

# Article



# Promoting Sustainable Development through the One Health Approach: Insights from Bangladesh

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## **Abstract**

Introduction: The One Health approach offers a promising framework for addressing the intertwined challenges of human health, animal health, and the environment, essential for achieving sustainable development. Understanding the specific insights gained from implementing this approach in Bangladesh will not only contribute to the local context but also provide valuable lessons for other regions facing similar challenges. By promoting collaboration and integration, the One Health approach has the potential to pave the way for a sustainable and resilient future for Bangladesh and contribute to global efforts towards sustainable development.

**Methods:** A literature search was conducted on open access databases like PubMed Central, Scopus, Web of Science, using relevant keywords and search terms. Open access articles, including research papers, review articles, and other publications related to the topic were collected. Each article was critically evaluated, taking into consideration factors such as the quality of the research, the credibility of the authors, and the impact of the publication.

Findings: The One Health approach in Bangladesh has led to the establishment of effective surveillance systems, early detection mechanisms, and rapid response strategies for infectious diseases and zoonotic outbreaks. This has greatly contributed to preventing and managing public health crises. Bangladesh has successfully implemented the One Health approach to address health challenges impacting humans and animals. Through collaboration between human and animal health sectors, the country has effectively controlled zoonotic diseases, such as avian influenza and Nipah virus. The integration of veterinary and agricultural sectors has improved food safety by addressing the indiscriminate use of antibiotics in animal husbandry. The One Health approach in Bangladesh aligns with the Sustainable Development Goals (SDGs), particularly Goal 3 (Good Health and Well-being), Goal 2 (Zero Hunger), and Goal 15 (Life on Land). Bangladesh's success exemplifies the importance of recognizing the interdependence of human, animal, and environmental health for sustainable development.

Conclusion: The One Health strategy has shown to be an effective foundation for encouraging sustainable development. It acknowledges the linkages between the health of people, animals, and the environment and offers insightful solutions to difficult problems. Bangladesh has achieved considerable success in utilizing the power of One Health to create a healthier population, healthy ecosystems, and a more sustainable future. This achievement has been made possible by cooperation between government organizations, researchers, medical professionals, and local communities.

#### Introduction

The concept of sustainable development has become a global imperative, requiring a comprehensive and integrated approach to address complex challenges at the nexus of human health, animal health, and the environment. In recent years, the One Health approach has emerged as a powerful framework that recognizes the interconnectedness of these domains and aims to promote holistic solutions for achieving sustainable development goals<sup>1</sup>. This article delves into the innovative implementation of the One Health approach within Bangladesh; a country confronted with distinctive socio-economic and environmental challenges. Bangladesh,

with its dense population, agricultural dependency, and vulnerability to climate change, provides a compelling context for examining the effectiveness and potential of the One Health approach in promoting sustainable development. The One Health approach emphasizes the collaboration and communication of professionals from multiple disciplines, including human health, veterinary medicine, environmental science, and public health, to address health issues that transcend traditional boundaries<sup>2</sup>. By recognizing the interdependence between human health, animal health, and the environment, this approach seeks to improve health





outcomes, enhance animal welfare, and conserve ecological systems. Bangladesh has experienced numerous health challenges, including zoonotic diseases, food security issues, and the impacts of climate change<sup>3</sup>. These challenges necessitate innovative and context-specific approaches that integrate knowledge and expertise from different sectors. The One Health approach, with its emphasis on cross-disciplinary collaboration, provides a framework to tackle these interconnected challenges effectively4. This article aims to provide insights into the application of the One Health approach in Bangladesh and its contribution to sustainable development. By examining successful initiatives, challenges faced, and lessons learned, we seek to highlight the potential of this approach to address complex health issues and promote sustainable development outcomes. Through this analysis, we hope to contribute to the growing body of knowledge on the practical implementation of the One Health approach and its role in promoting sustainable development in Bangladesh and beyond.

#### Methods

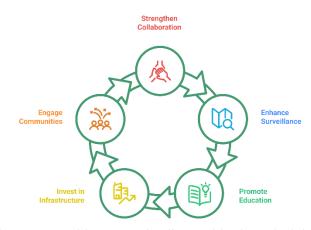
The purpose of this review was to provide a comprehensive overview of "Promoting Sustainable Development through the One Health Approach: Insights from Bangladesh" based on open access articles. We identified relevant keywords and search terms and conducted a literature search on open access databases like PubMed Central, Scopus, and Web of Science. A range of open access articles, including research papers, review articles, and other publications related to the topic, were collected. Each article was critically evaluated, taking into consideration factors such as the quality of the research, the credibility of the authors, and the impact of the publication. Once a sufficient number of open access articles were identified, we organized them thematically, grouping them according to similarities and differences in their content and approach. The findings from the open access articles were then summarized and synthesized, highlighting important trends, gaps, and insights related to the topic. Finally, we discussed the implications of our review for future research, policy, and practice in the field.

