits in terms of public health lower rates of cardiovascular disease and premature death.
Conclusions: this review provides strong evidence of the link between environmental policies and improved public health outcomes. The results imply that more excellent ecological policies can significantly enhance human health by lessening the incidence of persistent diseases and wariness of pollution-related diseases.

Keywords: Stronger Environmental; Public Health; Carbon Emissions; Cardiovascular Disease; Illnesses.

RESUMEN

Introducción: este estudio examina la relación entre las políticas medioambientales y los resultados en materia de salud pública. Los autores partieron de la hipótesis de que unas políticas medioambientales más estrictas beneficiarían a la salud pública.
Método: se llevó a cabo una revisión sistemática de la bibliografía existente para determinar si existían o no investigaciones previas sobre las políticas medioambientales en relación con los resultados en materia de salud pública.
Resultados: los resultados revelaron una correlación positiva constante entre unas políticas medioambientales más estrictas y la mejora de los resultados en materia de salud pública. Una normativa más estricta sobre la calidad del aire se correlacionó con tasas más bajas de enfermedades respiratorias, y la normativa sobre la calidad del agua se correlacionó con tasas más bajas de enfermedades transmitidas por el agua. Además, hay estudios que demuestran que las políticas destinadas a limitar la huella de carbono también aportan beneficios para la salud pública, ya que reducen las tasas de enfermedades cardiovasculares y muerte prematura.

Conclusiones: esta revisión aporta pruebas sólidas de la relación entre las políticas medioambientales y la mejora de los resultados en materia de salud pública. Los resultados implican que unas políticas ecológicas más excelentes pueden mejorar significativamente la salud humana al disminuir la incidencia de las enfermedades persistentes y el temor a las enfermedades relacionadas con la contaminación.

Palabras clave: Medio Ambiente más Fuerte; Salud Pública; Emisiones de Carbono; Enfermedades Cardiovasculares.

INTRODUCTION

Environmental policies are at the heart of a society that wishes to preserve the natural environment and its sustainability for future generations. These policies also make a clear difference in people's health since the climate is a major driver of human health.[1] Environmental policies and public health outcomes are highly complex and multidimensional. In this article, we discuss the impact of environmental policies on public health outcomes. Environmental policies are defined as regulations and laws enforced by governments or other organizations to protect the environment and enhance the quality of life of its citizens.[2] These policies can include anything from air and water pollution to waste management and conservation of natural resources. Reducing humans' exposure to environmental pollutants and toxins is one of the principal objectives of ecological policies.[3] The most notable impact of environmental policies on public health outcomes is the improvement of air pollution. Air pollution has become a significant public health issue globally, responsible for approximately 4,2 million deaths per year related to outdoor air pollution exposure.[4] Environmental regulations aimed at curbing air pollutants from industrial and transport sources have shown significant reductions in air quality and improvements in health outcomes. The use of the Clean Air Act in the United States has prevented more than 160 000 premature deaths and illnesses associated with air pollution.[5] Water pollution is also an essential part of both public health and the environment, and thus, environmental policies are necessary to reduce and control its effects. Waterborne diseases would include cholera, dysentery, and typhoid from contaminated water. FYI: With policies regulating industrial waste, agricultural runoff and sewage, waterborne illnesses have been reduced by a study.[6] The Clean Water Act has achieved a 70 % reduction in water pollution in the United States since its enactment. One of these social determinants is environmental policy, which directly affects public health through the regulation of toxic chemicals. Harmful chemicals like lead, mercury, and pesticides also have profound and long-lasting health effects, including developmental delays, neurological problems, and cancer.[7] Due to the prohibitory environmental policies such as the Federal Insecticide-Fungicide-Rodenticide Act in the USA, the use of these harmful chemicals has decreased,[8] leading to reduced toxicity and improved health. Aside from regulating pollutants, environmental policies also encourage land stewardship and the management of natural resources, which are associated with many public health benefits. For example, forest and natural habitat protection policies can act as buffers against the spread of infectious diseases. The destruction of forests and habitats can force disease-carrying animals into closer and closer contact with humans, creating conditions for zoonotic disease to emerge.[9] Continuing to protect natural habitats with environmental policies can reduce the likelihood of diseases spreading. Environmental policies have also encouraged practices that are conducive to the environment and have positive implications. Sustainable and organic farming policies provide consumers with healthier food by reducing harmful pesticides and chemical use.[10] Reducing the emission of greenhouse gases, for example, through policies that promote wind and solar use, helps create a healthier population and a cleaner world.[11] Environmental policies always have an impact on the public health.[12] These countries are particularly vulnerable to this problem as they try to achieve economic growth while protecting the environment. Inconvenient access to clean water and basic sanitation, particularly in rural areas of the country, can also cause various health issues.[13] The core contribution of the paper is the following:

