



Original Article

A comparative study on perception of knowledge, clinical signs, and vectors of Zoonotic diseases with special reference to the Gwalior Chambal region

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Summary

Zoonosis are infections naturally transmitted between vertebrate animals and humans. An exploratory questionnaire-based survey was carried out in twenty-seven villages ($n = 27$) among the population living close to their livestock in the Gwalior-Chambal region of North Madhya Pradesh to assess local knowledge, attitudes and public awareness on animal Zoonosis. Both closed and open-ended questions and focus group discussions techniques were employed to gather information on perceptions concerning the type of Zoonotic diseases prevalent in the study area, indigenous name of the diseases, animal or vector related Zoonotic diseases, clinical signs associated with the diseases in humans, clinical signs associated with the Zoonosis in animals and mode of transmission. The results demonstrated that Rabies, Malaria, and Dengue were considered the three most common Zoonotic diseases identified by the respondents through focus group discussion along with their carriers/vectors. Death was the common symptom of Rabies recognized by the respondents (55%), chill (68.2%) for Malaria and (75%) for engue. Co-residence with livestock consumption of un-treated livestock products (i.e. milk, meat or eggs) and attending to parturition were perceived as routes of transmission. These results suggest that in the Gwalior-Chambal region, rare awareness and knowledge of Zoonosis, along with food consumption habits and poor animal husbandry are the main cause for the local population an increased risk of contracting Zoonosis. A significant difference at $P \leq 0.05$ has been observed in the value identified as Zoonoses by respondents through focus group discussions. Public health promotion on education and inter-disciplinary one-health collaboration between vets, public health practitioners and policy makers should result in a more efficient and effective joint approach to the diagnosis and control of Zoonosis in Gwalior-Chambal region.

Keywords: Knowledge, Perception, Transmission, Zoonosis, Gwalior, India

Introduction

Diseases that have potential to get transmitted from animals, both wild and domestic, to humans are called Zoonosis. (Coleman, 2002). Brucellosis, Rabies, human African trypanosomiasis, bovine tuberculosis (BTB), cysticercosis, echinococcosis, and anthrax are considered as seven widespread Zoonosis of

concern (WHO, 2006). Both emergence and re-emergence of Zoonotic infectious have the potential impact on human health and livestock both direct and indirect and is a major concern around the globe. The indirect impact is a result of lowering the economic, human health, and investment on control programs (Perry et al., 2009). An increase in the demand for livestock

products results in an increase in production both in urban and peri-urban areas, which poses a risk of introducing Zoonosis (Maudlin et al., 2009; Perry et al., 2009). Management practices like awareness, perceptions, knowledge, and attitude to Zoonosis in relation to environmental conditions in rural and peri-urban areas can affect the risk of Zoonosis (Ahearn, 2018). There may be a difference in terms of awareness and knowledge among different systems (Postral, Agro postral, and small dairy holders) in rural and pre-urban areas. Different studies have been conducted in various parts of the world in this regard (Ariza, et al., 1992; Cleaveland et al., 2002). The purpose is that the grass root level data generated will help to the development of effective and joint veterinary–medical policies and guidelines for controlling these zoonotic diseases.

Materials and methods

Study area and population

The current study was carried out in Gwalior Chambal - region in North Madhya Pradesh, India, during 2015-16 and 2016-17 at the study areas including Gwalior, Morena, and Bhind districts. Gwalior district is situated with the geographical co-ordinates of latitude 26° 14' N, longitude 78° 10' E, and the total population of Gwalior district is 2,241,004. The male and female ratio is 864 per 1000. Morena district is about 39.5 km away from Gwalior towards north-west with the geographical co-ordinates of latitude 26° 30' N and longitude 78° 0' E. Population of Morena district is 6,07,246 with male and female ratio of 840 per 1000 and the average literacy rate is 71.03% (Census, 2011). Bhind district is situated at the north-east of Gwalior; the district head quarter Bhind is about 79 km from the Gwalior centre with geographic co-ordination latitude of 26° 36' N and longitude 78° 46' E. Total population of Bhind is 15,59,306 with male-female ratio of 838 per 1000.