## The One Health Approach

The One Health approach emphasizes the interconnectedness of these three domains and the need for coordinated efforts among professionals from various disciplines, including medicine, veterinary science, environmental science, public health, and others<sup>5</sup>. By bringing together experts from these diverse fields, the One Health approach seeks to address complex health issues that transcend traditional disciplinary boundaries. One of the fundamental principles of the One Health approach is the recognition of zoonotic diseases, which are infectious diseases that can be transmitted between animals and humans<sup>1</sup>. Many emerging infectious diseases,

such as Ebola, Zika virus, and COVID-19, have zoonotic origins. The One Health approach recognizes that preventing and controlling zoonotic diseases require a comprehensive understanding of the interactions between animals, humans, and the environment6. In addition to zoonotic diseases, the One Health approach also considers the broader ecological factors that impact human and animal health. This includes addressing environmental degradation, climate change, pollution, and other factors that can have significant health implications for both humans and animals<sup>6,7</sup>. By taking into account the health of ecosystems and their impact on human and animal populations, the One Health approach promotes a more comprehensive understanding of health and disease. The benefits of adopting the One Health approach are numerous8. By breaking down silos and fostering collaboration among different sectors and disciplines, it enables the sharing of knowledge, expertise, and resources. This interdisciplinary collaboration can lead to more effective surveillance and early detection of disease outbreaks, improved response to public health emergencies, enhanced animal welfare, and better management of natural resources.

One Health Approach Cycle in Bangladesh



The One Health approach aligns with the principles of sustainable development. By recognizing the interdependencies between human health, animal health, and the environment, it promotes a more balanced and integrated approach to development that ensures the well-being of current and future generations<sup>9</sup>.

# One Health Initiatives in Bangladesh

The concept of One Health, which recognizes the interconnectedness of human, animal, and environmental health, has gained prominence in Bangladesh as a means to promote sustainable development. This article sheds light on the One Health initiatives implemented in the country and their impact on various sectors.





#### Disease Surveillance and Control:

Bangladesh has made significant strides in strengthening disease surveillance systems through the One Health approach. By integrating data from human health, animal health, and environmental sectors, the country has improved its ability to detect and respond to infectious disease outbreaks. Collaborative efforts have been instrumental in containing diseases such as avian influenza, Nipah virus, and antimicrobial resistance<sup>10</sup>.

# **Zoonotic Disease Prevention:**

Zoonotic diseases pose a significant threat to public health in Bangladesh due to the close interaction between humans and animals. One Health initiatives have prioritized zoonotic disease prevention through vaccination campaigns, improved animal husbandry practices, and public awareness programs<sup>11</sup>. These efforts aim to reduce the transmission of diseases like rabies, brucellosis, and leptospirosis.

# **Environmental Conservation and Wildlife Management:**

Environmental degradation and loss of biodiversity have farreaching consequences for human and animal health. One Health initiatives in Bangladesh emphasize sustainable environmental conservation and wildlife management practices. Efforts are underway to mitigate deforestation, promote responsible land use, and preserve critical habitats. Conservation measures contribute to the overall well-being of ecosystems, ensuring the long-term health of both humans and animals<sup>12,13</sup>.

# Safe Food Production:

Food safety is a crucial aspect of public health, and the One Health approach in Bangladesh recognizes the importance of safe food production systems. Integrating the efforts of agriculture, veterinary, and public health sectors, initiatives have been implemented to ensure the quality and safety of food products. This includes promoting hygienic practices in food processing, minimizing the use of harmful agrochemicals, and enforcing regulatory standards<sup>14,15</sup>.

# Research and Capacity Building:

One Health initiatives in Bangladesh emphasize research and capacity building to enhance the understanding and implementation of the approach. Research institutions and universities collaborate across disciplines to investigate the complex relationships between human, animal, and environmental health<sup>16</sup>. Furthermore, training programs and workshops are conducted to build the capacity of healthcare professionals, veterinarians, and environmental experts, enabling them to work effectively in a One Health framework.

The One Health initiatives in Bangladesh exemplify a comprehensive and collaborative approach to address health challenges and promote sustainable development. By recognizing the interdependencies between human, animal, and environmental health, Bangladesh has made significant progress in disease surveillance and control, zoonotic disease prevention, environmental conservation, safe food production, and research and capacity building. These initiatives serve as valuable lessons for other countries striving to achieve sustainable development through the integration of multiple sectors under the One Health framework<sup>17–19</sup>.

