Journal of Advanced Zoology

ISSN: 0253-7214

*Volume **45** Issue **S-4** **Year 2024** Page **208-214***

Challenges In Implementing One Health Approaches In Nepal

Vidhu Prakash Kayastha[1*], Prof. Dr. B. S. Bhatia[2]

[1]Ph.D. Scholar, RIMT University, Mandi Gobindagadh, Punjab.*
[2]Pro-Vice Chancellor, RIMT University, Mandi Gobindagadh, Punjab.

***Corresponding Author:** Vidhu Prakash Kayastha*
***Ph.D. Scholar, RIMT University, Mandi Gobindagadh, Punjab.*

Abstract

Background: The prioritization of the One Health approach remains lacking in countries like Nepal, where the urgency to tackle this issue has yet to be acknowledged. It is imperative to incentivize rural farmers to enhance the well-being of their crops and livestock for the sake of fostering truly sustainable agriculture. This approach not only aligns with economic sensibility but also paves the way for a more enduring and resilient economy in the long run. By disseminating knowledge about One Health and executing the One Health National Strategy, Nepal stands to enhance its overall health landscape and set a precedent for other South Asian nations. Beyond immediate financial gains, stakeholders including farmers, policymakers, and consumers must adopt a forward-thinking perspective, integrating the One Health approach into their practices to facilitate a sustainable developmental trajectory. Research methods encompassed a thorough examination of One Health publications and the collection of data via a structured questionnaire administered during field visits, supplemented by telephone interviews with participants. The lessons gleaned from the COVID-19 pandemic underscore the significance of addressing health crises stemming from zoonotic diseases—those originating in animals and transferring to humans. Prioritizing the reinforcement of preparedness and response capabilities in rural settings, devising contingency plans, diversifying agricultural produce, investing in eco-friendly farming techniques, and promoting sustainable agricultural practices are pivotal for empowering communities to better withstand future adversities and uncertainties.

Keywords: Awareness, COVID-19, Health Issues, One Health, Zoonotic Diseases.

1. Introduction:

The One Health (OH) approach embodies an interconnected framework aimed at sustainably optimizing the health of people, animals, and plants within shared ecosystems. Recognizing the inherent interdependence among human, animal, and environmental health, this approach unites various sectors and communities across societal strata to collectively safeguard well-being and combat health and ecological threats while ensuring access to clean water, energy, air quality, and addressing climate change. The overarching goal is to promote sustainable development and fulfill collective needs (Aarestrup et al., 2021).

One Health initiatives encompass a spectrum of concerns including zoonotic diseases, vector-borne illnesses, antimicrobial resistance, food safety, environmental pollution, climate change, and other health hazards. Citizens' apprehensions about health threats and proactive measures during public health emergencies persistently surface. Recent emergencies such as the Ebola virus outbreak in West Africa (2014-2015), the emergence of the Zika virus syndrome (2015-2016), the yellow fever outbreak in parts of Africa (2016), and the ongoing COVID-19 pandemic underscore the urgency of effective risk communication strategies within affected populations, given the inherent nexus between human and animal health within a singular ecosystem. Various natural and anthropogenic disasters continuously disrupt ecosystem cycles. The declaration of the COVID-19 pandemic by the WHO on March 11, 2020, underscores the critical need for public awareness regarding zoonotic bacteria that can afflict both animals and humans, leading to a spectrum of illnesses ranging from mild to severe, including fatalities. Notably, scientists estimate that over one-sixth of known human infections are vector-borne, with three-quarters originating from animals (Munir et al., 2020).

In recent years, One Health (OH) has garnered substantial attention as society increasingly recognizes the intricate interactions among humans, animals, plants, and the environment. The OH topics encompass zoonotic diseases, antimicrobial resistance, food safety, vector-borne illnesses, pollution, and other health threats to humans, animals, and the environment (OHHLEP et al., 2022).