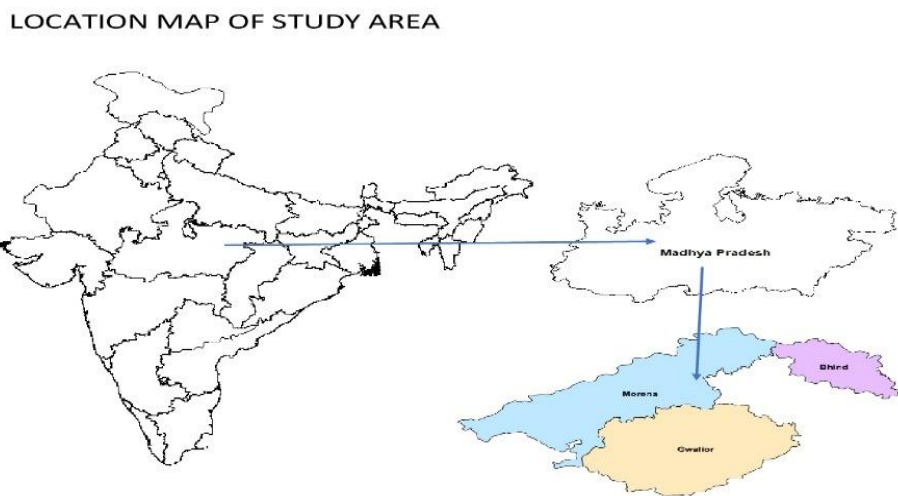


Fig 1. Study area of the Gwalior-Chambal region

Site selection

A total of 27 villages from 17 blocks of three districts were identified as falling in the intensive study area of Gwalior-Chambal region. Multistage random sampling techniques were used to select the different villages for the study. The initial sampling procedure involved 10% by keeping

different factors into consideration. The selection of 10% villages from each district was based on random sampling technique. Finally, only 5% of them that qualified for the criteria were retained. Thus, a wide geographic coverage was achieved, but it was considered to be time-consuming, and the sampling procedure was therefore revised to

include two households from each of two ten cell units. Based on the previous reports of Zoonosis, the sample size was calculated to obtain the total

number of animals to be screened from each selected household.

