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Assessment of Public Awareness on One Health and Zoonoses in India

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ABSTRACT: This study addresses the gap in public awareness of One Health and zoonoses in India. By assessing knowledge of the interconnections among human, animal, and environmental health, we aim to identify gaps and implement measures for disease prevention. We assessed public awareness of One Health and zoonoses, in India using a structured questionnaire developed from literature review. Data were collected via Google Forms, distributed individually and through public platforms like Gmail, LinkedIn, and WhatsApp, ensuring all questions were made mandatory to prevent incomplete submissions. The survey collected 374 responses across 24 states and 5 UTs in India, with the majority from Kerala (220). Most participants (58.9%) were aged 26-35, and 72% of them were familiar with term "One Health with 89.3% recognizing the human-environmental health connection and 74.9% linking animal and human health. The study revealed 84.3% awareness on "zoonoses," with 86.4% recognizing bidirectional transmission between animals and humans. Most (89.9%) believed zoonotic diseases are preventable. Rabies (97.3%) was the most recognized disease, while scrub typhus (66.9%) was least. Risk behaviours included raw milk consumption (7.2%), raw meat consumption (1.9%) especially in religious ceremonies and keeping pet indoors (29.9%), emphasizing prevention's importance. This study reveals substantial awareness of One Health and zoonotic diseases, in India. It emphasizes the need for targeted education, community engagement, and collaboration between medical and veterinary fields to enhance disease prevention and control efforts.

Keywords: Awareness, Zoonoses, One health, India.

INTRODUCTION

Human-wildlife coexistence is crucial for planetary health (Nyhus *et al.*, 2016), yet expanding human activities have caused significant environmental changes, increasing threats to animals, plants, and humans (Baker *et al.*, 2022). Zoonotic diseases, pathogens transferred from animals to humans, have surged, with over 60% of human infectious diseases and 75% of emerging diseases originating from animals (Salyer *et al.*, 2017). Outbreaks like SARS (2003), Ebola (2014), Zika (2015), and COVID-19, linked to wildlife reservoirs and environmental disruption, demonstrate severe health and economic impacts (Keusch *et al.*, 2022), including mortality, healthcare strain, economic disruption, and mental health effects (Smith *et al.*, 2019; Fardin, 2020). In India, where 68% of the workforce engages with domestic animals (Pavani *et al*., 2014), zoonotic risks are exacerbated by unsafe practices like improper waste disposal, slaughtering diseased animals, and inadequate hygiene. Limited awareness of zoonoses and their impacts challenges control measures (Asokan *et al.*, 2011). Understanding dairy farming practices, cultural dietary habits, and farmers' perceptions is vital for improving disease control strategies (Swai and Schoonman 2010), as their awareness directly influences management success.

Our study addressed public awareness gaps about One Health and zoonoses in India, assessing knowledge of human-animal-environment health connections. It explored how socio-demographic factors like gender, age, and education affect understanding. The findings aim to assist health administrators in planning educational campaigns, fostering prevention, and improving control measures for zoonotic diseases. This approach underscores the need for awareness to mitigate zoonotic risks effectively.

MATERIALS AND METHODS

To assess the awareness of public about the concepts like One health and zoonoses in India. A structured questionnaire was made by reviewing articles published in good impact factor journals, regarding the knowledge and awareness on one health and zoonoses and basic questions regarding the socio-demographic variables like gender, age, and education were also included in order to get the interconnectedness between those variables and awareness about the above mentioned

core concepts activities which interconnect them in day to day life (Table 1).

Collection of responses. The questions were fed in Google forms (Google.com) and shared to the public individually as well as in groups through public platforms like Gmail, Linked In and Whatsapp for data collection. All the questions in the google forms were made mandatory to answer by changing the settings, so that incomplete forms cannot be submitted. All the responses obtained from the questionnaire was processed in Microsoft excel for evaluation and interpretation of results.

Table 1: Questionnaire for assessment of Public Awareness on One Health, and Zoonoses in India.

