Asian Journal of Population Sciences p-ISSN 2822-1613
(A Peer-Reviewed, Open Access Journal; Indexed in NepJOL) e-ISSN 2822-1621
Email: population@pncampus.edu.np
eJournal Site: http://ejournals.pncampus.edu.np/ejournals/ajps/

[ORIGINAL RESEARCH ARTICLE]

Demand of One Health Activities by Community-Level Service Providers in Selected Districts of Nepal

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Article History
Submitted 15 October 2022; Reviewed 13 December 2022; Accepted 18 December 2022
DOI: https://doi.org/10.3126/ajps.v2i1.51090

Published by
Department of Population Studies
Prithvi Narayan Campus
Tribhuvan University
Pokhara, Nepal

Scan to Access eJournal

Abstract

One Health (OH) is a new approach to controlling zoonoses in the veterinary and public health fields in Nepal. This study aims to explore the OH-related knowledge, perception, and practices of service providers like veterinarians, public health, and livestock-related cooperative members in selected districts of Nepal. We randomly selected three municipalities from three districts of Gandaki province in Nepal using by qualitative dominant mixed-method research approach for data collection. The study showed that most of the respondent service providers had a low level of knowledge of the OH approach and conducted their zoonoses control programs vertically in a traditional way. Foot and mouth disease (FMD), brucellosis, Peste des petits ruminants (PPR), rabies, leptospirosis, and bovine tuberculosis (BTB) are livestock-related common zoonoses and dog bites, worm infestation, diarrhoeal diseases showed the common health problems in public health sectors in the study. This prevalence creates a higher zoonoses risk in farming communities of Nepal. Therefore, to control the zoonoses we need to make knowledgeable service providers who are engaged basically in human and

animal health care sectors by applying the OH approach. Government should introduce OH-related programs up to the community level and should establish the OH committee at every local level with united all public health, animal health, and water sanitation and hygiene (WASH) related officials in the country.

Keywords: Service Providers, Local Level, Livestock, One Health, Zoonoses

INTRODUCTION

One Health (OH) is an emerging approach in the field of zoonoses and public health sectors. It has an emphasis on the multi-sectoral, and trans disciplinary collaboration working at the local, regional, national and global to achieve optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment (Centre for Disease Control and Prevention (CDC), 2018). In 2007, one health (OH) approach was indorsed the first time by the American Medical Association (AMA) for pandemic preparedness with the alliance of the American Veterinary Medical Association (AVMA) and in 2008 Food and Agriculture Organization (FAO), the World Organization for Animal Health (OIE), World Health Organization (WHO), collaborated with United Nations Children's Fund (UNICEF), World Bank and others to develop a joint strategic framework for reducing the risk of infectious diseases at the human-animal ecosystem interface (Gayathri, 2020).

OH, the program in Nepal is still embryonic stage. The government of Nepal developed and approved the One Health strategy, in 2019 in Nepal (Ministery of Agriculture and Livestock Division (MoALD), 2019 although it is not fully functioning up to the community level still now. Few donor-funded programs collaborating with the government conducted some awareness campaigns only for a celebration like; world rabies day, world antimicrobial resistance awareness week, and world animal health day (Acharya et al., 2019). Close contact between humans, and animals and sharing the same environment creates vulnerability for zoonoses transmission to animals and humans and vice-versa. OH, the approach emphasizes the cooperation between public health, animal health, and environmental health sectors to fight against zoonoses (CDC, 2018).

People in underdeveloped or developing counties like Nepal live in close contact with their livestock mainly for livelihood perspectives. Those types of exposure to animals (livestock) started from human civilization and animals have a special role in human societies (Bagale & Adhikari, 2019). However, due to inadequate health care and poor health literacy (Pathak et al., 2020; Sharma et al., 2021) those connections might to seriously threaten human beings with huge economic losses. So, zoonoses or other neglected tropical diseases are not only biologically determined but also constructed and distributed as a result of economic, demographic, or community behaviour (WHO, 2010).

