

EcoHealth Paradigm: To Improve One Health and Sustainability

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SUMMARY

EcoHealth is a newly developing trans-disciplinary and interdisciplinary approach of research and education that addresses human health, animal health, ecosystem health and their sustainability challenges. This article outlines its differences and similarities with other multisectoral studies, a brief description of its constituent disciplines, the issues it addresses and the further course of action.

INTRODUCTION

Most profound global challenges include food and nutrition insecurity, climate change, emerging and re-emerging diseases and antimicrobial resistance. The Ecosystem approach towards health (EcoHealth) is considered a promising field to address ecological sustainability and global health (Waltner-Toews D, 2009). EcoHealth refers to a holistic understanding of health encompassing human-animal-environment interface in its entirety (Charron D, 2012).

This term was first popularized by the International Development Research Centre (IDRC), Canada in the late 2000s. It comprises human health, animal health, and health of the ecosystem in which they survive. The presence of macro and micro environments in ecosystems are directly related to the health consequence raised in living beings. It is an integration and amalgamation of diverse fields and different approaches like medicine, ecology, animal health, public health, etc. along with a focus on social and economic issues.

One Health vs. EcoHealth

Although both One Health and EcoHealth overlap at theoretical level and are convergent in their vision and goals, One Health is a science driven with an emphasis on human-animal diseases and their transmission whereas EcoHealth is a biodiversity-driven conserved system. Both are cross-sectoral and multidisciplinary approaches to alleviate risks threatening ecosystems, veterinary and public health. One Health is a large-scale approach, like food safety and public health improvement and EcoHealth is a grass-root level approach with active participation of stakeholders.

The EcoHealth paradigm is correlated with the One Health paradigm and combining these two paradigms gives a new era to researchers. The widening of the blurred boundary between the two calls for interdisciplinary scientific analysis, modeling and risk assessment to optimize resources and prevent duplication of efforts. This collaboration will be beneficial to evolve a joint model for development and implementation of integrated policy decisions.

Zoonoses and Sustainability

Human health and the health of all living beings are dependent on their environment (Lebel, 2003). Biodiversity is a fundamental factor to human health. The increased use of agriculture and industrialization leads to deforestation and it hampers the Eco health of the system. Several host and co-host of the biological reservoirs became extinct due to anthropogenic pressure on the biodiversity hotspots and several species are at the brink of extinction which leads to zoonotic spillover. SARS, Avian Influenza, Ebola and the recent COVID-19 pandemic are dreary precedents of the same. About 60 percent of known infectious diseases in humans and 75 percent of all emerging infectious diseases are zoonotic (UNEP). Zoonoses account for millions of deaths globally. Along with that, its impact on human life can be estimated by calculating Disability Adjusted Life Years (DALYs).

Studies estimate that 26 percent of DALYs are lost to zoonotic diseases in low-income countries in contrast to only 1 percent in high-income countries (Grace et al. 2012). Early detection, epidemiological survey, comprehensive and effective surveillance, focus on endemic areas and incentivizing reporting like tangible financial aids will be effective to tackle further outbreaks. Seasonal management and vaccination of animal hosts is very essential to control transmission of many diseases.

Ecosystem and Environment Health

An ecosystem is stable and sustainable if it is free from distress. Costanza (1992) proposed that “Ecosystem health is closely linked to the idea of sustainability, which is seen to be a comprehensive, multi-scale, dynamic measure of system resilience, organization, and vigor”. Our environment has a significant contribution of social and economic value to the human population. The impact of disease dynamics is highly affecting ecological and social relationships (Machalaba et al. 2015).

The damage and degradation caused to the ecosystem due to human activities like deforestation, intensive agriculture, urbanization, industrialization, mining, refining and fossil fuel use are alarming signals towards EcoHealth. These activities catalyze climate change, conversion of land to desert and barren land and loss of biodiversity which culminates in catastrophes like cyclones, floods, cloudbursts, droughts and storms. Its potential repercussions on food security and economic stability are inconceivable.