The evolution of the OH concept reflects an understanding that the health of people, animals, and ecosystems is deeply entwined and has been recognized for centuries. Hippocrates, the ancient Greek physician often hailed as the father of medicine, advocated for considering all facets of a patient's life, including environmental factors, over 2,500 years ago. In the 19th century, Rudolf Virchow coined the term "zoonosis" for infectious diseases originating from animals, acknowledging the parallels between human and veterinary medicine. Calvin Schwabe, an American veterinary epidemiologist referred to as the father of veterinary epidemiology, highlighted the interconnectedness of human, animal, and environmental health in his seminal work "Veterinary Medicine and Human Health," coining the term "One Medicine" in 1984. Since then, numerous conferences and events have further refined and elucidated the OH paradigm (Mackenzie J et al., 2014).

International bodies such as the One Health Commission, the World Organization for Animal Health, and institutions like the WHO and FAO continually advocate for OH approaches. Additionally, regional entities such as the European Commission (EC) and the Asian Development Bank (ADB) have formulated regional action plans to operationalize the One Health approach (Habib et al., 2022).

2. Literature Review:

Anthony & De Paula Vieira, (2022) mentioned that the One Health (OH) approach advocates for inclusivity by acknowledging the interconnectedness of human, animal, and environmental elements. Typically centered around infectious diseases, One Health initiatives involve not only public veterinary experts but also encompass environmental factors such as ecotoxicity, land use changes, and climate change. The entry point for implementing this value-added approach varies depending on specific topics and contexts, though gauging industry relevance can pose challenges. Overlooking animal and environmental aspects in public health risk assessments may lead to the underestimation of their relevance.

Sironi et al., (2022) underscore the ongoing environmental degradation and biodiversity loss, emphasizing the imperative of reducing pollution, preserving Earth's green resources, and curbing biodiversity overexploitation. They advocate for a more ecologically sensitive approach to environmental protection and advocate for adopting a One Health perspective to safeguard living ecosystems.

According to Barry, (2004), before the emergence of the coronavirus, humanity faced various health emergencies throughout history. Among them, the deadliest was the 1918-1919 influenza pandemic, known as the Spanish flu, claiming an estimated 21 million lives, with recent studies suggesting a toll between 50 to 100 million. With the global population then only at 28% of current levels, the majority of fatalities occurred within 16 weeks from mid-September 1918 to mid-December 1918.

Bidaisee & Macpherson, (2014) categorically stated that the World Health Council (OHC) recognizes that nearly 75% of new infectious diseases affecting humans in the past three decades originated from animals. Collaboration among health professionals and relevant sectors and institutions is crucial to ensuring adequate healthcare, food security, and water supply for the world's expanding population.

Häsler et al., (2020) found in a study they have conducted that the undeniable link between One Health (OH) approaches and occasional pandemics in three case studies of the Republic of Ireland's supportive model, the New South Wales Department of Basic Industries' One Health response to COVID-19, and the African Network of One Health Universities (AFROHUN) during the pandemic.

Exploring transboundary diseases with high contagion rates among animals, Garcia et al., (2020) highlight their significant economic impact on farmers, including reduced food availability and increased costs. This has critical implications as the global population is projected to reach 9.7 billion by 2050, posing significant challenges to 21st-century food security.
Acharya et al., (2019) proposed a One Health (OH) campaign to bolster human, animal, and plant health while enhancing capacity through network building, a study notes Nepal's recent strides in public health measures against diseases like rabies and avian influenza. However, gaps in addressing health awareness and communication persist, emphasizing the need for comprehensive approaches.
Khatiwada et al., (2021), expressed concerns over the insufficient attention given by health authorities to One Health strategies. They stressed on the urgent need for rational application to address ongoing emergencies, suggesting a restructured institutional framework.
Contrastingly, in another study, Subedi et al., (2022) reported positive findings regarding Nepali veterinary students' knowledge and awareness of One Health, indicating exposure to related issues during their academic journey.

2.1 Research Gap:
While existing studies provide valuable insights, literature gaps persist following gaps:
- Ongoing systematic research on the nexus between the One Health approach and COVID-19 is underway.
- Limited coverage on One Health and risk communication systems related to zoonotic diseases.
- Comprehensive addressing of health awareness and communication issues amidst the interconnectedness of human and animal health within ecosystems remains lacking.

3. Research Methodology:

Quantitative methods were employed for data collection and analysis, involving university professors, government officials, and experts from international and non-governmental organizations (INGOs and NGOs). A sample size of 100 was chosen for collecting data through closed-ended questionnaires and interviews.