There are several zoonotic pathogens (bacteria, viruses, protozoa, etc.) with complex life cycles. When they get a favourable environment, they enter susceptible hosts through various routes. About 61% of all human pathogens are zoonotic in nature if they are recurrent presented among human diseases are

defined as re-emerging zoonosis (Taylor et al., 2001). Many developed countries have of successfully eliminated several fatal infectious diseases because of vaccination and other educational programs. However, in Nepal people are still dying even the vaccine-preventable diseases. The school-level curriculum does not properly cover the content of zoonoses in Nepal. Not only that health education which is a milestone for healthy behaviour change excluded as the core curriculum at the secondary level (Curriculum Development Centre (CDC), 2019) even though, most of the students in schools are from agrarian communities facing zoonoses threats.

To control, manage or eliminate zoonotic diseases needs to be responsible and skilful professionals in all sectors (human health, animal health, and ecology) with collaborative efforts. As a new paradigm (OH approach) in the field of zoonoses, we need to acknowledge to those professionals, which ultimately leads to positive outcomes to control the zoonoses. Therefore, this study aims to explore the one health (OH) related knowledge, perception, and practices of service providers who are currently involved in the field of public health, animal health, and livestock-related co-operative in Manang, Tanahun, and Nawalpur districts of Gandaki province in Nepal, which might support for further initiation to control the zoonoses under the same umbrella (one health approach).

MATERIALS AND METHODS

This study followed a cross-sectional convergent parallel mixed-method research design. However, it mainly focused on qualitative data (QUAL+quan) which was obtained from the purposively selected service providers (i.e., veterinarian, public health workers and cooperative members). Qualitative data were obtained from key informants interviews (KII) by using the KII guidelines. However, quantitative data were got from office records as a secondary source.

Population and Sample Size

This study was conducted in Nasung Rural Municipality of Manang, Bhanu municipality of Tanahun, and Kawaswoti Municipality of Nawalpur in Gandaki Province. The study site was selected randomly throughout the total municipalities of respected districts. Officials who were working in public health and animal health in government sectors (medical and veterinary health professionals) and members of the livestock-related cooperative in study areas are the populations and single institutions and single respondents were taken from each municipality purposively. So, in total eight respondents (3 veterinarians, 3 public health service providers, and 2 from livestock-related cooperatives) were taken as a sample of this study.

Data Collection Tools, Technique, and Analysis Procedure

Primary data were collected from the respondents who were service providers in veterinary and public health sectors by using key informants interview (KII) guidelines, , which was developed by the researcher's teams then secondary data were from clinical records of respective institutions. After getting official approval from each municipality, the researcher visited every institution

(health post, primary health center, veterinary office, and office of livestock-related cooperative) for data collection. Before the interviewing researcher established a good rapport with the respondents and then explained the research objectives. Collected data were analysed under the thematic and descriptive analysis process.

Ethical Consideration

The study proposal was approved by the research committee board of the Graduate School of Education, Tribhuvan University. During the data collection, researchers maintained ethical standards as per Nepal Health Research Council (NHRC) guidelines (NHRC, 2011). Consent was taken before the interview, and respondents were requested to participate voluntarily. All data were kept confidential with anonymity. Moreover, we followed the ethical guidelines made by the American Psychological Association (APA, 2020) throughout the research process.

RESULTS

Respondent Characteristics in the Study

This study was conducted in three districts of Gandaki province namely Manang, Tanahun, and Nawalur, which are representing three ecological belts of Nepal; Mountains, Hill, and Terai. To identify the knowledge, perception, and existing practices related to the OH approach data were taken through the key informant interview (KII) on the professional service providers in the study districts.

Table 1.

General characteristics of the Respondents

Districts	Municipality	Professionals	No. of Respondents	Job experience
Manang	Nasung	Veterinarian	1	25 years
		Public health Workers	1	3 years
Tanahun	Bhanu	Veterinarian	1	13 years
		Public health workers	1	7 years
		Cooperative member	1	3 years
Nawalpur	Kawaswoti	Veterinarian	1	3 years
		Public health workers	1	21 years
		Cooperative members	1	7 years

Source: Field Survey 2021/022

Where in Manang public health and veterinarian and Tanahun and Nawalpur public health service providers, veterinarians, and livestock-related cooperative members were interviewed focused on one health (OH) and zoonoses-related issues. Single respondent were taken from each institution and they had a minimum of three years to twenty-five years of job experience in their profession.

