

# Assessment of Veterinary Extension Service and Public Perception on Major Infectious and Zoonotic Disease at Robe Veterinary Clinic of Bale Zone, Oromia, Ethiopia

Sultan Abda Neja (✉ [sultanabda@gmail.com](mailto:sultanabda@gmail.com))

Hawassa University Faculty of Veterinary Medicine, P.O. Box 05, Hawassa, Ethiopia

Amir Adam

Hawassa University Faculty of Veterinary Medicine, P.O. Box 05, Hawassa, Ethiopia

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## Research Article

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# Abstract

## Background

A survey-based cross-sectional study was conducted from April to August 2021 to assess veterinary extension service and public perception on major infectious and zoonotic diseases at Robe veterinary clinic. 384 animal owners who brought their animals for treatment were interviewed.

## Results

The result indicated that 70.8% of respondents had no veterinary extension service. The majority (88%) had no access to the veterinary consultant. Although 51.6% of them used AI, only 7.8% of them know how to detect estrous. The most frequently known zoonotic diseases were Rabies (96.6%) followed by Anthrax (33.07%), and Tuberculosis (4.2%). Out of the 96.6% of respondents that replied to know about Rabies, 51.8% of them mentioned the disease can be transmitted only through dog biting while 14.8% of them say through biting and contact with saliva. Likewise, only 43.3% of respondents perceive that Anthrax is transmitted through ingestion, whereas 85% of them mentioned Tuberculosis can be transmitted from animal to humans only through inhalation. Although most animal owners prefer early treatment of animals in the veterinary clinic, there are also practices of traditional animal treatment. Remarkable only 16.4% and 24.7% of respondents know the importance of vaccination and slaughterhouse respectively. 93.8% and 94.8% of them still consume raw milk and meat respectively.

## Conclusion

: The finding indicates that veterinary extension services are a neglected venture; the knowledge, attitude, and practice on prevention and control of major infectious and zoonotic diseases are still insufficient. Therefore there should be multidisciplinary one-health approach in educating the community about infectious and zoonotic diseases.

## Background

Extension services provide farmers with important information, such as patterns in crop prices, new seed varieties, animal management, and marketing[1]. As awareness of previous technologies and knowledge produces actual demand, it gives signal to the input delivery systems thus, extension and input distribution systems are kept to be reciprocally reinforcing [2]. An ideal extension service system also provides feedback from farmers to research centers [3]. Extension activities are often aimed to improve farmers' knowledge, attitude and practice to use of their resources and albeit technologies that are available to them [4]. In this regard, the term 'veterinary extension' has been defined as an informal education provided by veterinarians on animal health and zoonosis to the rural livestock owners [5].

Livestock sector in Ethiopia is an integral part of agriculture, accounting for about 45% of the total value of agricultural production and supporting the livelihoods of over 65% human population. More than 80% of the population lives in rural areas in contact with livestock out of which 30% of them are still in poverty [6, 7]. In terms of livestock population, Ethiopia leads African countries with an estimated 59 million cattle, 30 million sheep, 23 million goats, 1 million camels, and 57 million poultry, 11 million equines and a small number of pigs [8]. On top of their use as a source of foods, product of commodities and services to the people, the livestock also provides 10% the countries export earnings, mainly through live animal export. The total supply of animal source foods in the country, including net trade, translates into a per capita consumption of 9 kg meat, 56.2 liters of milk and about 4 eggs per year. Cattle products, beef and cow milk contribute to almost 80% of all meat and milk consumption. Market transactions are largely in urban areas as self-consumption dominates in rural areas [9]

In Ethiopia, where animals are used for transportation, farming, cloths, source of fuel and dietary protein, there is very close contact among humans, animals, wildlife and the surrounding environment. In the absence of appropriate animal and human health care and preventative health services, this cross-contact creates public health risks via zoonotic disease transmission with enormous economic consequences [10, 11].

Health extension services for knowledge transfer from professionals to society play an important role in the prevention and control of infectious diseases. Before 2015 in Ethiopia, there was no well-developed national strategy to teach society about animal health and zoonosis. This important gap created a lack of perception of society about the disease. Later in 2015 multidisciplinary One-Health initiative workshops developed a list of Rabies, anthrax, brucellosis, leptospirosis and echinococcosis as the top five priority zoonotic diseases the greatest national concern in Ethiopia[12].

Veterinary health extension is a sector of animal health service to the community that can provide information through continuing education, informal training, consultations and materials to practitioners as well as animal health packages to the animal owners. Although improvement in animal health care correlates with better public health care, the control of zoonotic disease in Ethiopia has been partially neglected between veterinary and medical professionals [5, 13]. Currently, the number of universities that produce veterinary professionals and veterinary infrastructures that could provide the platform for animal health extension services in the country. But still, the extension service so far given by the veterinarian is very limited and mainly targets the convectional treating sick animals, providing seasonal vaccination and occasionally delivery of artificial insemination. Chemotherapy becoming the routine attempt for treatment and control of animal disease; which usually end-up with antibiotic resistance [5]. There is a limited attempt by the veterinarian to transfer the knowledge about risks of animal disease transmission to the animal owners and community at large [14].

Zoonosis is an infectious disease that is transmitted from animals to humans. Of the microbial diseases affecting humans 61% are zoonotic [15]. The transmission may occur through direct contact with the animal, through vectors, or food or water contamination. Globally, zoonosis is said to account for 75% of

all emerging pathogens [16, 17]. The impact of zoonotic diseases on society includes animal and productivity loss, livelihood income loss and human health burden which further causes societal and economic loss [18]. There is high zoonotic disease health problem with many farmers still practicing poor livestock production [19, 20].