4. Statistical Techniques Used:

The study utilized SPSS 25, an advanced statistical software, for data aggregation, visualization, and analysis. SPSS aids researchers in organizing and analyzing vast amounts of data from market research, providing clear visualizations to ensure accuracy and reliability in data interpretation.
(a) Percentage Formula

$$\text{Percentage} = \frac{\text{Given Value}}{\text{Total Value}} \text{ X } 100$$

(b) Chi-square
Chi-Square Test: The chi-square test, also denoted as χ^2 test, is a statistical hypothesis test wherein, under the null hypothesis, the sampling distribution of the test statistic follows a chi-square distribution. Often abbreviated as "Chi-square test," it's commonly used as Pearson's chi-square test. This test determines if there's a significant difference between the expected frequencies and observed frequencies in one or more categories. In the current study, the researcher utilized the Chi-square test to identify differences among the observations.
Formula:
The Chi-Square is denoted by $\chi 2$. The chi-square formula is:
$\chi 2 = \sum (Oi - Ei)2/Ei$
where,
Oi = observed value (actual value)
Ei = expected value.

(c) Fisher's Exact Test
Fisher's exact test is a statistical test used to determine if there are nonrandom associations between two categorical variables.

Let there exist two such variables X and *Y*, with *m* and *n* observed states, respectively. Now form an *m x n* matrix in which the entries *aij* represent the number of observations in which *x = i* and *x = j*. Calculate the row and column sums *Ri* and *Cj*, respectively, and the total sum of the matrix.
Then calculate the conditional probability of getting the actual matrix given the row and column sums, given by

which is a multivariate generalization of the hypergeometric probability function. Now find all possible matrices

$$P_{\text{cutoff}} = \frac{(R_1!\,R_2!\cdots R_m!)\,(C_1!\,C_2!\cdots C_n!)}{N!\,\prod_{i,j} a_{ij}!},$$

of nonnegative integers consistent with the row and column sums *R*i and *Cj*. For each one, the associated conditional probability is calculated where the sum of these probabilities must be 1.

Formula:
c) P-value: To calculate the P-value for a test, the table is ordered based on the chosen criteria for measuring dependence. Tables representing deviations from independence equal to or greater than the observed table are summed for their probabilities. Various criteria, such as Pearson chi-square or proportion differences, can be used to measure dependencies, particularly in a 2 x 2 case. Fisher's exact test is commonly used. For larger tables, measures like likelihood ratio tests or G-squared can be applied. The p-value for a 2 x 2 matrix test can be calculated by summing all p-values less than the cutoff value < Pcutoff.

5. Findings:

The survey encompassed 100 experts initially, including government officials, professors, teachers, and state/local government professionals of Nepal.

5.1The interrelationship between human health, plant health and animal health

Table 1 presents data on the perceptions of government officials categorized by gender regarding their understanding of the correlation between human health, plant health, and animal health. A notable portion of government officials, specifically 25.3% of males and 47.6% of females, responded affirmatively ("Yes"). However, the Fisher's exact test yielded a value of 5.066, indicating insignificance and suggesting no significant association between gender and government officials' perceptions regarding the interplay of human, plant, and animal health.

Further insights are provided regarding government officials' perceptions based on age groups concerning their understanding of the correlation between human health, plant health, and animal health. The majority across age brackets responded positively, with 27% aged 25-40, 28.6% aged 41-60, and 42.9% aged over 60 answering in the affirmative ("Yes"). Despite this, the Fisher's exact test value of 7.791 indicates insignificance, implying no notable relationship between age groups and government officials' perceptions regarding the interconnectedness of human, plant, and animal health.

Additionally, the table presents data on government officials' perceptions based on their educational backgrounds regarding the correlation between human health, plant health, and animal health. The majority, comprising 28.6% with bachelor's degrees and 38.1% with master's degrees, responded positively ("Yes"), while 26.1% with higher educational attainment strongly agreed. However, the Fisher's exact test value of 7.520 suggests insignificance, implying no significant correlation between educational levels and government officials' perceptions regarding the interrelationship of human, plant, and animal health.