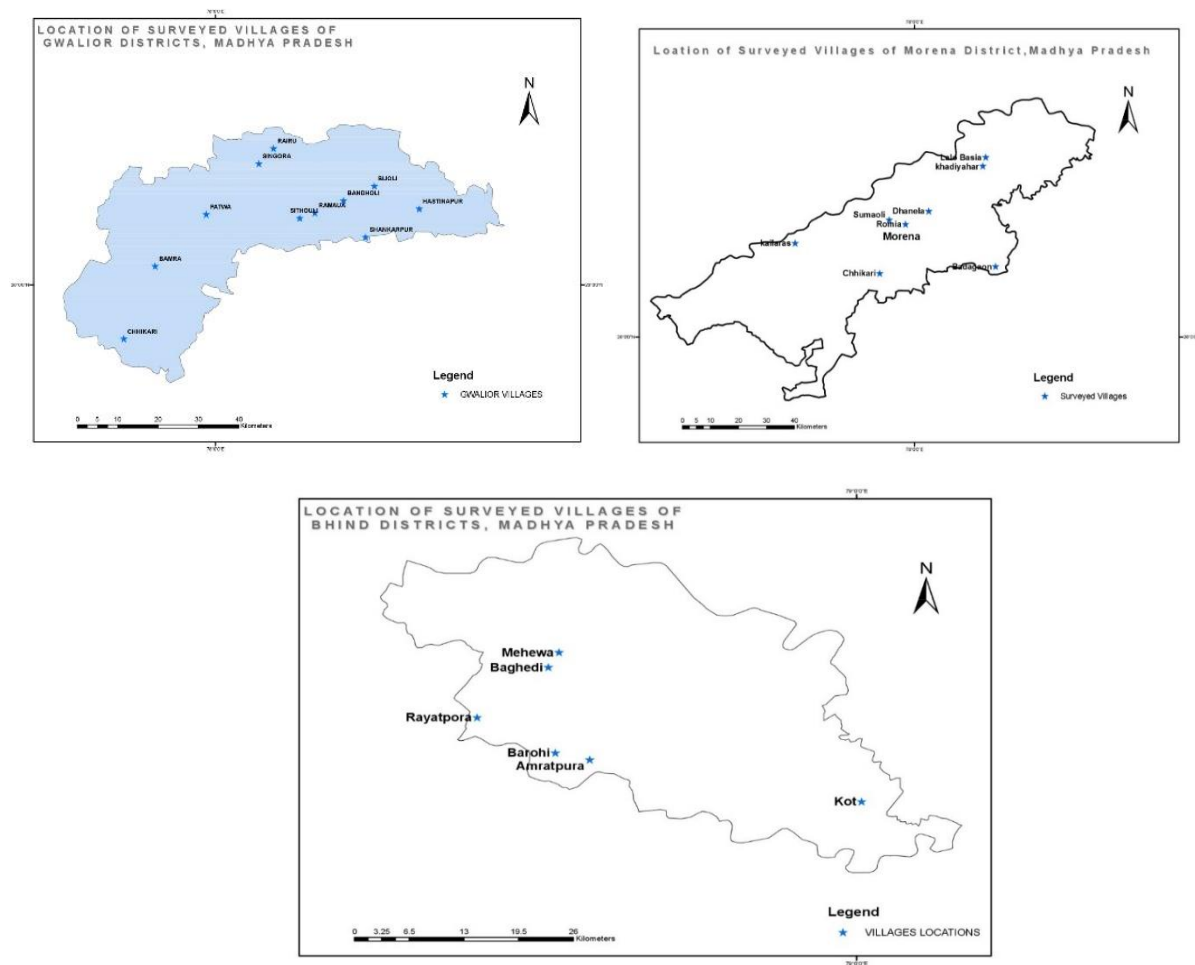


Fig 2. GIS location of three study sites; (a) Gwalior, (b), Morena, and (c) Bhind.

Study design and data collection

A semi-structured open-ended questionnaire was developed to assess perceptions, knowledge, and attitudes toward Zoonosis. The focus of the questionnaire was on animal health workers and livestock keepers in Gwalior-Chambal region of north Madhya Pradesh, India. Knowledge is considered important for identification and perception of Zoonosis. With respect to awareness, essential information that were asked included diseases identification, animal or vector associated with the Zoonosis, clinical signs in humans, and clinical signs in animals. Finally, data were collected on the risk of Zoonosis between localities i.e. urban, peri-urban, and rural.

Statistical analysis

All the statistical values used in the present study were calculated using Microsoft Excel Version 2010.

Results

Zoonotic diseases reported by respondents

All respondents knew that there are certain diseases in their area, which are Zoonosis. Rabies, Malaria, Dengue, Bird Flu, Swine Flu, Chikungunya, Brucellosis, Tuberculosis, Plague, Glanders Diseases, and Parvo were reported as the top eleven diseases (Table 1). Whereas, Rabies, Malaria, Dengue, Swine Flu, Chikungunya,

Brucellosis and Tuberculosis were identified as the most important Zoonotic diseases by all the respondents. Bird flu, Plague, Glanders diseases, and Parvo were mentioned, respectively, 25%, 25%, and 50% by the respondents.

Table 1. Diseases identified as zoonoses by respondents through focus group discussions

Disease	Indigenous name	Agro- Postoral village (n= 24)	Smallholder dairy village (n=03)	Level of perception (n=27)
Rabies	- Do-	24	03	****
Malaria	Motijhra	24	03	****
Dengue	- Do-	24	03	****
Swine flue	- Do-	22	03	****
Bird Flue	- Do-	14	01	**
Chikungunya	- Do-	19	03	****
Brucellosis	- Do-	24	03	****
Bovine Tuberculosis	T. B	19	02	****
Plague		08	0	**
Glanders Disease	Gorha	16	0	***
Parvo (in dogs)		12	0	**

**** > 75% of respondents say yes. *** >50% of respondents say yes. ** >25% of respondents say yes. * ≤ 25% of respondents say yes.