Socio-demographic variables	**Responses**
Gender	1-male 2-female 3-others 4-prefer not to say
Age	1 =15–25 years 2 = 26–35 years 3 = 36–45 years 4 = 46–55 years 5 = 56-65 years 6 = 66 or older
State	
District	
Residence	1= Rural 2= Urban
Level of education	1= Below 10th 2 = Below 12th 3 = Undergraduate 4 = Postgraduate 5 = Doctorate
Profession	1= Students 2= Teachers 3= Medical or Allied 2= Veterinary or Allied 3= Others, Specify_____
One Health awareness	**Responses**
Have you heard of the term One Health?	0= "No, I haven't 1= "Yes, I have 2= Not sure
How closely do you believe people's health is connected to animal health?	Likert-scale responses 1= "Not at all 2 = “Somewhat 3 = “Very 4 = “Extremely
How closely do you believe people's health is connected to plant and environmental health?	Likert-scale responses 1= "Not at all" 2 = “Somewhat” 3 = “Very” 4 = “Extremely”
What subjective social class do you belong to?	1= Lower class 2= Middle class 3= Upper class 4= Prefer not to say
Awareness on Zoonotic diseases	**Responses**
Have you heard of the term Zoonoses?	0= No, I haven't 1= Yes, I have
Do you know zoonotic disease transmission will occur from animals to humans and vice versa ?	0= No 1= Yes
Do you believe zoonoses is preventable?	0= No 1= Yes
Do you have awareness about the following diseases? (Multiples options possible)	Leptospirosis Nipah Monkey Pox Kysanur Forest Disease Tuberculosis Rabies Anthrax Brucellosis Kala Azar

	Scrub typhus
Awareness was obtained through which platform? (Multiples options possible)	1= Television 2= Social media's 3= Veterinarians 4= Medical doctors 5= Peer groups
Do you keep your pets inside house?	1= Yes 2= No
Do you have the habit of consuming raw green leafy vegetables?	1= Yes 2= No
Do you have and habit of consuming raw milk?	1= Yes 2= No
Do you consume raw milk served in temples/Mosque/church as a part of ritual ceremonies?	1= Yes 2= No
Do you consume raw meat served in temples/Mosque/church as a part of ritual ceremonies?	1= Yes 2= No

RESULTS

A total of 374 responses were gathered from across 24 states and 5 Union Territories (UTs) of India. Regionally, Southern India accounted for the majority of responses, with 277 responses (74.06%) from states and UTs such as Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Telangana, Puducherry, and Lakshadweep. Northern India contributed 56 responses (14.97%), covering states like Himachal Pradesh, Punjab, Uttarakhand, Uttar Pradesh, and Haryana, as well as UTs including Delhi, Jammu and Kashmir (J&K), Chandigarh, and Ladakh. Western India provided 23 responses (6.1%) from states such as Rajasthan, Gujarat, Maharashtra, and Goa, along with the UTs of Dadra and Nagar Haveli and Daman and Diu. Eastern India contributed 6 responses (1.6%) from West Bengal, Odisha, Bihar, and Jharkhand, while the Northeastern region accounted for 8 responses (2.13%) from Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim. Central India provided 4 responses (1.06%) from Madhya Pradesh and Chhattisgarh (Table 2). All response data were organized in an Excel file for further analysis.

Table 2: Percentage of responses obtained from various Parts of India.

Regions of India	Response obtained (%)
Southern India	74.06
Northern India	14.97
Western India	6.14
North-eastern India	2.13
Eastern India	1.60
Central India	1.06

Socio-demographic details. The survey gathered responses from a balanced gender distribution, with 50.9% male and 49.1% female participants. Age-wise, the majority (58.9%) of respondents were between 26-35 years, followed by 26.9% aged 15-25 years, and the remainder over 35 years. Geographic distribution showed that 57.1% of participants resided in rural areas, while 42.9% were from urban settings. Regarding socioeconomic classification, 67.5% belonged to the middle class, 22.7% to the upper-middle class, with smaller percentages in the upper (1.6%) and lower classes. Education levels among respondents were high, with 44.8% holding postgraduate degrees, 37.3% undergraduates, 15.7% doctorate holders, and only 2.1% below the 12th standard. Professionally, 41.9% were veterinary doctors, followed by students (22.7%), medical doctors (13.6%), teachers (3.1%), paramedics (2.4%), and other professions.