Moreover, insights based on residential addresses reveal that the majority of government officials, 30.4% in rural areas and 31.2% in urban areas, responded with varying degrees of agreement or disagreement. However, the Fisher's exact test value of 2.412 indicates insignificance, indicating no significant association between residential addresses and government officials' perceptions regarding the correlation between human health, plant health, and animal health.

Table-1: The interrelationship between human health, plant health and animal health

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Fisher's Exact Test	p-value
Gender	Male	17	21.5%	19	24.1%	5	6.3%	20	25.3%	18	22.8%	5.066	0.281
	Female	3	14.3%	4	19.0%	2	9.5%	10	47.6%	2	9.5%		
Age	25 to 40	10	27.0%	10	27.0%	2	5.4%	10	27.0%	5	13.5%	7.791	0.454
	41 to 60	8	16.3%	10	20.4%	3	6.1%	14	28.6%	14	28.6%		
	Above 60	2	14.3%	3	21.4%	2	14.3%	6	42.9%	1	7.1%		
Educational attainment	Bachelor's degree	9	25.7%	10	28.6%	2	5.7%	10	28.6%	4	11.4%	7.502	0.484
	Master's degree	5	11.9%	8	19.0%	3	7.1%	16	38.1%	10	23.8%		
	Above master's degree	6	26.1%	5	21.7%	2	8.7%	4	17.4%	6	26.1%		
Residential address	Rural	7	30.4%	4	17.4%	2	8.7%	6	26.1%	4	17.4%	2.412	0.661
	Urban	13	16.9%	19	24.7%	5	6.5%	24	31.2%	16	20.8%		
Employment status	Govt Expert	14	25.5%	10	18.2%	2	3.6%	18	32.7%	11	20.0%	12.336	0.419
	University teacher	4	13.3%	8	26.7%	2	6.7%	8	26.7%	8	26.7%		
	Expert in I/NGO	2	15.4%	4	30.8%	3	23.1%	3	23.1%	1	7.7%		
	Freelancer	0	0.0%	1	50.0%	0	0.0%	1	50.0%	0	0.0%		
	Total	20	20.0%	23	23.0%	7	7.0%	30	30.0%	20	20.0%		

Source: Primary data collected by the researcher in the field survey

Lastly, perceptions based on employment status show varied responses among civil servants, government professionals, independents, university teachers, and I/NGO participants. Notably, 32.7% of government professionals and 50% of independents agreed, while 26.7% of university teachers and 30.8% of I/NGO participants disagreed. The Fisher's exact test value of 12.336, however, suggests significance, indicating a notable relationship between employment status and government officials' perceptions regarding the interconnectedness of human health, plant health, and animal health.

5.2Concerned category of ONE HEALTH initiatives

Table 2 presents data on the perceptions of government officials regarding One Health initiatives, categorized by gender. A notable portion of government officials, comprising 43% of males and 33.3% of females, responded positively to the question on "Surveillance and control of zoonotic diseases." However, the chi-square value of 5.956 indicates insignificance, suggesting no significant association between gender and government officials' perceptions of One Health initiatives.

Further insights are provided based on age groups, revealing that the majority across all age brackets responded positively to "Surveillance and control of zoonoses." However, the chi-square value of 3.760 suggests no significant connection between age groups and government officials' perceptions of One Health initiatives.

Additionally, data based on educational backgrounds show that most civil servants, with 42.9% holding bachelor's degrees and 40.5% holding master's degrees, responded positively to "Supervision and control of zoonoses." However, the chi-square value of 6.618 indicates insignificance, implying no significant connection between education levels and government officials' perceptions of One Health initiatives.

Moreover, insights based on residential addresses indicate varied responses, with the majority in rural areas (52.2%) and urban areas (37.7%) responding positively to "Surveillance and control of zoonotic diseases." However, the chi-square value of 2.279 suggests no significant association between residential addresses and government officials' perceptions of One Health initiatives.