Prevalence of Zoonoses in Study Areas

Close exposure to livestock without any safety is more vulnerable to zoonoses transmission. Lack of proper studies we had no actual data on the incidence and prevalence of zoonoses in Nepal (Bagale & Adhikari, 2019). However, if we can communicate zoonoses-related knowledge and preventive practices to the vulnerable population through collaboration with human health, animal health, and environmental sectors based on the OH approach we can control zoonoses in both fields. Table 2 and Table 3 show the presumptive data (case) on the prevalence of zoonoses in human and livestock sectors in study three districts in the year 2020, and many of these diseases mighe be transmitted through livestock to humans as a zoonosis.

Table 2.
Common Zoonotic Diseases in Human Population in 2020

Common Zoonotic Diseases in Human	
Districts [Municipality]	**Common zoonoses [Institutional]**
Manang [Nasung rural municipality]	Dog bite, worm infestation, scabies, dysentery, giardiasis, influenza
Tanahun [Bhanu municipality]	Dog bite, snake bite, tape worm infestation, amoebiasis, giardiasis, influenza
Nawalpur [Kawaswoti municipality]	Dog bite, snake bite, worm infestation, diarrhoea, ringworm, tapeworm infestation, influenza

Source: Field Survey 2021/022

Table 2 shows the common zoonotic diseases in the human population in three municipalities of the study districts. Based on data dog bites, worm infestation, and influenza are common health problems in human in all studied areas. Similarly, dysentery, diarrhoea, snake bite, tapeworm, giardiasis, scabies, and ringworm are also reported in these areas. However, snake bite was not reported in Manang, and most of the diseases were diagnosed based on clinical symptoms.

Table 3 shows the presumptive zoonotic cases of livestock in the studied three districts (municipalities) in the year 2020. Data shows that tick burn diseases, diarrhea, Foot and mouth disease (FMD), and brucellosis are common in Nasung Rural Municipality Manang. Tapeworm (*Fitte Juka*), FMD, rabies, PPR, and brucellosis in Bhanu Municipality, Tanahun. Likewise, FMD, rabies, leptospirosis, bovine tuberculosis, and brucellosis are common livestock-related zoonoses in Kawaswoti Municipality, Nawalpur. In data FMD and brucellosis were reported from all three study districts in this period, and most of the livestock-related zoonoses were laboratory diagnosed in Kawaswoti Veterinary Office in Nawalpur.

Activities Based on the OH approach

One Health (OH), is an emerging concept to control and manage the zoonoses (CDC, 2018). To determine the knowledge and perception towards the OH approach and programs implementation situation followed by this approach

researcher conducted a total eight key informant interviews (KII) with the professional service providers in human health, animal health, and livestock-related cooperative in the study. During the interview session, we found similar expressions by human and animal health care providers in all study districts. They explored that, most of the program in their institution conducted vertically like a traditional approaches. However, they were accepted the values of multisectoral collaboration to control the zoonoses. While most of them were unaware of the term one health (OH) which is mention here with their perception under the global themes, as a thematic data analysis process (Table 4).

Table 3.

Presumptive Prevalence of zoonoses in study areas in 2020

Common Zoonotic Diseases in Livestock						
	Nasung Veterinary Office, Manang		Bhanu Veterinary Office, Tanahun		Kawaswoti Veterinary Office, Nawalpur	
Disease	Number of affected livestock	Total death of affected livestock	Number of affected livestock	Total death of affected livestock	Number of affected livestock *	Total death of affected livestock
FMD	30	0	150	0	2500	0
Diarrhea	110	0	-	-	-	-
Tick	150	7	-	-	-	-
Food poison	150	10	-	-	-	-
Brucellosis	10	0	10	0	1	0
Tape worm (Fitte Jukaa)	-	-	650	0	-	-
PPR	-	-	60	7	-	-
Dog bite	-	-	80	(rabies) 3	80	(rabies) 2 cows
Leptospirosis	-	-	-	-	12	0
Bovine TB	-	-	-	-	10	0