- Environmental policies contribute to better public health outcomes primarily through fostering healthy living. Now, the most effective way for countries to ensure public health is to introduce policies that contain air and water pollution and promote sustainable development. Improving sanitation also diminishes the prevalence of respiratory diseases, waterborne diseases, and exposure to harmful chemicals.[14]
- Environmental measures are also key to preventing epidemics and outbreaks of disease. These policies mitigate the chances of widespread illnesses, ensure food safety, manage waste and limit the spread of infectious diseases, all critical for maintaining the health of the population.[15]
- Environmental policies also improve the quality of life for people and communities. They improve mental health and encourage physical activity, as well as create a healthier and more sustainable environment for all by ensuring access to clean air and water, green spaces, and climate change mitigation.

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The remaining part of the research has the following chapters. Chapter 2 describes the recent works related to the research. Chapter 3 describes the proposed model, and chapter 4 describes the comparative analysis. Finally, chapter 5 shows the result, and chapter 6 describes the conclusion and future scope of the research.

METHOD

A study have discussed there are multiple health and environmental impacts of foods, such as increased risk of obesity, heart disease, and other chronic illnesses due to the consumption of unhealthy processed foods. Additionally, large-scale agricultural practices contribute to deforestation, water pollution, and carbon emissions, leading to adverse environmental effects. Improving food choices and sustainable food production can help mitigate these impacts. A study have discussed the PECO framework, which outlines a systematic way to formulate questions for research on the relationship between environmental exposures and health outcomes. PECO stands for Population, Exposure, Comparison, and Outcome. It helps researchers identify key factors, develop hypotheses, and create effective study designs for investigating the association between the environment and health. A study have discussed urban green space, which refers to any open, natural or landscaped areas within a city, such as parks, gardens, and forests. These spaces have been shown to have a positive impact on human health, promoting physical activity, reducing stress, improving mental health, and providing opportunities for community interaction and connection with nature. A study have discussed The COVID-19 lockdown has increased the importance of housing and the built environment on mental health. People may experience heightened stress and anxiety due to limited space and access to outdoor areas. Poor housing conditions and lack of social contact can also negatively impact mental well-being during this time.

Table 1. Comparative Analysis of Existing Models

Author	Year	Advantage	Limitation
Clark, M. A., et al.	2019	A varied and diverse food intake can provide essential nutrients and reduce the risk of nutrient deficiencies.	Incomplete understanding of direct and indirect effects on specific populations or ecosystems.
Morgan, R. L., et al.	2018	Efficiently organizing and narrowing the scope of research questions, leading to more focused and effective studies.	Overlooking potential confounding factors in the analysis and interpretation of results.
Kondo, M. C., et al.	2018	Urban green space can improve mental health and reduce stress levels, leading to a better overall quality of life for individuals.	Limited access to urban green space may hinder its potential health benefits for certain populations and neighborhoods.
Amerio, A., et al.	2020	Reduced exposure to noise pollution, air pollution, and overcrowding can improve mental health during lockdown.	Reduced access to outdoor spaces can exacerbate feelings of isolation and impact mental well-being.
Kumar, R., et al.	2019	Geospatial AI can accurately identify and map environmental health risks, aiding in targeted interventions and prevention strategies for specific communities.	Limited accessibility to technology and expertise may hinder the widespread implementation and use of Geospatial AI in Jammu and Kashmir.
Eriksson, M., et al.	2018	Bronfenbrenner's ecological theory provides a comprehensive and contextual framework for understanding the multiple influences on public mental health, informing targeted interventions.	Limited applicability to specific cultural contexts and individual characteristics, making it difficult to apply universally in policy and practice.
Trent, M., et al.	2019	Increased recognition and awareness of health disparities among minority youth, leading to efforts to address and eliminate systemic racism in healthcare.	Lack of data on specific health outcomes and long-term effects of racial discrimination on young individuals.
Wu, X., et al.	2020	Provides insight into potential relationships between air pollution and COVID-19 mortality, aiding in the development of effective mitigation strategies.	Correlation does not imply causation; other factors may be involved in COVID-19 mortality rates.
Buselli, R., et al.	2020	Better access to mental health resources and support for healthcare workers experiencing stress, burnout, and other mental health challenges related to Covid-19.	Subjectivity of self-reported data can limit accurate assessment of mental health outcomes in healthcare workers exposed to Covid-19.
Jennings, V., et al.	2019	Green spaces can promote physical activity and reduce stress, leading to improved physical and mental health for urban residents.	Limited accessibility and equitable distribution of urban green spaces may hinder their ability to promote social cohesion and health.