Table 2. Perception of knowledge of animals/vectors associated with the zoonoses during PAR (*Participatory Rural Appraisal*)

Diseases	Animal/Vector	Scientific Name	Agro- Postoral village n= 24	Smallholder dairy village n=03	Overall village response (%: n=27)	Level of perception on n=27)
Rabies	Dog/Cat/Fox/ Monkey	<i>Cans/FelisCatus/VulpesVulpus/Simians</i>	24	03	100	****
Malaria	Mosquito	-	24	03	100	****
Dengue	Mosquito	-	24	03	100	****
Chikungunya	Mosquito	-	14	0	51	**
Bird flu	Birds/ Poultry	<i>Aves</i>	15	01	59	**
Swine flu	Pig	<i>Susscrofa</i>	17	0	62	**
Brucellosis	Cow/ buffalo	<i>Bos Taurus/ BubalusBubalis</i>	24	03	100	****
Bovine tuberculosis	Cow/ buffalo	<i>Bos Taurus/ BubalusBubalis</i>	19	03	81	****
Plague	Flea bites/Infected rodents	<i>Siphonaptera/Rodentia</i>	11	0	40	**
Glanders disease	Horse	<i>EquusCaballus</i>	17	0	62	***
Parvo(in dogs)	Dogs	<i>Canis lupus</i>	18	02	74	***

Average
Mean =76
SD =18.62

**** > 75% of respondents say yes. *** >50% of respondents say yes. ** >25% of respondents say yes. * ≤ 25% of respondents say yes.

Perception of knowledge of animals/vectors toward Zoonosis

All the respondents (both agro-postoral and smallholder dairy village) have a 100% level of perception of knowledge about the animals/vectors associated with the Zoonosis, namely Rabies, Malaria, Dengue, Brucellosis, and Bovine Tuberculosis, while as the level of perception of knowledge for Chikungunya, Bird Flu, Swine Flu, Glanders Diseases and Parvo are more than 50%. Plague is the only Zoonotic disease in the study area for which there is least knowledge for animal/ vectors, i.e., 25% (Table 2).

Perception of knowledge of clinical signs of Zoonosis in humans

The maximum number of respondents have good knowledge for clinical signs of Zoonosis in humans in the study area (Table 3), 68.2% of the respondent have knowledge for the clinical sign of malaria (fever), and 59.9% of respondents for chill as a clinical sign. The overall average mean values for clinical signs of malaria are (64.05%).

The minimum number of respondents have good knowledge for Rabies, 55.0% of respondents have knowledge about death as a clinical sign for Rabies. In comparison, as 15.8% of respondents have knowledge for madness as a clinical sign and only 11.3% of respondents know barking as a clinical sign. The overall mean value for clinical signs of Rabies is 27.36. For swine flu, 24.6% of respondents have good knowledge for dry cough as a clinical sign and only 6.9% of respondents have knowledge for nausea as a clinical sign, overall mean value for the clinical signs of swine flu is 15.75. 22.3% of respondents know that Cough is a clinical sign for bird flu and 42.4% of respondents have good knowledge for fever (over 100.4°F or 38°C) as one of the clinical signs for bird flu, the overall mean value for the clinical signs of bird flu is 32.35. 47.2% of respondents have knowledge that joint pain is a clinical sign for chikungunya while only 25.0% of respondents know that joint swelling is a clinical sign for chikungunya and the overall mean value for the clinical signs of chikungunya is 36.1.