Awareness and knowledge on the concept of One Health among public. Among the respondents, 72% reported familiarity with the term "One Health," while 28% were unfamiliar with it. When asked about the broader concept, 89.3% acknowledged a strong connection between human health and the health of plants and the environment. Additionally, 74.9% believed that animal health is closely tied to human health, while 21.3% felt that animal health is only somewhat connected to human health. These findings highlight a generally high level of awareness regarding the interconnectedness of human, animal, and environmental health within the One Health framework.

Awareness and knowledge on Zoonosis among public. Among respondents, 84.3% reported awareness of the term "zoonoses," while 15.7% were unfamiliar with it. A majority (86.4%) recognized that disease transmission can occur between animals and humans in both directions, with 13.6% not holding this view. Regarding preventability, 89.9% of participants believed zoonotic diseases can be controlled with appropriate preventive measures. Awareness of specific zoonotic diseases varied: 97.3% of respondents were familiar with rabies, followed by tuberculosis (95.7%), anthrax (93.6%), monkeypox (92.8%), and the least recognized being scrub typhus (66.9%) (Fig. 1). Sources of zoonotic disease information included veterinarians (63.2%), social media (59.2%), and peer groups (46.9%) (Fig. 2). Regarding habits that may contribute to zoonotic disease transmission, 29.9% of respondents reported keeping pets indoors, while 7.2% regularly consumed raw milk, and 28.5% did so during religious ceremonies. Additionally, 1.9% of individuals reported consuming raw meat as part of religious practices. Consumption of raw green leafy vegetables was also common, with 32.5% of respondents indicating this practice. These behaviors reflect potential pathways for zoonotic disease exposure, highlighting the importance of awareness and preventive measures.

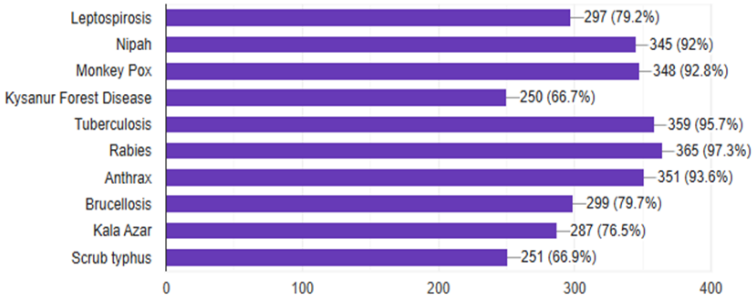

Fig. 1. Awareness about the zoonotic disease prevalent in India.

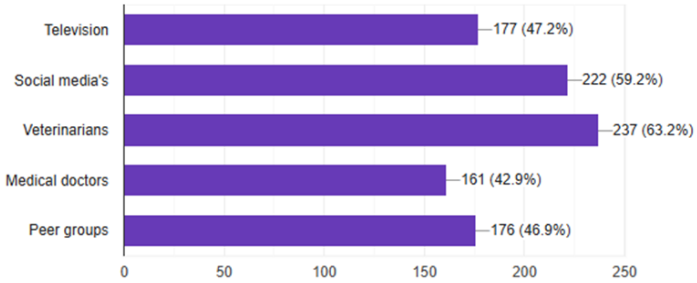

Fig. 2. Platforms from which awareness regarding the zoonoses were obtained.

DISCUSSION

This study assessed awareness and knowledge of One Health and zoonotic diseases. The result obtained was sufficient enough to understand the opinions of public regarding these core concepts, which will definitely lay stones to further research in India, as the concepts play a major role in the 21st century.