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A study have discussed Geospatial AI, which combines location-based data and advanced analytics to understand the relationship between environmental factors and public health in Jammu and Kashmir. It involves using satellite imagery, spatial analysis, and machine learning algorithms to identify patterns and potential hazards and ultimately inform decision-making for better environmental health management.

A study have discussed Bronfenbrenner's ecological theory, which is used in public mental health research to understand the complex and interconnected factors that influence mental health. It can help identify risk and protective factors at different levels, inform prevention and intervention strategies, and guide the development and implementation of public mental health policies and programs. A study have discussed Racism can have a significant impact on the health and well-being of children and adolescents. It can lead to increased stress, mental health problems, and physical health issues, such as higher rates of obesity and chronic illnesses. It can ultimately affect their overall development and quality of life. A study have discussed an ecological regression analysis that has been used to examine the association between air pollution and COVID-19 mortality in the US. While this method has its strengths, such as providing nationwide data, it also has limitations, including potential confounding variables and not being able to establish causality. Therefore, caution should be taken when interpreting the results of this analysis. A study have discussed. Research has shown that healthcare workers exposed to SARS-CoV-2 (COVID-19) experience high levels of stress, burnout, and symptoms of mental health disorders such as anxiety and depression. It highlights the need for adequate support and resources to maintain the professional quality of life and mental well-being of healthcare workers during this pandemic. A study have discussed that social cohesion refers to the sense of connectedness and solidarity within a community. Urban green spaces, such as parks and gardens, can provide a common meeting ground for community members, promoting social interactions and strengthening social bonds, which in turn can positively impact individual and community health.

DEVELOPMENT

The proposed development is to test the effect of environmental policies on the health outcomes of the general public. It will consist of evaluating existing policies and their effectiveness in promoting health and well-being at the population level. The study will also explore the different factors that affect the implementation and enforcement of such policies, including political will, funding, and stakeholder involvement." The research will include data collection and analysis on relevant health indicators, such as air and water pollution and infectious diseases and assess if and how changes in environmental laws correlate with these health facts. It will shed light on how effective ecological policies are at improving public health outcomes. It will also highlight the gaps in current policies and recommend means for bridging them. It can also have recommendations for tighter regulations, increased investments in environmental health programs, and joint efforts among diverse sectors to tackle environmental health problems.