Table 3. Clinical signs associated with zoonoses in humans as identified by respondents during the PAR (Participatory Rural Appraisal) survey (n=1350)

		Agro-Postoral village (n = 24)	Smallholder dairy village (n = 3)	Overall village response % (n = 27)	Overall mean value of signs for individual diseases
Disease/signs					
Rabies	Madness	181	32	15.8	27.36
	Barking	132	21	11.3	
	Death	621	121	55.0	
Malaria	Chill	694	115	59.9	64.05
	Fever	782	138	68.2	
Dengue	Chill	884	127	75.0	44.25
	Vomiting	169	12	13.5	
Swine flu	Dry cough	282	50	24.6	15.75
	Nausea	88	05	6.9	
Bird Flue	Cough	252	49	22.3	32.35
	Fever (over 100.4°F or 38°C)	450	120	42.4	
Chikungunya	Joint pain	227	409	47.2	36.1
	Joint swelling	285	53	25.0	
					Average Mean = 36.6433
					SD = 15.00237

Number of sampling (01), (n = 1350)

Perception of knowledge of clinical signs of Zoonosis in animals

The predominant clinical signs of different Zoonotic diseases in animals identified by the respondents are reported in Table 4. The main clinical signs for Rabies in the animals are madness and death, and in this case, 50.8% of respondents identified the madness as a clinical sign, while 73.3% of respondents identified death as a clinical sign. Emaciation and milk drop are

the clinical signs for brucellosis, and 14.5% of respondents identified emaciation as a clinical sign, while 72.6% of respondents identified milk drop as a clinical sign. For bovine tuberculosis, coughing and emaciation are the predominant clinical sign in animals, and 49.2% of respondents have good knowledge about coughing as a clinical sign, and 36.5% of respondents knows emaciation as one of the clinical signs for bovine tuberculosis among livestock.

Table 4. Clinical signs associated with zoonoses in animals as identified by respondents during the PAR (Participatory Rural Appraisal) survey (n = 1350)

		Agro- Postoral village n= 24	Smallholder dairy village n=3	Overall village response (%: n=27)	Overall mean value of signs for individual diseases
Disease/signs					
Rabies	Madness	607	81	50.8	62.05
	Death	864	126	73.3	
Brucellosis	Emaciation	157	38	14.5	43.55
	Milk drop	864	121	72.6	
Bovine tuberculosis	Coughing	526	140	49.2	42.85
	Emaciation	445	54	36.5	
Foot and mouth disease	Eating less	891	121	74.8	74.8
	Reluctance to move or stand due to sore feet	891	121	74.8	
Hemoregicsepticium	Loss of apatite	364	70	31.8	36.6
	Salivation	495	63	41.4	
Black quarter	Hot limbs	243	81	23.8	25
	Swelling of limbs	256	94	26.2	
Epimoralfever	Coughing	148	40	13.7	14.75
	Fever	189	27	15.8	
Glandersdisease	Coughing	351	40	30.1	49.1
	Fever	405	513	68.1	
Mastitis	Fever	297	81	28	50.2
	Milk with the wateryappearance	850	135	73.2	
					Average Mean = 44.3222 SD = 17.03201

For foot and mouth disease, eating less and reluctance to move or stand due to sore feet are the main clinical signs among domestic animals. About 74.8% of respondents had good knowledge for both of these clinical signs. Clinical signs for hemoregicsepticium are loss of appetite and salivation, and about 31.8% of respondents

know that loss of appetite is a clinical sign for hemoregicsepticium, while about 41.4% of respondents know that salivation is a clinical sign. Hot limbs and swelling of limbs are the common signs for black quarter diseases, and 23.8% and 26.2% of respondents know about these signs; for Epimoral fever and Glanders disease, clinical

signs are very much the same. The important clinical sign for Mastitis diseases is fever and milk with watery appearance, and 73.2% of respondents had good knowledge about the clinical sign.

Discussion

Zoonotic diseases are now more prevalent in almost all parts of the world. The number of studies carried out across the country have revealed most of the victims in these areas are the population with economically poor and mostly those who do not have access to basic facilities. The present study was focused on the Gwalior-Chambal region to study the different Zoonotic diseases and the environmental factors responsible for the transmission of these diseases. These diseases have caused great morbidity and mortality among the people of the region. Different factors are responsible for the transmission of these diseases.

