

One Health: A Holistic Approach to Tackling Global Health Issues

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Abstract

One Health approach is a concept which provides a comprehensive framework to address the interconnectedness of human, animal, and environmental health in tackling global health challenges. It emphasizes the urgent need for a multidisciplinary approach to effectively address emerging infectious diseases, antimicrobial resistance, and environmental degradation. The article highlights the importance of collaboration, communication, and coordination among diverse stakeholders as well as the integration of human and animal healthcare systems. It emphasizes the significance of sharing data, expertise, and resources to enhance disease surveillance and rapid response. The transformative potential of One Health in addressing global health issues and creating a resilient future is underscored. This article provides valuable insights for researchers, policymakers, and healthcare professionals, emphasizing the integration of disciplines to safeguard health and the environment.

Keywords: Collaboration, global health issues, interconnectedness, multidisciplinary approach, One Health

INTRODUCTION

In today's interconnected world, the health of humans, animals, and the environment are intricately linked. The concept of "One Health" recognizes this interdependence and advocates a holistic approach for addressing global health issues.^[1] One Health encompasses the understanding that the well-being of humans, animals, and ecosystems are interconnected and that interventions must be collaborative, transdisciplinary, and multisectoral in order to effectively tackle complex health challenges. In recent decades, the increasing occurrence of emerging infectious diseases, antimicrobial resistance, and environmental degradation has underscored the limitations of traditional isolated health approaches. These challenges transcend national boundaries and disciplines, demanding innovative strategies that can tackle their complex root causes.^[2]

One Health provides innovation by fostering collaboration and cross-disciplinary interaction between medical professionals, veterinarians, ecologists, policymakers, and other stakeholders. By acknowledging the holistic nature of health, One Health paves the way for a more resilient, sustainable, and healthier future for both human populations and the planet. This article explores the principles and significance of One Health and highlights its potential in addressing some of the most pressing global health issues.

THE CONCEPT OF ONE HEALTH

The idea of One Health is not new; it has existed for at least 200 years under various names, including One Medicine, One World and finally One Health.^[3] One Health is an approach that recognizes the inextricable links between human health, animal health, and the environment. It acknowledges that diseases can pass between humans and animals and that environmental factors play a significant role in disease emergence and transmission.^[4] The concept emphasizes the need for collaboration across disciplines, such as medicine, veterinary science, ecology, and environmental sciences, to promote a comprehensive understanding of health issues and develop effective interventions.^[5]

THE IMPORTANCE OF ONE HEALTH

Zoonotic disease prevention

Zoonotic diseases, which are infections that can be transmitted between animals and humans, account for a significant

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How to cite this article: Danasekaran R. One health: A holistic approach to tackling global health issues. Indian J Community Med 2024;49:260-3.

Received: 27-07-23, **Accepted:** 22-10-23, **Published:** 07-03-24

Access this article online

Quick Response Code:



Website:
www.ijcm.org.in

DOI:
10.4103/ijcm.ijcm_521_23

proportion of emerging infectious diseases. One of the pivotal realms where the One Health approach shines is in the prevention of zoonotic diseases, which are infections transmitted between animals and humans. Examples include Ebola, SARS, avian influenza, and COVID-19.^[6] In the One Health framework, the proactive identification and control of zoonotic disease reservoirs and vectors are paramount. Surveillance systems that integrate data from human and animal health sources facilitate early detection and response, helping to curtail potential outbreaks. Collaborative efforts among epidemiologists, veterinarians, ecologists, and public health officials enable the mapping of disease hotspots, contributing to targeted interventions.^[4]

The One Health approach recognizes that preventing and controlling zoonotic diseases requires collaboration between human health, animal health, and environmental sectors.^[7] By monitoring and addressing disease threats at the animal source, implementing surveillance systems, and promoting responsible agricultural practices, One Health can help prevent future pandemics.^[8]

Antimicrobial resistance

In the context of global health challenges, the One Health approach has emerged as an indispensable strategy in combating the escalating threat of antimicrobial resistance (AMR). AMR, a phenomenon where microorganisms develop resistance to the drugs designed to kill them, has severe implications for both human and animal health, underscoring the necessity of a multidisciplinary and collaborative approach.^[9] AMR poses a serious threat to global health. Overuse and misuse of antibiotics in both human and veterinary medicine contribute to the emergence and spread of drug-resistant pathogens.^[10]