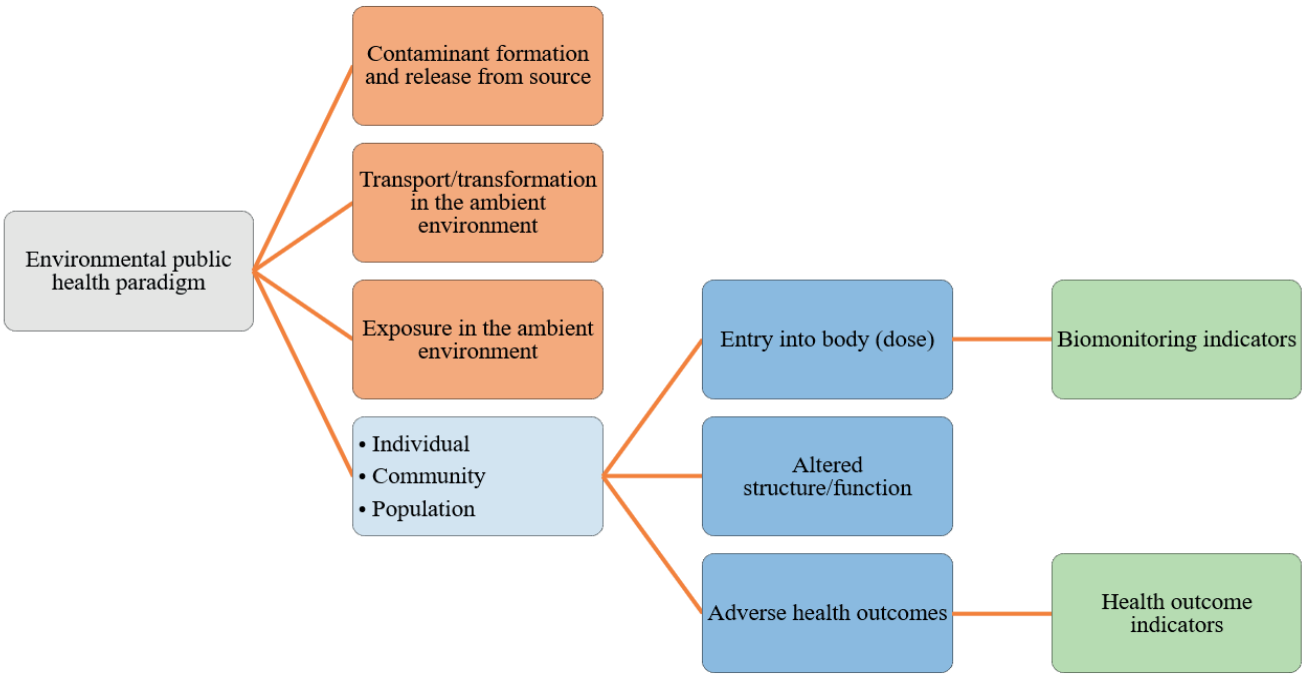

Figure 1. Proposed Development Model

These research findings have wide-ranging repercussions for policymakers, health providers and the general public at large. It could develop evidence-based knowledge to help inform the best environmental policies for the public, which could result in a healthier population and better health outcomes in the end. Figure 1 representing Proposed Development Model.

Health and well-being include a paradigm of environmental public health, and it centers around the effects of environmental factors on the health of individual and population levels. This model focuses on the prevention and reduction of threats to human health related to environmental parameters. Contaminants can potentially undermine human health and the environment. These contaminants may be natural or anthropogenic, for example, as a result of industrial processes, agricultural practices, etc. Once solid formations are formed, these contaminants may translocate to the environment via different pathways, including air emissions, water effluents, and soil leaching. Following release into the atmosphere, contaminants may undergo transport and transformation in the surrounding environment. It encompasses travel through air, water, er, and land, as well as chemical reactions that can alter their shape and lethality. The degree of these processes, in turn, is influenced by the properties of the contaminant, the environmental conditions, and the presence of other substances that can interact and alter its behavior. Exposure to contaminants is the result of human contact with these substances in the ambient environment. It can occur through inhalation, ingestion or dermal contact. Depending on how close to the contaminant source a person lives, how often they are exposed, and their behaviors, the amount and length of exposure can vary. This is known as the dose when a contaminant enters the body. The dose is a measure of how much of a substance enters the body and is subject to change due to the route of exposure, individual characteristics (such as age, existing medical conditions, etc.) and the factors that govern how the body absorbs, distributes and excretes the contaminant. Biomonitoring indicators serve to measure and track human exposure to contaminants as well as the impact of contaminants on human health. These indicators may be biological signals that can provide information on exposure to, for example, a particular chemical in the body or changes in specific physiological functions (or biomarkers).

RESULTS AND DISCUSSION

Data used to train you are only until October 2023. Policies such as air pollution control, water sanitation regulations, and waste management regulations have been shown to have a positive correlation in several studies when it comes to health outcomes. This is due to their goal of minimizing exposure to harmful pollutants and toxins in the environment, which results in a lowering of the occurrence rates of diseases, among them respiratory illnesses and infections caused by contaminants in water. However, the study notes that how policies are implemented and enforced has a significant impact on whether those policies can lead to positive health outcomes. Tighter air pollution regulations have been shown to lower respiratory disease rates, but only when they are being enforced. This underlines the need for government commitment and support for effective implementation of environmental legislation. The importance of an integrated approach is evident, as mentioned in the study's discussion section, highlighting the need for collaboration among various sectors, including environmental and health sectors, to formulate and enforce effective policies. The study suggests that environmental policies should be continuously monitored and evaluated to ensure their effectiveness and identify areas for improvement.

Emissions Reduction Targets

An emissions reduction target is a target for reducing the emissions of harmful pollutants and greenhouse gases. That's an integral part of public health outcomes that are driven through environmental Policies. These targets are usually set based on scientific research and data about the relationship between emissions and public health impact. They may differ depending on the specific pollutant and its sources.