Table-2: Concerned category of ONE HEALTH initiatives

		Zoonoses surveillance and control		Human health and animal health		Human health, plant health and animal health		All of above		No comment		Chi-Square	p-value
Gender	Male	34	43.0%	25	31.6%	17	21.5%	0	0.0%	3	3.8%	5.956	0.202
	Female	7	33.3%	6	28.6%	7	33.3%	1	4.8%	0	0.0%		
Age	25 to 40	17	45.9%	9	24.3%	10	27.0%	0	0.0%	1	2.7%	3.760	0.878
	41 to 60	18	36.7%	18	36.7%	11	22.4%	1	2.0%	1	2.0%		
	Above 60	6	42.9%	4	28.6%	3	21.4%	0	0.0%	1	7.1%		
Educational attainment	Bachelor's degree	15	42.9%	13	37.1%	6	17.1%	0	0.0%	1	2.9%	6.618	0.578
	Master's degree	17	40.5%	13	31.0%	9	21.4%	1	2.4%	2	4.8%		
	Above master's degree	9	39.1%	5	21.7%	9	39.1%	0	0.0%	0	0.0%		
Residential address	Rural	12	52.2%	5	21.7%	5	21.7%	0	0.0%	1	4.3%	2.279	0.685
	Urban	29	37.7%	26	33.8%	19	24.7%	1	1.3%	2	2.6%		
Employment status	Govt Expert	24	43.6%	16	29.1%	11	20.0%	1	1.8%	3	5.5%	7.073	0.853
	University teacher	13	43.3%	9	30.0%	8	26.7%	0	0.0%	0	0.0%		
	Expert in I/NGO	3	23.1%	5	38.5%	5	38.5%	0	0.0%	0	0.0%		
	Freelancer	1	50.0%	1	50.0%	0	0.0%	0	0.0%	0	0.0%		
	Total	41	41.0%	31	31.0%	24	24.0%	1	1.0%	3	3.0%		

Source: Primary data collected by the researcher in the field survey

Lastly, perceptions based on employment status reveal varied responses among civil servants, with notable differences between government professionals, university teachers, and I/NGO experts. Notably, the chi-square value of 7.073 indicates significance, implying a notable relationship between employment status and government officials' perceptions of One Health initiatives.

6. Recommendations:

The study underscores the need to update and implement existing One Health strategic plans to enhance public and private sector participation in human, animal, and plant health within ecosystems. Efforts are needed to increase understanding of occupational health among the general public. Short-term and long-term approaches are recommended to establish operational systems and develop expertise. Recommendations include community awareness campaigns, multidisciplinary collaboration, policy development, international cooperation, veterinary-medical integration, environmental protection, economic incentives, stakeholder engagement, media communication, and resource allocation.

7. Conclusion:

The research paper has shed light on the multifaceted challenges hindering the effective implementation of One Health approaches in Nepal. Through a comprehensive analysis of various factors including institutional, socioeconomic, and cultural aspects, it has become evident that while the concept of One Health holds immense potential for addressing complex health issues at the human-animal-environment interface, its practical application in Nepal is fraught with hurdles.

The findings underscore the critical need for concerted efforts from multiple stakeholders including government bodies, non-governmental organizations, communities, and international partners to overcome these challenges. Strategies such as enhancing intersectoral collaboration, strengthening healthcare infrastructure, promoting community engagement, and fostering interdisciplinary research and education are imperative to advance the One Health agenda in Nepal.

Moreover, acknowledging and addressing the unique contextual factors within Nepal, such as geographic diversity, cultural beliefs, and resource constraints, is crucial for the successful integration of One Health principles into policy and practice.

While the road ahead may be arduous, the potential benefits of implementing One Health approaches in Nepal, including improved disease surveillance, enhanced food security, and sustainable environmental conservation,

make it a pursuit worth undertaking. By addressing the identified challenges in a systematic and collaborative manner, Nepal can pave the way towards a healthier, more resilient future for its people, animals, and ecosystems, ultimately serving as a model for other regions facing similar complexities.

In essence, this research underscores the importance of holistic, interdisciplinary approaches to address complex health challenges and calls for unified action towards realizing the vision of One Health in Nepal and beyond. Despite the current lack of priority for the One Health approach, countries like Nepal need to address this urgency. Improving the health of plants and animals is crucial for sustainable agriculture and economic resilience. By promoting One Health knowledge and implementing national strategies, Nepal can lead as a model for South Asian countries, fostering sustainable development processes for future generations.