 # Secondary source; Diseases or case prevalence based on veterinary office records

*Laboratory-diagnosed facilities in their institution

Source: Field Survey 2021/022

Table 4.
Perception of service providers towards the OH approach

District	Perception towards the OH approach
Veterinarian in Manang and Tanahun	*If we conduct a mutual program with multisectoral collaboration, it might be an effective role to control the zoonoses.*
Veterinarian in Nawalpur	*Of course, we should do it anyway. Currently, we have been coordinating with health posts and doing some targeted programs. But we had not practiced clinical protocol. If we were able to do so zoonotic diseases might be under control.*
Paramedics in Manang, Tanahun and Nawalpur	*We don't know the term One Health (OH) and its concept. We mostly conducted our programs based on our self-initiation or vertical approaches. But we think there should be coordination between veterinary and public health departments.* - [Thematic perspective of paramedics]
Livestock-related cooperative member in Tanahun	*I have not had any ideas about the OH approach ever before. However, some organizations supported uinor the program of safe milk production (machine and equipment) for our dairy.*
Nawalpur	*There is no any NGO / INGO to support for our cooperative. The government has been providing training from time to time. It was last year we visited Pokhara Gyan Kunja for training, which was coordinated by the provincial government and our institution. However, that was mainly focused on income generation by livestock, their nutrition, and milk production rather than farmers' protection from zoonoses.*

Source: Field Survey 2021/022

Table 4 explored the OH-related perception of health service providers and program implementation situation in study municipalities. Veterinarians in the study agreed that such types of programs based on the OH approach might be effective to control the zoonoses.

However, participants from (public) health services providers in all studied districts explored that they conducted their (public health) programs vertically as a traditional approach. They also explored that, we had not any ideas about OH approach previously and had not any organization conducted programs based on OH approach in our communities (*by health care service providers in Manang, Tanahun, and Nawalpur*).

A similar reflection showed by a cooperative member in Tanahun and Nawalpur. They were unaware of the term OH and zoonoses. However, some organizations supported their cooperative and livestock farmers mainly focused on milk management, and milk production rather than farmers' protection from zoonoses.

Suggestive Intervention to Control the Zoonoses

In this study, most of the respondent's health service providers in both fields, and cooperative members had no clear ideas about the term OH and zoonoses. However, they agreed to collaboration between the stakeholder, training for livestock farmers, and easy access to a veterinarian, which are areas and scope of the OH approach. Based on professional experiences related to livestock farming, milk management, or human and animals health issues, health service providers and cooperative members were suggested some interventional approaches to policymakers or responsible authorities which might be supported to design the policy, plan and strategies for zoonoses control and betterment to livestock profession in the farming communities.

Table 5.

Intervention for Zoonoses Control

District	**Interventional Approach Suggested by Veterinarian**
Manang	*Planning and implementation of programs like mass awareness or campaigns, and joint programs in coordination with public health and livestock health concerned people.* *All three-level governments should provide plans and budgets for the zoonoses control program.* *Government should increase the post of veterinarians in all municipalities and need to empower them (Training).*
Tanahun	*Mass awareness programs, training for livestock farmers and timely management the zoonotic illness in both fields with coordination of veterinarians and public health concerned people.*
Nawalpur	*Increment in public consciousness among farmers, personal hygiene, and livestock house (farm/ shed) sanitation should be given top priority. Joint programs in coordination with concerned authorities. Making and implementing plans with coordination between public and livestock health carrying out publication and broadcasting of information.*
	Interventional Approach Suggested by Cooperative Member
Tanahun	*The program should be conducted in coordination with the public health and veterinary department.* *Conducting awareness programs in cooperation with other concerned sector.* *Farmers should be taught about how we can prevent and protect from zoonoses.* *The veterinary doctor should visit the shed to prepare a schedule for livestock observation and education for farmers.*
Nawalpur	*We don't have a professional veterinarian, so we are facing many problems related to animal health. If we had one it would be easier.* *We expect seminars and training, it would be fruitful if we could know the way of transmission of animal disease and the way to eradicate it.* *It would be effective if we choose the commercial farmer for training.*