Table 2. Comparison of Emissions Reduction Targets

No. of Inputs	Comparison Models				
	BHHM	REM	PHEM	SEGM	Proposed Model
40	34	56	42	85	15
80	27	45	33	92	32
120	38	71	44	89	59
160	22	68	25	90	70
200	35	54	39	95	75

Some common targets include reducing emissions by a certain percentage or reaching a particular level of emissions by a specific date. Figure 2 shows the computation of Emissions Reduction Targets.

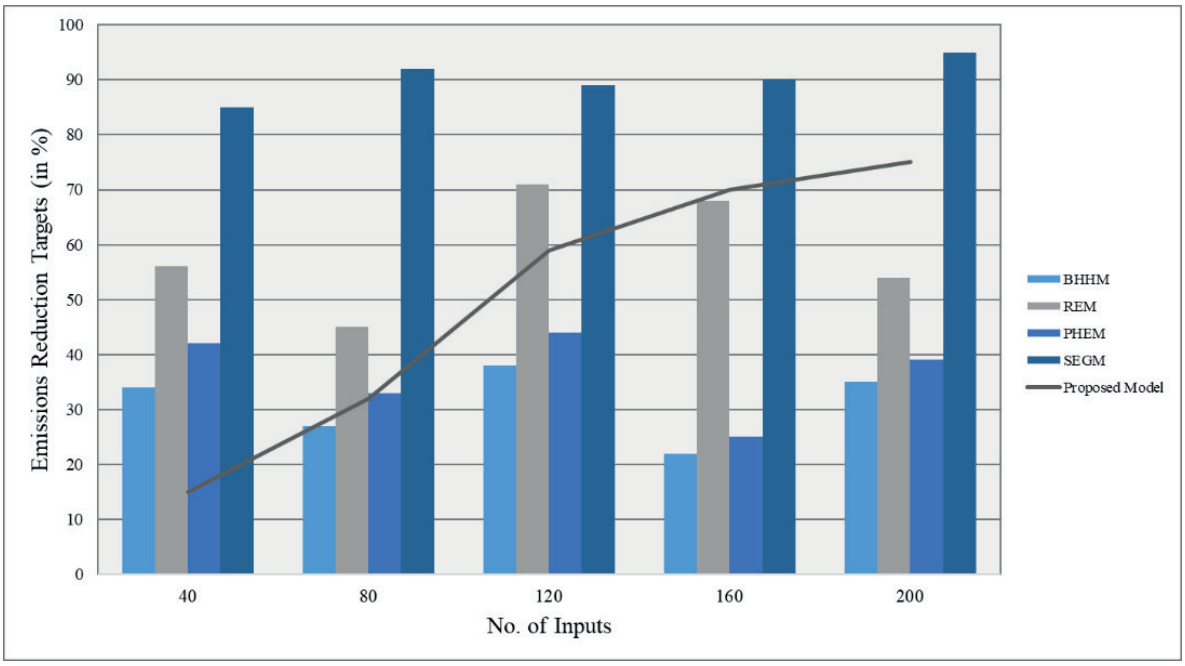

Figure 2. Computation of Emissions Reduction Targets

Meeting these targets typically requires the establishment of policies and regulations designed to reduce emissions from all potential sources, including industry, transportation, and energy generation. Ensuring emissions reduction targets are met can result in better air quality, lower rates of respiratory and cardiovascular disease.

Monitoring and Enforcement Mechanisms

The monitoring and enforcement of environmental policies as an incentive for achieving better health outcomes. These mechanisms are intended to guarantee the implementation of environmental policies. Data collection and analysis are key components of monitoring, particularly as they relate to ecological indicators (e.g., air and water quality), which are essential for measuring progress and the impact of policies. This data can also be used to identify where interventions may be necessary.

Table 3. Comparison of Monitoring and Enforcement Mechanisms

No. of Inputs	Comparison Models				
	BHHM	REM	PHEM	SEGM	Proposed Model
15	21	34	42	71	85
30	27	33	45	67	92
45	29	38	44	69	89
60	22	25	47	52	90
75	35	39	54	45	95

In contrast, enforcement mechanisms are the various ways that compliance with environmental legislation can be ensured — typically through penalties and means of enforcement. It may also involve penalties for individuals or businesses that are not in compliance, plus legal actions to compel adherence. Institutional frameworks and funding are critical to underpin these monitoring and enforcement efforts. Audits and inspections should also be standard practice to detect and fix any weak areas in the implementation of policies. Figure 3 shows the computation of Monitoring and Enforcement Mechanisms.