In order to assess and to compare knowledge, attitude, and practices of livestock keepers on Zoonosis in agro-pastoral and smallholder dairy, farming systems, a cross-sectional study was carried out, and it was revealed from the study that the most predominant Zoonotic diseases reported were Rabies, Malaria, Dengue, Swine Flu, Bird Flu, Chikungunya, Bovine Tuberculosis, Brucellosis, Plague, Glanders disease, and Parvo infection. In addition to these Zoonotic diseases, other diseases reported in the study area are foot and mouth diseases, black quarter, ephemeral fever, and mastitis.

In the present study, it was observed that 100% of the respondents in both PAR and cross-sectional study identified Rabies as a Zoonotic disease; also, 100% of respondents identified the animals/vectors associated with the transmission of Rabies. Most of the respondents were able to identify death as a clinical sign for Rabies, and only less percent of respondents identified barking and madness as a clinical sign for Rabies. Our findings are supported by the study carried out by Swai et al. (2010), who showed that 100% of the respondents in both the PRA and cross-sectional

surveys identified Rabies as a Zoonosis. Another similar study reveals that 100% of respondents in both the PRA and cross-sectional studies identified dogs as animals associated with Rabies (Radostits et al., 2000). They also presented that madness was identified in both the PRA and cross-sectional studies as one of the clinical indicators of Rabies in animals (Radostits et al., 2000). A study done by Unger and Munstermann(2004) shows that madness and death are frequently identified by respondents as associated with Rabies in humans in both the PRA and cross-sectional studies. The identification of Rabies as a Zoonotic disease is due to the knowledge of Rabies and fear of contracting the disease among the livestock keepers. Hence; they report animal bite injuries to hospitals mainly for post-exposure vaccination. The awareness by health staff sometimes plays a critical role in directing people to report such incidences. The fact that high proportion of livestock keepers identified Rabies as a Zoonosis, this could be an indicator that the disease is prevalent.

A study done by Radostits et al. (2000) shows that respondent in both the PRA and cross-sectional studies identified bovine tuberculosis as a Zoonotic disease, and domestic ruminants as the animals associated with bovine tuberculosis. Besides, coughing and emaciation are the clinical signs of tuberculosis in animals identified in both the PRA (Radostits et al., 2000). Our study also reveals the same findings as 77% of respondents in both PRA and cross-sectional study identified tuberculosis as a Zoonotic disease, and about 81% of respondents identified animals associated with bovinetuberculosis. Coughing and emaciation were identified as the clinical symptoms of tuberculosis.

In the present study, it was revealed that 100% of respondents identified brucellosis as a Zoonotic disease both in PRA and cross-sectional studies, which is almost the same as the previous study (Kunda et al., 2004). In northern Tanzania, there were a high proportion of livestock keepers in agro-pastoral systems that identified brucellosis as

a Zoonosis during the PRA and cross-sectional studies. The reason that why a high proportion of livestock keepers in agro-pastoral systems identified brucellosis as a Zoonosis during the PRA and cross-sectional studies could be due to the fact that brucellosis is present in their communities, and humans probably became aware of the disease after attending health facilities. All respondents identified that domestic ruminants are associated with brucellosis. The studies carried out by other researchers (Omer et al., 2000; Refai, et al., 1990) showed that domestic ruminants are associated with brucellosis in Africa. The reported clinical signs (drop in milk, and emaciation in humans) are supported by the previous results (Radostits et al., 2000; Karimi et al, 2020).

Conclusion

People closely associated with animals are less acquainted about the common Zoonotic diseases. Moreover, the rural area populations do not have basic knowledge about mode of transmission and identification of Zoonotic diseases. The government should take steps in collaboration with the veterinary department and NGO to overcome the burden of Zoonotic diseases. Some Zoonotic diseases are pandemic, so awareness among common people is the urgency of time. Common vaccination for most Zoonotic diseases should be on a priority basis to minimize the burden of death in human lives and economic burden. Most of the diseases among the victims are due to human-animal contact and careless attitude in handling such animals. There is an urgent intervention by the health department to spread knowledge towards Zoonotic diseases.

Acknowledgement

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Conflict of Interest Statement

We declare that we have no conflict of interest.

Ethical approval

Ethical clearance number is JU/IHEC/2017-B/01.

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