Antimicrobial Resistance

Antimicrobial resistance is one of the most urgent health problems and sustainability challenges of this century. If not addressed seriously, it is estimated to account for the loss of 10 million lives by 2050 (O’Neill et al. 2016). Antimicrobials, especially antibiotics fortify almost all aspects of modern medicine, surgery and chemotherapy. Although AMR is a natural phenomenon, several other factors such as skipping doses, incomplete doses, use in viral diseases and over-the-counter purchase of antibiotics have accelerated it by leaps and bounds (Edgar et al. 2008). Use of antibiotics as a growth promoter in livestock and poultry as a substitute for good hygienic conditions is a common practice in many countries.

AMR is a grave problem in the low and middle income countries due to lack of functional and infrastructural resources and weak regulatory mechanisms and it poses a major challenge to public health professionals. AMR has decreased our ability to control several important diseases leading to public health damage and economic losses (Munir and Xagorarakis, 2011). It is a matter of concern that in recent years the resistance to existing antimicrobials is increasing rapidly and development of new antimicrobials is decreasing.

CONCLUSION

Health and ecosystems are directly linked with each other. As there is a huge gap in paradigm and practice, sharing information, pooling resources and coordinated efforts to detect and respond to all these pressing system-wide threats and developing a multilevel understanding of doctors, veterinarians, agriculturists, microbiologists, public health experts, researchers and general public is the way forward to overcome disciplinary confines and finding the most conscious and sensible solutions. EcoHealth needs integrated research to effectively address complex health issues of humans, animals and their environment.

REFERENCES

- Charron D. *Ecohealth Research in Practice. Innovative Applications of an Ecosystem Approach to Health*. Ottawa, ON: IDRC (2012). doi: 10.1007/978-1-4614-0517-7
- Costanza, R. (1992). Toward an operational definition of ecosystem health. *Ecosystem health: New goals for environmental management*, 239, 269.
- Edgar, T., Boyd, S. D., & Palamé, M. J. (2009). Sustainability for behaviour change in the fight against antibiotic resistance: a social marketing framework. *Journal of Antimicrobial Chemotherapy*, 63(2), 230-237.
- Grace, D., Gilbert, J., Randolph, T., & Kang’ethe, E. (2012). The multiple burdens of zoonotic disease and an ecohealth approach to their assessment. *Tropical animal health and production*, 44(1), 67-73.
- Halliday, J., Daborn, C., Auty, H., Mtema, Z., Lembo, T., Bronsvort, B. M. D., ... & Cleaveland, S. (2012). Bringing together emerging and endemic zoonoses surveillance: shared challenges and a common solution. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 367(1604), 2872-2880.
- Lebel, J. (2003). Health: an ecosystem approach; the issue, case studies, lessons and recommendations. *In_focus/IDRC*.
- Machalaba, C. C., Daszak, P., Karesh, W. B., & Shrivastava, P. (2015). Future earth and EcoHealth: A new paradigm toward global sustainability and health. *Dec*; 12(4):553-4. Galvani, A. P., Bauch, C. T., Anand,

- M., Singer, B. H., & Levin, S. A. (2016). Human–environment interactions in population and ecosystem health. *Proceedings of the National Academy of Sciences*, *113*(51), 14502-14506.
- Munir, M., & Xagorarakis, I. (2011). Levels of antibiotic resistance genes in manure, biosolids, and fertilized soil. *Journal of environmental quality*, *40*(1), 248-255.
- O'Neill, J. (2016). Tackling drug-resistant infections globally: final report and recommendations.
- Pokharel, S., Raut, S., & Adhikari, B. (2019). Tackling antimicrobial resistance in low-income and middle-income countries.
- Roger, F., Caron, A., Morand, S., Pedrono, M., Garine-Wichatitsky, M. D., Chevalier, V., & Binot, A. (2016). One Health and EcoHealth: the same wine in different bottles?. *Infection ecology & epidemiology*, *6*(1), 30978.
- Waltner-Toews D. Food, global environmental change and health: ecohealth to the rescue? *McGill J Med MJM*. (2009) 12:85–9.