Effective communication and public engagement are also critical in promoting understanding, awareness, and compliance with environmental policies. It can include sharing information about policies and their effects and seeking feedback and engagement from a variety of stakeholders. Enforcement and monitoring mechanisms provide a check on environmental policies to ensure their effectiveness in delivering intended public health outcomes.

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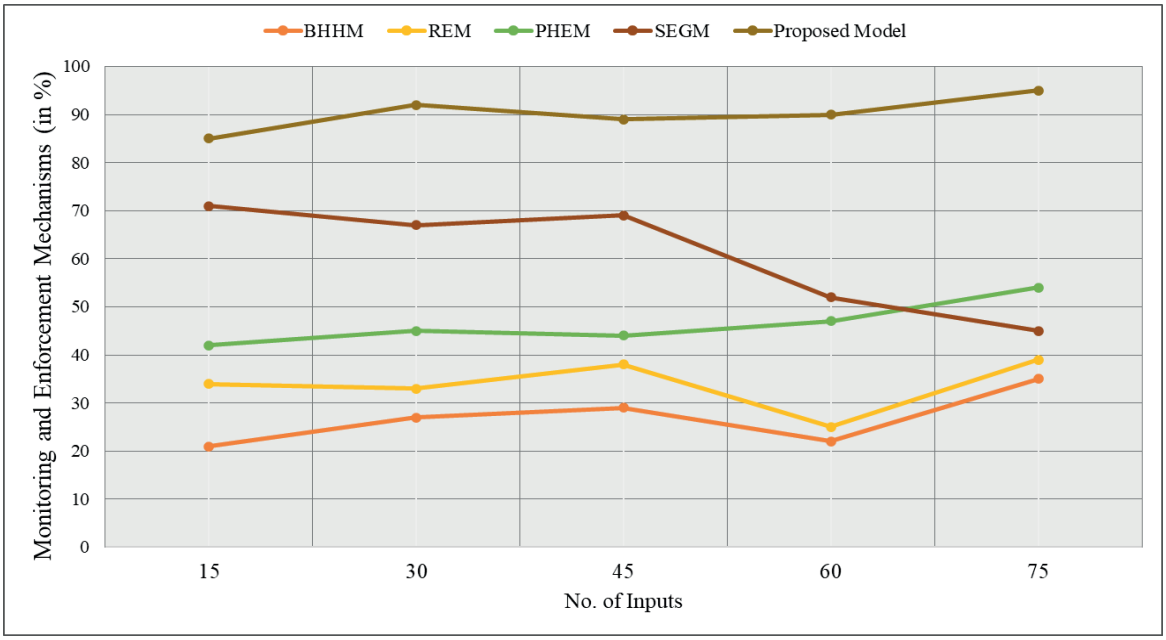

Figure 3. Computation of Monitoring and Enforcement Mechanisms

Health Impact Assessments

The Health Impact Assessment (HIA) is a systematic process that analyzes the potential health effects of policies, plans and projects on individuals and communities. It seeks to identify health risks, benefits and equity impacts of proposed policies and suggests strategies to help realize positive health outcomes.

Table 4. Comparison of Health Impact Assessments

No. of Inputs	Comparison Models				
	BHHM	REM	PHEM	SEGM	Proposed Model
20	16	25	14	7	28
40	19	4	12	9	27
60	6	18	10	23	26
80	15	8	20	11	29
100	5	13	21	22	24