# One Health Initiatives in Bangladesh



# Challenges

The One Health approach, which recognizes the interconnection between human, animal, and environmental health, has gained significant recognition as an effective strategy to promote sustainable development worldwide. Bangladesh, a densely populated country in South Asia, faces numerous challenges in achieving sustainable development goals while addressing the complex interplay of health issues. This article sheds light on the challenges faced by Bangladesh in promoting sustainable development through the One Health approach.

#### Limited awareness and understanding:

One of the major hurdles in implementing the One Health approach in Bangladesh is the limited awareness and understanding among kev stakeholders, including policymakers, healthcare professionals, and the general population. There is a need for comprehensive education and awareness campaigns to emphasize the importance of the interconnectedness between human, animal, and environmental health.

#### Weak institutional collaboration:

Effective implementation of the One Health approach requires strong collaboration between multiple sectors and





institutions, including health, agriculture, environment, and wildlife. In Bangladesh, there is a need to strengthen coordination and cooperation among these sectors, as well as establish clear governance structures that facilitate interdisciplinary collaboration.

# Inadequate surveillance and monitoring systems:

Timely detection and monitoring of emerging diseases and environmental risks are crucial for effective disease control and prevention. Bangladesh faces challenges in establishing robust surveillance and monitoring systems that can promptly detect and respond to health threats at the human-animalenvironment interface.

#### Limited resources and infrastructure:

The lack of adequate resources and infrastructure poses significant challenges in implementing the One Health approach in Bangladesh. Insufficient funding, inadequate laboratory facilities, and limited healthcare access in rural areas hinder the effective integration of human and animal health systems.



# Socioeconomic and cultural factors:

Socioeconomic and cultural factors play a pivotal role in shaping health behaviors and practices. Addressing these factors, such as promoting hygiene practices, sustainable livestock production, and responsible use of natural resources, requires comprehensive community engagement strategies tailored to the local context.

The One Health approach holds great promise for promoting sustainable development in Bangladesh by addressing the interconnected challenges at the human-animal-environment interface. Overcoming the challenges of limited awareness, weak institutional collaboration, inadequate surveillance systems, limited resources, and socioeconomic and cultural

factors will require concerted efforts from various stakeholders. By fostering a multidisciplinary and collaborative approach, Bangladesh can harness the potential of the One Health approach to create a healthier, more sustainable future for its people, animals, and ecosystems<sup>20–22</sup>.

#### **Future Directions and Recommendations**

The One Health approach, which recognizes the interconnectedness of human, animal, and environmental health, has emerged as a powerful framework to address the complex challenges facing our world. In the context of Bangladesh, where population growth, urbanization, and environmental degradation pose significant threats to sustainable development, embracing the One Health approach is crucial. Building on the insights gained from Bangladesh's experiences, this section highlights future directions and recommendations to promote sustainable development through the One Health approach.

# **Strengthening Cross-Sector Collaboration:**

To effectively implement the One Health approach, it is essential to establish robust collaboration among various sectors, including health, agriculture, environment, and wildlife. Governments, non-governmental organizations, and academic institutions should work together to facilitate knowledge sharing, policy coherence, and joint action plans. Strengthening intersectoral coordination mechanisms can foster a holistic and integrated approach to address emerging health threats.

#### Enhancing Surveillance and Early Warning Systems:

Improving disease surveillance and early warning systems is critical for timely detection and response to emerging infectious diseases. Investments in surveillance infrastructure, data sharing platforms, and capacity building for healthcare professionals should be prioritized. The integration of human, animal, and environmental health data can enable early detection of zoonotic diseases and facilitate evidence-based decision-making.

# Promoting One Health Education and Research:

Incorporating One Health principles into educational curricula and research programs is vital to build a skilled workforce capable of addressing complex health challenges. Encouraging interdisciplinary collaboration among medical, veterinary, and environmental science institutions can foster innovative solutions and generate evidence-based knowledge to inform policy-making.

# **Investing in Infrastructure and Resources:**

Adequate investment in healthcare infrastructure, veterinary services, and environmental conservation is essential for the





successful implementation of the One Health approach. Strengthening diagnostic capabilities, surveillance laboratories, and veterinary facilities can enhance disease detection and control. Additionally, allocating resources to support sustainable agriculture practices and ecosystem conservation can mitigate the risks of disease emergence.

# **Engaging Communities and Raising Awareness:**

Engaging communities in the implementation of One Health initiatives is crucial for long-term success. Public awareness campaigns, community dialogues, and capacity-building programs can empower individuals to adopt practices that promote human, animal, and environmental health. Encouraging behavioral changes, such as responsible pet ownership, proper waste management, and sustainable farming practices, can significantly contribute to sustainable development.

Bangladesh can pave the way for sustainable development by addressing the interconnected challenges of human, animal, and environmental health. Strengthening collaboration, enhancing surveillance systems, promoting education and investing in infrastructure, research. and communities essential future directions are and recommendations to harness the transformative potential of the One Health approach. By implementing recommendations, Bangladesh can inspire other nations to adopt similar approaches, ultimately contributing to a healthier, more sustainable world<sup>7,23–25</sup>.