One Health advocates for coordinated efforts to promote the responsible use of antibiotics in humans and animals as well as improved surveillance and research on AMR. The excessive use of antibiotics in both clinical settings and agriculture contributes to the selection and dissemination of drug-resistant pathogens, a process that respects no geographical boundaries.^[11] In this regard, One Health serves as a unifying platform for healthcare professionals, veterinarians, researchers, policymakers, and environmentalists to collectively address AMR's multifaceted nature. By addressing AMR comprehensively, One Health can help preserve the effectiveness of antibiotics and ensure their availability for future generations.^[12]

Environmental health

The health of ecosystems and the environment is closely linked to human and animal health. Environmental degradation, climate change, and pollution can lead to the emergence and spread of diseases, disrupt ecosystems, and impact the well-being of communities.^[13] Moreover, the One Health paradigm reinforces the significance of responsible resource management and sustainable practices to curtail the degradation of ecosystems and subsequent health risks.^[14] The depletion of natural habitats, climate change, pollution, and habitat degradation disturb the delicate balance of ecosystems,

leading to a myriad of challenges, including the emergence of infectious diseases and altered disease transmission patterns. One Health recognizes the importance of safeguarding the environment and promoting sustainable practices to protect human and animal health.^[15] By integrating environmental considerations into health policies and practices, One Health can contribute to a healthier and more resilient planet.^[16]

Food safety and security

In an increasingly interconnected world, where the journey from farm to fork traverses multiple sectors, One Health recognizes that the safety and security of our food supply necessitate a multidisciplinary, collaborative approach. Foodborne illnesses, a pressing global concern, often stem from the convergence of human, animal, and environmental factors. Pathogens can emerge from livestock, wildlife, or contaminated water sources, infiltrating the food chain and affecting both humans and animals.^[17] One Health initiatives bolster surveillance and response systems, enabling the early detection of potential foodborne outbreaks. By promoting collaboration between the agriculture, veterinary, and public health sectors, One Health can help identify and mitigate food safety risks, ensuring access to safe and nutritious food for all.^[10]

EXAMPLES OF ONE HEALTH IN ACTION

Early warning systems

One Health surveillance systems that monitor animal populations for diseases can provide early warnings of potential outbreaks that could affect humans. For instance, the Global Early Warning System for Major Animal Diseases (GLEWS) combines data from human and animal health sectors to detect and respond to disease threats more effectively.^[10] By sharing information and coordinating responses, One Health approaches enable timely interventions to prevent the spread of diseases.^[18]

Vaccination programs

Vaccination is a crucial tool in preventing the transmission of diseases. One Health initiatives recognize the importance of vaccination in both human and animal populations. For example, vaccinating domestic animals, such as dogs and livestock, against rabies not only protects animal health but also reduces the risk of rabies transmission to humans.^[19] By integrating vaccination programs across species, One Health can contribute to the control and elimination of preventable diseases.^[20]

Collaborative research

One Health encourages collaborative research efforts that bring together experts from different disciplines to study complex health issues. For instance, interdisciplinary teams studying zoonotic diseases can investigate the ecological factors, animal reservoirs, and human behaviors that contribute to disease transmission. This integrated approach facilitates a deeper understanding of disease dynamics and helps inform effective prevention and control strategies.^[21]

Policy development

One Health advocates for the development of policies that recognize the interconnections between human, animal, and environmental health. These policies promote collaboration and coordination between sectors to address health challenges more effectively.^[1] For example, integrated approaches to water management can reduce the risk of waterborne diseases, benefiting both human and animal populations.^[22] One Health-informed policies also support sustainable agricultural practices and responsible use of antimicrobials, ensuring the long-term health and well-being of ecosystems and communities.^[10]

CHALLENGES AND OPPORTUNITIES

While the One Health approach holds great potential for addressing global health issues, several challenges need to be addressed:

Interdisciplinary collaboration

Amidst the intricate tapestry of global health challenges, fostering interdisciplinary collaboration stands as a pivotal opportunity encapsulated within the One Health approach. The multifaceted nature of contemporary health issues, including emerging diseases, climate change impacts, and antimicrobial resistance, necessitates a concerted effort that transcends traditional disciplinary boundaries.^[13] One Health underscores the significance of uniting experts from various domains, such as medicine, veterinary science, ecology, and public health, to collectively tackle complex challenges. Interdisciplinary collaboration within the One Health framework is exemplified by initiatives like the Global Virome Project, which brings together virologists, ecologists, and epidemiologists to preemptively identify potential pandemic threats.^[23] By pooling expertise and resources from diverse fields, One Health provides a pathway to more comprehensive, effective, and sustainable solutions that resonate across human, animal, and environmental health domains.