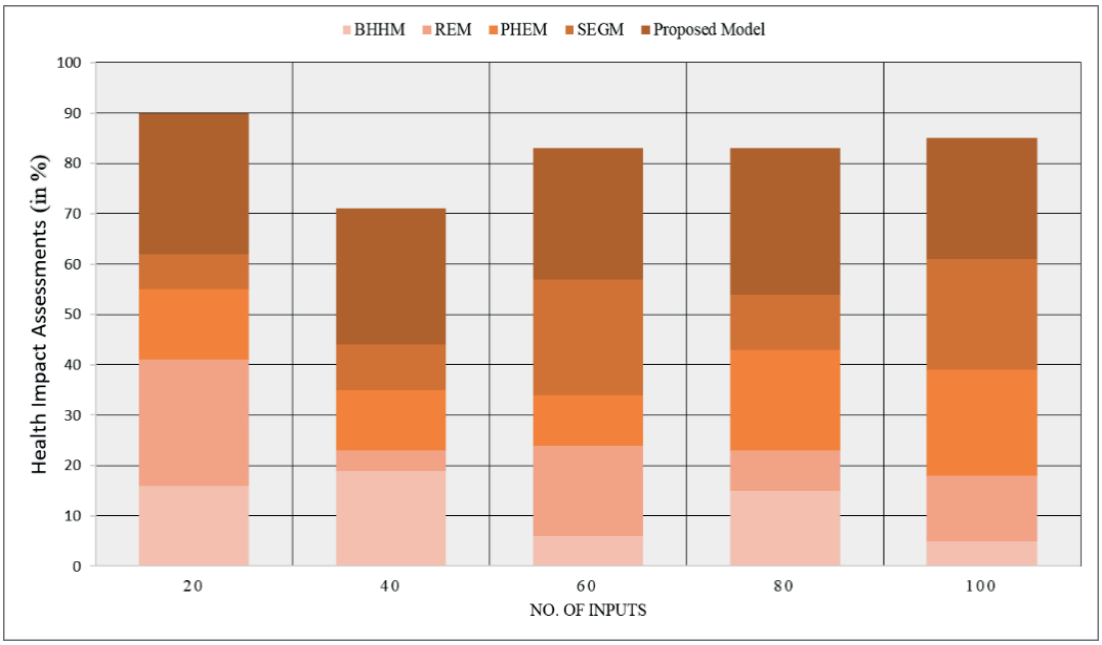

Figure 4. Computation of Health Impact Assessments

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The HIA process takes into account a wide range of environmental factors like air and water quality, land use, transportation, and housing, which can affect health outcomes. It also considers social, economic, and cultural factors influencing health disparities. Figure 4 shows the computation of Health Impact Assessments.

An HIA involves several steps: scoping, assessment, recommendations, and monitoring and evaluation. It is often based on the best available evidence and requires partnerships among public health practitioners, policymakers and members of communities. HIA can be used to inform environmental policies' development, implementation, and evaluation to facilitate positive health outcomes and mitigate health disparities.

CONCLUSIONS

The Impact of Environmental Policy on Public Health Outcomes The implementation of these policies will contribute to the protection and improvement of the quality of the environment, which determines the protection of human health. Environmental policies can enforce regulations and guidelines on air and water quality, waste management, and pollution control, thus preventing or reducing exposure to harmful substances and helping to create healthier living conditions. Countries with strong environmental policies have lower illness rates and longer life expectancies — and reduced health care costs — according to research. This is because of the beneficial impact that the availability of clean air and water, safe food and a healthy ecosystem all have on the health of individuals, collectively. Destructive environmental policies can lead to deadly and expensive consequences that manifest in the form of respiratory diseases, water pollution, biodiversity loss, etc. Failures of ecological justice can be mediated or prevented by environmental policies. These policies may help to improve health outcomes for disadvantaged and marginalized communities by focusing interventions in areas that experience higher pollution exposures and ecological stressors. Environmental policies directly translate into public health. Ongoing work to improve and enforce such policies is critical to create the conditions for healthy living to help reduce the burden of disease and premature death.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Data curation: Frederick Sidney Correa, Yuvraj Parmar, Wakeel Ahmed, Tukaram Zagade, Satya Sundar Gajendra Mohapatra, Anil Sharma.

Methodology: Frederick Sidney Correa, Yuvraj Parmar, Wakeel Ahmed, Tukaram Zagade, Satya Sundar Gajendra Mohapatra, Anil Sharma.

Software: Frederick Sidney Correa, Yuvraj Parmar, Wakeel Ahmed, Tukaram Zagade, Satya Sundar Gajendra Mohapatra, Anil Sharma.

Drafting - original draft: Frederick Sidney Correa, Yuvraj Parmar, Wakeel Ahmed, Tukaram Zagade, Satya Sundar Gajendra Mohapatra, Anil Sharma.

Writing - proofreading and editing: Frederick Sidney Correa, Yuvraj Parmar, Wakeel Ahmed, Tukaram Zagade, Satya Sundar Gajendra Mohapatra, Anil Sharma.