

IMPACT OF ENVIRONMENTAL SUSTAINABILITY ON PUBLIC HEALTH IN INDIA: A CRITICAL REVIEW

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ABSTRACT

Biodiversity encompasses environmental factors such as life, genetic characteristics, as well as ecosystems and features, and, therefore, it is an indispensable component of human development and health. Such crucial services as water cleansing, soil enrichment and climate maintenance are crucial for people, and biodiversity is the basis for them. The correlation between biodiversity and ecosystem services suggests that it is critical to increasing food, energy and water availability. In terms of prevention and control of the disease, biodiversity is also important as it helps to maintain ecosystems and control the vectors and pathogens causing disease. Various systems can act as buffers to prevent the spread of infectious diseases and thus promote public health. But the continuing loss of ecosystems and climate alteration, and pollution greatly undermine this. This has also been linked to the decline of natural ecosystems that contain facilities for medical care while infectious disease that is dangerous to global health increase. In addition, biodiversity is a critical factor in ensuring food security. Through various ecosystems, large range of food types is available that aids in the intake of a variety of foods and counteracts malnourishment. There is assurance of the supply of a considerable number of nutrients that are important for the body through the protection of biodiversity. These include policies that combine environmental and health goals, habitat restoration, and sustainable land management. In summary, biodiversity has a critical role in public health. Ensuring sustainable health outcomes and the welfare of future generations requires concerted efforts to protect biodiversity.

Keywords: *Environmental Sustainability, Public Health, Air Pollution, Water Management, Climate Change Adaptation.*

Introduction

As for the sustainable practices that us humans carry out, it allows some services to be provided which includes air filtration, water purification, soil fertilization, and climate control which benefit humans. In a growing economy like India, environmental sustainability has even greater significance to public health. WHO reports indicate that 1.6 million people die every year from air pollution in India. Poor sanitation also leads to waterborne diseases, which is a huge problem in the rural India. Environmental degradation harms health and in turn human health heavily impacts socio-economic standing especially poverty and inequality. All rural and slum populations are the most affected as they lack resources like clean drinking water, quality healthcare, and nutrition. Water contaminated with faeces causes diarrhoea which is one of the biggest causes of child mortality in India. Fertilizers used in industrial areas, along with heavy metals, are a reason behind long term health issues such as developmental disorders and cancer (Gupta & Kumar, 2021). The connection between the environment and the economy. Building community resilience simultaneously requires strong public health initiatives, such as increased access to

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clean drinking water, better sanitation, and a more robust healthcare system. Sustainability initiatives are also greatly aided by community involvement and education. People and communities can embrace sustainable behaviours by being more conscious of the negative health effects of environmental deterioration. Initiatives such as Swachh Bharat Abhiyan serve as examples of how public involvement can effectively tackle issues related to waste management and sanitation, improving environmental and public health results (Kumar et al., 2020). India can address its environmental issues, lessen health disparities, and guarantee a healthier, more resilient populace for future generations by putting sustainability and public health programs first.

Air Quality and Public Health in India: Challenges, Strategies, and Sustainable Solutions

Renewable energy sources such as solar, wind, and hydropower are essential to reducing reliance on fossil fuels and pollution (Chandrappa & Kulshrestha, 2016; Mondal et al., 2020). Adoption of clean cooking methods like LPG or even electricity is quite critical in rural and urban slums to alleviate indoor air pollution. Real-time air quality monitoring helps in tracking pollution patterns and evaluating programs like NCAP (NCAP) (Gupta et al., 2021; Kumar & Sharma, 2020). Other approaches attempt to enhance the urban environment using green infrastructure, active transport, and more efficient waste disposal methods. Curbing pollution from mobile sources is possible with investment in walking, underground transport facilities, and electric buses (Sahu et al., 2021). A holistic approach requires collaboration across energy, transportation, urban development, and health sectors, aligning with the UN Sustainable Development Goals (Pandey et al., 2021). Public awareness campaigns can drive behavioural changes like carpooling and clean energy adoption (Sahu et al., 2021). Enforcing air quality standards and providing incentives for clean technologies will further reduce emissions (Maji et al., 2017). These strategies can help India mitigate air pollution and promote sustainability.

Water Sustainability and Public Health in India: Challenges, Strategies, and Policy Imperatives

The overall health of people relies heavily on clean and safe drinking water and pollution negatively affects that through diseases such as cholera and dysentery. In India, the sources of water are highly polluted and the rural parts lack proper sanitation facilities which increases health risks. WHO estimates indicate that waterborne diseases are responsible for almost 80% of sickness in developing countries which strongly suggests the importance of sophisticated water management systems (WHO, 2022). Rainwater collection and wastewater recycling are effective methods for increasing water availability and decreasing pollution in fresh water systems (Kumar et al., 2021). Projects like Namami Gange have highlighted the positive results targeted pollution control efforts can have on river systems when industrial discharge and sewage outfalls are stopped (Singh & Gupta, 2020). For sustainable water consumption, community attendance is crucial. Participation of community members in rain water harvesting and monitoring of critical resource quality will ensure effective long term management of the resource (Sharma & Patel, 2019). Various other campaigns, for instance, Swachh Bharat Abhiyan have shown how teaching citizens about proper sanitation and hygienic living conditions can yield productive results (Gupta & Mehta, 2021). Regulations to harness these opportunities require more proactive policy development and collaboration between states, NGOs, and the private sector to promote water-sustainable practices, technologies, and improving infrastructure.