Source: Field Survey 2021/022

DISCUSSION

The increasing number of emerging and re-emerging infectious zoonoses has been a major challenge for the human and animal health professional globally. However, many of them successfully managed those problems with well updated professionals guided by strong health policy. One Health approach is an example of this updated strategy, which was practiced since 2007 with the multisectoral collaboration to control the zoonoses (Gayathri, 2020). However, countries like Nepal, many health-service providers in community level still unknown about the approach One Health to control the zoonoses. To determine and explore the One Health related knowledge, perception and practices of the service providers working at the community level, we conducted a total of eight KII with the health service provider in veterinary and public health sector and livestock-related cooperatives in the study areas. Based on study results, knowledge, perception, and practices towards the OH approach were discussed here with relative themes.

Zoonoses in Farming Communities

Based on presumptive data from veterinary and public health institutions, foot and mouth disease (FMD), brucellosis and rabies are common zoonoses in all study districts but rabies was not reported on livestock in Manang. However, diarrhoeal diseases and ticks are common in Manang. PPR and tapeworm (fitte juka) are in Tanahun and leptospirosis and bovine tuberculosis are common livestock-related zoonoses in the Nawalpur district. Similarly, dog bites, worm infestation, and diarrhoeic diseases are common zoonoses in the public health sector in all study districts. However, snakebite is common in Tanahun and Nawalpur.

To compare the previous prevalence status of several zoonoses with this study also found a similar situation in Nepal. Literature shows that outbreaks of dengue occurred in 2016 with 1473 confirmed laboratory cases (Khetan et al., 2018). Every year about 100 -150 people die because of rabies and dogs are the main sources of human rabies in Nepal (Pant et al., 2012). Brucellosis is a public health problem in Nepal with have a significant (5.60 to 9.42 % in males and 2.90 to 60 % in females) prevalence rate (Acharya et al., 2016). Bird flu is very common in Nepal, it was recently seen in the Kavre district in March 2018 [Chitra, 2075] with one human fatality (Shrestha, 2019). Swine flu (H1N1) is another viral zoonotic disease that is endemic in Nepal. In 2009 it was reported 172 cases of 2 deaths in Nepal (Adhikari et al., 2011). Those evidence either in primary data or from literature, we can say that Nepal has many zoonoses with highly prevalent in both human and livestock sectors. So, professionals who work in public and animals health sectors needs to have the updated national plan and policy with knowledge and well equipped against the zoonoses. However, many professionals work in community level in Nepal; need to be updated One Health approach for significant outcome.

Many countries have successfully implemented OH-based programs to control the zoonoses, which might be motivation for us. The paper in BMC Public Health, disseminates the successful example of the OH approach to

manage the zoonotic Anthrax, which outbreaks in 2016 in New Nakuru county, Kenya. There, outbreaks of anthrax typically occur annually, and the disease is endemic (Munyua et al., 2019).

The paper described that, in 2016 after 10 cows suddenly died, a farmer who suspected anthrax infection sent samples to a veterinary laboratory. When the samples was positive for anthrax, the veterinarian notified public health officers, and traced the affected farms, conducted community awareness and engagement activities, and ensured that exposed humans received prophylactic treatment from health workers at nearby health centers. Field epidemiologists then followed up a month later by conducting epidemiological surveillance in communities and at local health centers. They traced 29 people at risk of disease and found that only 3 had developed cutaneous anthrax. They found that a majority of those who did not develop clinical disease had been treated with prophylaxis earlier (Munyua et al., 2019).

Therefore, due to facing similar problems of zoonoses in both public health and veterinary sectors in Nepal, we most need to follow the OH strategy effectively. This report illustrates the importance of rapid communication between farmers, veterinary, and public health professionals with effective collaboration.

Knowledge and Perception towards the OH approach

Veterinarians and public health practitioners are prime sources of knowledge on livestock and human-related illness in the country (Weng & Ankrom, 2016). Every epidemic in the country is defenses by them as a frontline. However, good defense for an effective outcome is mostly determined by their knowledge, practice, and perception of the events and evidence with effective strategies. One Health is an emerging paradigm to control zoonoses with collaboration with human health, animal health, and the environmental sector (CDC, 2018). However, most of the respondent's in this study were exactly unaware of the term One Health approach, although they perceived that multisectoral collaboration might contribute positively to control the zoonoses.