Awareness and knowledge on one health among public. Assessing public awareness of the One Health concept is essential for understanding and shaping strategies that can enhance the public's understanding and adoption of One Health principles in India. This study surveyed the public in various Indian cities and found that a high proportion of respondents (72%) were familiar with the term "One Health." Additionally, there was substantial awareness of the concept's core ideas: 74.9% of respondents recognized that human health is closely connected to animal health, while 89.3% understood the link between human health, plants, and the environment. A trend was observed where younger individuals and those with higher socio-economic status showed greater familiarity with One Health principles, consistent with findings in a survey of 400 individuals in Wah, Pakistan (Shan *et al*., 2018). Furthermore, awareness of the term was associated with a deeper understanding of One Health's interconnected approach to health among humans, animals, and the environment, in line with previous research that found recognition of the concept's foundational idea often precedes recognition of the term itself (Varer Akpinar and Durmaz 2022). The study suggests that emphasizing these health connections, already resonant within cultural values, may bolster One Health awareness and understanding among the Indian public.

Awareness and knowledge on zoonoses among public. Zoonoses are defined as diseases and infections that naturally transmit between humans and vertebrate animals. Information dissemination and awareness training are essential for preventing the emergence and spread of zoonotic diseases. This cross-sectional study aimed to assess public awareness and prevention practices regarding zoonoses across various states in India. Data were gathered through a closed-ended questionnaire completed by 374 randomly selected respondents. Findings revealed that 84.3% of respondents had heard of zoonotic diseases, with high awareness rates for specific diseases, including Rabies (97.3%), Tuberculosis (95.7%), Anthrax (93.6%), Monkeypox (92.8%), Nipah virus (92%), Brucellosis (79.7%), Leptospirosis (79.2%), and Scrub typhus (66.9%). The majority of respondents obtained information about zoonoses from veterinary officials (63.2%), social media platforms (59.2%), television (48.9%), and medical doctors (42.9%).

The study also examined prevention practices, finding that 32.5% of respondents consumed raw green leafy vegetables, 28.5% consumed raw milk, and 1.9% consumed raw meat in religious ceremonies, indicating potential risk behaviors. In another study conducted, it states that more than 60% of the study participants did not consider unpasteurized milk as possible contamination sources (Singh *et al*., 2023). Although the community demonstrated good awareness overall, findings underscore the need for enhanced knowledge through continuous health education and awareness campaigns. Such initiatives, particularly via public and social media, should address the sources, transmission routes, and prevention practices related to zoonoses.

The ecological interdependence of diverse animal species underscores the need for collaboration among biologists, veterinarians, and medical practitioners to control emerging zoonotic diseases effectively. Increasingly, veterinary and traditional medical professions have collaborated in efforts to manage emerging and re-emerging zoonotic diseases, as control often exceeds the capacity of each profession alone.

This collaborative need has contributed to the One Health concept, which necessitates interdisciplinary cooperation at local, national, and global levels. However, limited data availability and uncertainties around zoonotic transmission present significant challenges for decision-making. Therefore, an integrated approach between medical and veterinary professions is crucial to effectively treat and prevent zoonotic diseases (Gupta *et al.*, 2018).

CONCLUSIONS

This study assessed public awareness and knowledge of the One Health approach and zoonotic diseases across various Indian states. The findings revealed a significant understanding of the One Health concept, with 72% of participants recognizing its importance and 89.3% acknowledging the interconnectedness of human, animal, plant, and environmental health. To promote One Health, the study recommends integrating the concept into educational curricula and implementing community engagement programs, particularly targeting populations with lower education levels. Regarding zoonotic disease awareness, 84.3% of respondents were familiar with zoonoses, with high awareness of specific diseases such as rabies, tuberculosis, and anthrax. Despite this, certain risk behaviors, such as consuming raw vegetables and unpasteurized milk, were prevalent, underscoring the need for targeted health education on zoonosis prevention. The study emphasizes the critical role of interdisciplinary collaboration between medical and veterinary professionals in effectively managing and preventing zoonotic diseases.

FUTURE SCOPE

This study explores the current state of awareness and understanding of zoonotic diseases and the One Health concept among the general population across India. It highlights the need for effective awareness programs to address the country's present scenario concerning zoonoses. The findings of this study will contribute to formulating appropriate strategies to prevent the spread of zoonotic diseases and emphasize the importance of the One Health approach in containing such diseases effectively.

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Conflict of Interest. None.

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