Waste Management and Public Health in India: Challenges, Sustainable Practices, and Policy Interventions

The improper disposal of waste poses a danger to one's health due to the contamination of air, water, and soil which can lead to an array of health concerns. One can face respiratory problems, skin infections, gastrointestinal disorders, and vector-borne diseases such as malaria and dengue. Disease-carrying vectors are attracted to open dumping sites, and uncontrolled waste burning further adds to the problem by releasing toxic waste into the environment (Gupta et al., 2020). After all, poor waste management does not help the cause, as it contributes to the deterioration of the environment, amplifying the public health crisis. Practices like recycling and waste composting need to be exercised in order to eliminate landfill waste, lessen the pollution, and save resources. The promotion of a circular economy can mitigate the negative environmental and health impacts (Sharma & Patel, 2019). In recent times, India has implemented waste segregation and recycling programs which have drastically reduced waste accumulation. The Swachh Bharat Abhiyan seeks to improve overall sanitation, health, and hygiene through waste management policies by eliminating open defecation and improving waste segregation and processing (Kumar et al., 2021; Singh & Gupta, 2020). Though there is some progress, further development is required to ensure proper waste management, and encourage people to adopt

sustainable changes. The infusion of government policies with community participation is paramount in achieving effective long lasting waste disposal solutions.

Climate Change and Public Health in India: Risks, Adaptation Strategies, and Policy Responses

The shifts in temperature due to increased climate change can be detrimental to the public's health. Higher temperatures can increase the risk of heat stroke and strain due to the inability of the vulnerable population to take heat. Furthermore, the spread of diseases such as Malaria and Dengue is also more prevalent in hotter regions (Kumar et al., 2021). Along with that, floods, storms and droughts can lead to the contamination of water and availability of food, which in turn would lead to anxiety and unrest. To make sure these health impacts are mitigated, there also needs to be a focus on enhanced nutrition through sustainable farming techniques and increase in crop production during times of drought (Patel & Sharma, 2020). The aim is to reduce health risks that are caused by unstable climate factors through the implementation of emergency health services and efficient warning systems (Sahu et al., 2021). India's national policies provide an action plan that revolves around the need to change on an international scale through missions that focus on farming, hydrology, and energy resources. Assessing the impacts of climate change on a population's health and improving the healthcare systems in that country is the aim of National Mission on Health and Climate Change (Pandey et al., 2021). It is important for people from diverse sectors such as the government, businesses, and civil society to come together to create climate-resilient health systems and mitigating climate change's adverse health effects.

Renewable Energy and Public Health in India: Health Benefits, Sustainability, and Policy Implications

The use of solar, wind, and water energy significantly improves public health by reducing pollution from fossil fuels, which can worsen respiratory and cardiovascular diseases (Sharma & Patel, 2020). The pollutants released from fossil fuel power plants are responsible for almost 7 million early deaths worldwide every year (WHO, 2020). Clean energy sources also help in lowering the risk of public health concerns and greenhouse gas emissions (Kumar et al., 2021). Renewable energy opportunities in India have progressed. The solar energy developments in Gujarat have alleviated the use of coal and enhanced air quality, while the wind energy in Tamil Nadu has reduced the health burden of pollution (Singh & Gupta, 2019; Rathi & Khandelwal, 2020). The hydropower developments in Himachal Pradesh and Uttarakhand further reduce the reliance on thermal power plants which is good for public health and the environment. In addition to health, clean energy promotes social and economic development by creating jobs, providing energy in rural areas, and building sustainable communities. Solar mini grids in rural regions of India have also improved healthcare and nutrition and the standard of living.

Impact of Environmental Sustainability on Public Health in India

Much of the modern public health issues in India are caused by environment deterioration which includes air and water pollution, waste mismanagement, and misuse of industrial sources. The emissions from vehicles and industries are major contributors to air pollution, which result in respiratory and heart diseases for the populace. According to the WHO (2020), over 1.6 million people lose their lives each year in India due to complications caused by air pollution. Transitioning to renewable energy source such as wind and solar energy can less the air pollution along with its health problems (Kumar et al., 2021). It is also a severe problem in public health in India, as water sources that get polluted lead to serious infectious diseases such as dysentery and cholera, especially in the rural regions. To control these health problems, sustainable water management practices like river cleaning via treatment expansion and Namami Gange project should be applied (Patel & Sharma, 2020). People are at risk of infectious diseases because of low standards of waste management, and that exposes them towards the tremendous threat of public health aggravation. The Swachh Bharat Abhiyan program has a major objective to improve health by controlling the sanitation and cleanliness of waste disposal along with poorly managed public facilities (Kumar et al., 2021). In order to achieve positive health changes, as such in India, it is vital to incorporate further sustainable development approaches which manage the major pollutants such as air water and chemical waste, alongside with climate change, to steer better health outcomes. Combining health and environmental policies is critical to guarantee long term health improvement for the population (Pandey et al., 2021).

Conclusion

To achieve a public health goal like reducing inequities in health, increasing resiliency to climate change and ensuring that the citizens are healthy in the future, close integration of environmental sustainability alongside public health policy becomes vital. In India, where so much of the population faces harsh realities of climate change, cleaner air and water alongside better waste disposal directly

ensures better health outcomes. It is important to realize, however, that improving these determinants of health influences the public's health considerably. Programs such as Swachh Bharat Abhiyan and Namami Gange have shown how undertaking integrated approaches can result in tremendous positive synergy on health outcomes and accomplishing environmental objectives. Sustainable practices, or improving the use of non-biological fuel resources, in addition to improving water and waste management can serve as inexpensive and effective methods to mitigate risks to health from the environment. To ensure balancing these objectives strengthening the healthcare infrastructure, abiding by the set rules relating to the environment, and empowering people are the keys. By doing this in the long term, the goals of national health priorities will be met. There is also a need for a more multidisciplinary approach in achieving better public health citizenship that strengthens the role of government, scientific community and civil society in achieving sustainable development.

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