Veterinarians in Manang and Tanahun perceived that a mutual program with multisectoral collaboration might be an effective role to control the zoonoses. However, a veterinarian in Nawalpur, well-known about the OH concept and expressed that, *of course, we should follow the OH approach anyway. Currently, we have been coordinating with health posts and doing some targeted programs. But we had not practiced clinical protocol. If we were able to do so zoonotic diseases might be under control.*

On the other hand, public health professionals (paramedics) in all study clusters mention that they had no good ideas about the term OH. They expressed, '*We don't know the term One Health.'*

Based on all shreds of evidence, the public health service provider had low knowledge of the OH approach to compare the veterinarian in the study. However, perception towards the OH approach was found positive in all study districts and both fields of public health and veterinarian.

Suggestive Interventional Approaches

Despite poor knowledge about OH approaches, respondents of the study districts suggested some interventional activities for control the zoonoses and most of the suggestion looks similar to the concept of OH approaches.

Veterinarians in Manang suggested that *all three-level governments should provide plans and budgets for the zoonoses control program. Government should increase the post of the veterinarian in all municipalities and need to empower them (Training).* Veterinarians in Tanahun emphasized that, *a campaign like mass awareness, and joint programs in coordination with the associated sectors. Planning and its implementation by coordinating with public health and livestock health concerned people*. Similarly, a veterinarian in Nawalpur advised that an *increment in public consciousness among farmers, personal hygiene, and farm (shed) sanitation should be given top priority. Joint programmes in coordination with concerned authorities. Making and implementing plans with coordination between public and livestock health carrying out publication and broadcasting of information.*

Similarly, members of livestock-related cooperatives also suggested some interventional approaches to control zoonoses. Cooperative members in Tanahun suggested that *the program should be conducted in coordination with the public health, veterinary department, and another concerned sector. Farmers should be taught about how we can prevent and protect from zoonotic diseases. The veterinary doctor should visit the shed to prepare a schedule for livestock observation and education for farmers.*

Similarly, the cooperative member in Nawalpur suggested that *we don't have a professional veterinarian, so we are facing many problems. If we had one, it would be easier. We expect seminars and training; it would be fruitful if we could know the way of transmission of animal disease and the way to eradicate it. It would be effective if we choose the commercial farmer for training.*

So, the suggestions of respondents reflect that they were worried about human and animals health. Appointment to an adequate health service provider in both fields with well knowledge and equipment might be effective to control the zoonoses. Because of the low priority for livestock and zoonoses-associated health problems in Nepal, professionals are facing vulnerabilities for health and well-being. Therefore, OH activities should be implemented in farming communities throughout the country without dealy.

CONCLUSION AND RECOMMENDATION

One Health is an emerging paradigm in the field of zoonoses. This study tried to explore the OH-related knowledge, perception, and practices of service providers like; veterinarians, public health, and livestock-related cooperative members in selected districts in Nepal. A qualitative dominant mixed-method approach was followed in the study. The findings of the study uncover that, respondents service providers had a low knowledge towards the OH approach, and vertically conducted their programs against the zoonoses. However, they were positively perceived the concept of OH approach and demanded such programs up to the community level which create an optimistic situation against

the zoonoses in farming communities of Nepal. Therefore, to control the zoonoses by applying the OH approach we should establish the OH committee in every local level and should be united all public health, animal health, and WASH-related officials. The government should revised their policy with OH based strategies, and initially should be educated all service providers about the strategies of OH approach.

ACKNOWLEDGMENTS: This study is part of the Ph.D. of the first author. We would like to thank the participants for their time and responses.

FUNDING: No fund was available for the study.

CONTRIBUTION: KB: Conception of the study, data collection, analysis, interpretation of data, drafting and approval of the final version of the manuscript. **RA**: Design of the study, analysis of data, interpretation of data. **DA**: Design of the study, analysis of data, critical revision of the manuscript. **BD**: Design of the study, critical revision of the manuscript. **SS**: Decision of the study, language revision.

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