#### Discussion

In Bangladesh, a country grappling with various health concerns, the application of the One Health approach has yielded significant insights and positive outcomes. Bangladesh faces several health challenges that impact both human and animal populations. Infectious diseases, zoonotic outbreaks, and environmental degradation pose significant threats to public health and the overall well-being of the country<sup>26</sup>. Recognizing the need for an integrated approach, Bangladesh has embraced the One Health concept, which emphasizes the interconnections between human, animal, and environmental health. One of the notable successes of the One Health approach in Bangladesh lies in the control of zoonotic diseases<sup>27</sup>. Through collaborative efforts between the human and animal health sectors, the country has established effective surveillance systems, early detection mechanisms, and rapid response strategies. This integration has been crucial in preventing and managing outbreaks of diseases such as avian influenza and Nipah virus, which have the potential to cause severe public health crises. By recognizing that the health of humans and animals is interconnected, Bangladesh has been able to implement proactive measures that mitigate the risk of zoonotic disease transmission. The One Health

approach has played a pivotal role in enhancing food safety and security in Bangladesh<sup>28</sup>. By integrating the veterinary and agricultural sectors, the country has implemented measures to address the indiscriminate use of antibiotics in animal husbandry. This effort not only protects animal health but also ensures the safety of food products, safeguarding public health. The One Health approach recognizes that food safety is directly linked to the health and well-being of both humans and animals, making it a crucial aspect of sustainable development<sup>2,29</sup>. The application of the One Health approach in Bangladesh extends beyond disease control and food safety. It has broader implications for sustainable development, aligning with the Sustainable Development Goals (SDGs) set by the United Nations. Goal 3 (Good Health and Well-being), Goal 2 (Zero Hunger), and Goal 15 (Life on Land) are particularly relevant to the One Health approach in Bangladesh<sup>30</sup>. Through its integrated approach to health, Bangladesh has made significant progress towards achieving Goal 3. By controlling zoonotic diseases and promoting collaborative efforts, the country has improved public health, reduced the economic burden associated with disease outbreaks, and enhanced overall well-being. Additionally, by integrating veterinary and agricultural sectors to ensure food safety, Bangladesh has made strides towards achieving Goal 2, contributing to improved nutrition and food security. The One Health approach in Bangladesh also contributes to Goal 15 by addressing environmental degradation and promoting biodiversity conservation<sup>8,12,30</sup>. Recognizing interconnectedness of human, animal, and environmental health, Bangladesh has implemented measures to control pollution, protect ecosystems, and promote sustainable agricultural practices. By doing so, the country is working towards the sustainability of its natural resources, which is essential for the well-being of current and future generations. The One Health approach in Bangladesh has demonstrated its effectiveness in addressing complex health challenges and promoting sustainable development. By recognizing the interdependence of human, animal, and environmental health, the country has made significant progress towards achieving the SDGs related to health, food security, and environmental sustainability. Bangladesh's success serves as an important example for other nations facing similar challenges. By embracing the principles of the One Health approach and fostering collaboration between sectors, countries can work towards sustainable development that prioritizes the wellbeing of both humans and animals<sup>9,22,25</sup>.

#### Conclusion

The article explores how Bangladesh has embraced the One Health approach to promote sustainable development. It highlights the country's efforts in fostering cross-sector collaboration, strengthening surveillance systems, promoting education and research, investing in infrastructure, and engaging communities. By recognizing the interconnectedness





of human, animal, and environmental health, Bangladesh has made significant progress in addressing health threats and advancing sustainable development. The implementation of the One Health approach has led to improved disease detection and control, empowered individuals to adopt practices promoting health and sustainability, and positioned Bangladesh as a role model for other nations. This article underscores the importance of integrating One Health principles in global efforts to create a healthier and more sustainable world.

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#### Recommendations

Based on the findings and insights from this study, it is recommended that Bangladesh prioritize stronger institutional collaboration across the human, animal, and environmental health sectors to effectively implement the One Health approach. Integrating One Health principles into academic curricula and professional training programs will be essential to building a skilled, interdisciplinary workforce. Investment in surveillance systems, laboratory infrastructure, and crosssectoral research should be scaled up to enable timely detection and response to health threats. Furthermore, active community engagement through awareness campaigns and participatory programs is crucial for fostering behavioral change and sustainable practices at the grassroots level. International partnerships should also be strengthened to facilitate knowledge sharing, resource mobilization, and global visibility. Finally, embedding One Health strategies into national health policies and development plans will ensure long-term impact and sustainability, aligning Bangladesh's public health goals with the broader Sustainable Development Goals.

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