References:

1. Aarestrup, F. M., Bonten, M., & Koopmans, M. (2021). Pandemics– One Health preparedness for the next. *The Lancet Regional Health - Europe*, *9*, 100210. https://doi.org/10.1016/j.lanepe.2021.100210
2. Acharya, K. P., Karki, S., Shrestha, K., & Kaphle, K. (2019). One Health approach in Nepal: Scope, opportunities, and challenges. *One Health*, *8*, 1–4. https://doi.org/10.1016/j.onehlt.2019.100101
3. Anthony, R., & De Paula Vieira, A. (2022). One Health Animal Disaster Management: An Ethics of Care Approach. *Journal of Applied Animal Welfare Science*, *25*(2), 180–194. https://doi.org/10.1080/10888705.2022.2040360
4. Barry, J. M. (2004). The site of origin of the 1918 influenza pandemic and its public health implications. *Journal of Translational Medicine*, *2*(1), 3. https://doi.org/10.1186/1479-5876-2-3
5. Bidaisee, S., & Macpherson, C. N. L. (2014). Zoonoses and One Health: A Review of the Literature. *Journal of Parasitology Research*, *2014*, 1–8. https://doi.org/10.1155/2014/874345
6. Garcia, S. N., Osburn, B. I., & Jay-Russell, M. T. (2020). One Health for Food Safety, Food Security, and Sustainable Food Production. *Frontiers in Sustainable Food Systems*, *4*, 1–9. https://doi.org/10.3389/fsufs.2020.00001
7. Habib, N., Parry, J., Elfving, R., & Dunn, B. (2022). *Practical Actions to Operationalize the One Health Approach in the Asian Development Bank*. Asian Development Bank. https://doi.org/10.22617/WPS220202-2
8. Häsler, B., Bazeyo, W., Byrne, A. W., Hernandez-Jover, M., More, S. J., Rüegg, S. R., Schwarzmann, O., Wilson, J., & Yawe, A. (2020). Reflecting on One Health in Action During the COVID-19 Response. *Frontiers in Veterinary Science*, *7*, 1–6. https://doi.org/10.3389/fvets.2020.578649
9. Khatiwada, A., Karna, A., Bhat, N., & Deo, S. (2021). One Health in Nepal- An Overview. *Nepal Journal of Health Sciences*, *1*(1), 73–74. https://doi.org/10.3126/njhs.v1i1.38738
10. Munir, K., Ashraf, S., Munir, I., Khalid, H., Muneer, M. A., Mukhtar, N., Amin, S., Ashraf, S., Imran, M. A., Chaudhry, U., Zaheer, M. U., Arshad, M., Munir, R., Ahmad, A., & Zhao, X. (2020). Zoonotic and reverse zoonotic events of SARS-CoV-2 and their impact on global health. *Emerging Microbes & Infections*, *9*(1), 2222–2235. https://doi.org/10.1080/22221751.2020.1827984
11. One Health High-Level Expert Panel (OHHLEP), Adisasmito, W. B., Almuhairi, S., Behravesh, C. B., Bilivogui, P., Bukachi, S. A., Casas, N., Cediel Becerra, N., Charron, D. F., Chaudhary, A., Ciacci Zanella, J. R., Cunningham, A. A., Dar, O., Debnath, N., Dungu, B., Farag, E., Gao, G. F., Hayman, D. T. S., Khaitsa, M., … Zhou, L. (2022). One Health: A new definition for a sustainable and healthy future. *PLOS Pathogens*, *18*(6), e1010537. https://doi.org/10.1371/journal.ppat.1010537
12. Sironi, V. A., Inglese, S., & Lavazza, A. (2022). The "One Health" approach in the face of Covid-19: How radical should it be? *Philosophy, Ethics, and Humanities in Medicine*, *17*(1), 3. https://doi.org/10.1186/s13010-022-00116-2
13. Subedi, D., Gautam, A., Sapkota, D., Subedi, S., Sharma, S., Abdulkareem, M., Kandel, M., Ghimire, H., & Odetokun, I. A. (2022). Knowledge and perception of veterinary students on One Health: A first nationwide multi-institutional survey in Nepal. *International Journal of One Health*, 34–42. https://doi.org/10.14202/IJOH.2022.34-42