Resource allocation

Within the intricate landscape of global health, the One Health approach presents an avenue for optimized resource allocation, especially in addressing challenges that transcend the boundaries of human, animal, and environmental health. One Health encourages the pooling of resources across sectors, avoiding duplication and ensuring efficient utilization.^[14] By identifying shared priorities and goals, stakeholders can collaborate to allocate resources effectively, whether in research funding, infrastructure development, or crisis response. By investing in education and training that promote interdisciplinary skills, the One Health approach creates a workforce equipped to navigate complex health challenges.^[24]

Allocating resources toward strengthening surveillance systems that integrate data from diverse sectors ensures timely detection and response to disease outbreaks. The economic

argument for One Health is compelling. A study estimated that investments in preventing zoonotic diseases could save billions in economic losses and healthcare costs.^[11] Similarly, prudent allocation of resources to curb AMR aligns with the long-term goal of preserving effective antibiotics. Investing in capacity building, research, and surveillance systems is crucial in strengthening the One Health approach at local, national, and global levels.^[25]

Policy integration

One Health encourages the alignment of policies to address shared challenges, such as emerging diseases and environmental degradation. Furthermore, policy integration is pivotal in combating AMR by advocating for responsible antibiotic use across medical and veterinary settings. Integrating One Health principles into policy frameworks can be challenging due to existing sectoral silos and bureaucratic structures.^[5] Governments and international organizations need to promote policy coherence, develop multisectoral platforms, and ensure that One Health is mainstreamed into national and global health agendas.^[15] By fostering holistic policies that span human, animal, and environmental health, the approach amplifies the collective efforts to tackle intricate global health challenges.

Despite these challenges, the One Health approach offers significant opportunities for addressing global health issues:

Pandemic preparedness

The COVID-19 pandemic starkly underscores the urgency of a coordinated strategy that transcends human, animal, and environmental health domains. By focusing on early detection, rapid response, and preventive measures, One Health can enhance pandemic preparedness and response capabilities.^[4] Furthermore, One Health drives the development of predictive models and risk assessment frameworks, aiding in pandemic forecasting. Also, One Health initiatives such as the Global Health Security Agenda promote international collaboration to strengthen disease surveillance and response systems. Strengthening surveillance systems, promoting collaboration between animal and human health sectors, and investing in research on emerging infectious diseases are key components of effective pandemic preparedness.^[17]

Sustainable development

One Health aligns with the principles of sustainable development, recognizing the interconnectedness of health, environment, and socio-economic factors.^[12] Furthermore, One Health contributes to food security through sustainable agricultural practices. One Health also advances the United Nations Sustainable Development Goals. It addresses poverty, hunger, and health inequalities by focusing on equitable access to healthcare, improved animal health, and safeguarding natural resources.^[26] By integrating health considerations into development planning, One Health can contribute to more sustainable and resilient communities, promoting equitable access to healthcare, food security, and environmental conservation.^[17]

Knowledge sharing and innovation

Interdisciplinary communication, a cornerstone of One Health, nurtures an environment where ideas are exchanged and novel solutions are developed. The integration of perspectives from fields such as medicine, ecology, and veterinary science paves the way for holistic problem-solving. Moreover, One Health initiatives stimulate innovation in technology and research methodologies.^[23] For instance, advances in genomics and molecular biology contribute to the identification of zoonotic disease sources and transmission pathways.^[27] This interdisciplinary collaboration can lead to new insights, technologies, and interventions for addressing complex health challenges. It fosters a culture of learning and adaptation, ensuring that interventions are evidence-based and context-specific.^[2]

CONCLUSION

The One Health approach provides a holistic framework for addressing global health issues by recognizing the interconnectedness of human health, animal health, and the environment. By promoting collaboration, interdisciplinary research, and multisectoral actions, One Health has the potential to prevent zoonotic disease outbreaks, tackle antimicrobial resistance, safeguard environmental health, and ensure food safety and security.^[6] However, to fully realize the benefits of One Health, concerted efforts are required to overcome disciplinary barriers, allocate adequate resources, integrate policies, and promote collaboration across sectors. By embracing the principles of One Health, we can work toward a healthier and more sustainable future for all.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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