The control strategies for zoonotic diseases largely rely on the creation of public health awareness. In a resource-scarce developing country like Ethiopia, improving knowledge, attitude and practice of animal owners about infectious disease and zoonosis is critical to contain the spread of zoonotic diseases [21, 22]. In this regard, veterinarians are one of the key people in multidisciplinary and community-based health services. They could be able to deliver veterinary extension services to animal owners. However, particularly in Ethiopia, there are no clear policies and allocated veterinary professional positions that teach the community about primary animal health care. Hence the present study was intended to assess the current status of veterinary extension service as well as public perception on major infectious and zoonotic diseases at Robe veterinary clinic of Bale zone.

## **Material And Method**

### **Study Area**

Robe, also called Bale-Robe, is a town located in Sinana district of the Bale Zone, Oromia Regional State, Ethiopia. It is one of the consistently surplus producer zones of the region. The capital city of the zone, Robe town is located about 430 kilometers from Ethiopia's capital Addis Ababa. It has a latitude and longitude of 7°7'N 40°0'E with an elevation of 2,492 meters (8,176 ft) above sea level. Robe receives a relatively high amount of rainfall which is balanced in distribution pattern. According to available data, the mean annual rainfall ranges from 590 mm in the summer and 560 mm in the winter season. The area is highly populous, highly fertile and suitable for agricultural activities. The 2007 national census reported a total population for Robe of 44,382, of whom 22,543 were men and 21,839 were women[23].

### **Study population**

All population brought their animal for diagnosis to Bale Robe veterinary clinic having different health problems during the study periods were considered as the study population.

### **Study design**

A questionnaire-based cross-sectional study design was employed from April to August 2021 to assess the perception of the public on infectious disease and zoonotic diseases in Robe town of Bale zone, Oromia regional state. A structured and pre-tested questionnaire format was used.

### **Sample size determination**

The sample size was determined based on derivation sample size [25].

$$N = \frac{1.962 \cdot P_{exp}(1 - P_{exp})}{d^2}$$

Where

N= required sample size

exp= expected prevalence

d= desired absolute precision

## Data collection

### Questionnaire survey

A detailed and organized questionnaire format was designed in an attempt to generate baseline information related and used for the face-to-face interview to evaluate the current Veterinary extension service status, perception of the community about the common and major infectious animal disease and zoonotic disease [26]. The questionnaire contains questions that can evaluate the perception of the respondents about zoonotic and infectious disease's importance, their transmission cycle and major clinical signs in humans and animals. In addition, animal owner perception and practice on the prevention and control of the disease were accessed.

### Data management and analysis

The collected data were stored in the Excel Microsoft (MS excel 2007) and descriptive statistics and chi-square ( $\chi^2$ ) correlation analysis were performed using Statistical Program of Social Sciences (SPSS) version 16.0 software packages (SPSS Inc, Chicago, IL, USA). For all analysis performed, 95% CI and P-value < 0.05 was set for statistical significance of an estimate.

## Result

### Socio-demographic characteristics of the respondents

From Table 1, the majority of respondents were male (78.1%) and the remaining (21.9%) are female. The maximum and minimum Ages were (68) and (16) years. Concerning marital and education status, (64.3%) of the respondents are married followed by unmarried (28.4%) and (20.6%) of the respondents are illiterate. Most of the respondents that participated in this study were farmers and merchants in which account for a proportion of (40.1%) and (33.3%) respectively. The highest number of the respondents (65.4%) had come from around robe.

Table 1  
Socio-demographic characteristics of the respondents

<b>Kebele</b>	<b>Kebele 01</b>	<b>21</b>	<b>5.5%</b>
	<b>Kebele 02</b>	<b>38</b>	<b>9.9%</b>
	<b>Kebele 03</b>	<b>45</b>	<b>11.7%</b>
	<b>Kebele 04</b>	<b>29</b>	<b>7.6%</b>
	<b>Around Robe</b>	<b>251</b>	<b>65.4%</b>
Sex	Male	300	78.1%
	Female	84	21.9%
Age category	Less than 20	9	2.3%
	20 to 40	213	55.5%
	Above 40	162	42.2%
Marital status	Married	247	64.3%
	Divorced	18	4.7%
	Unmarried	109	28.4%
	Widowed	10	2.6%
Educational status	Illiterate	79	20.6%
	Read and write	109	28.4%
	Primary school	115	29.9%
	Secondary school	63	16.4%
	College and university	18	4.7%
Occupation	Farmer	154	40.1%
	Merchant	128	33.3%
	Employee	17	4.4%
	Housewife	29	7.6%
	Daily labor	50	13%
	Students	6	1.6

## Perception of respondents about veterinary extension service and production management practice

The highest number of the respondents (44%) had owned mixed-type livestock and followed by only cattle (30.5%) and shoats (7.8%). The fundamental questions for this study were to find out whether the respondents were trained about animal production, animal management, and animal health and how to control the animal disease. As shown in (Table 2) results reveals respondents (66.1%) and (70.8%) were not trained, which indicates that the extension service in the study area was poor. Regarding the presence of consultants in the study area, most of the respondents (88.5%) had no professionals who had been consulted them about animal health and management.

Analysis of the attitude of respondents toward extension services indicates that all of the respondents (100%) are in support of agricultural extension service although (99%) of the respondents keep their animal sanitation and health by cleaning their animal house. The major type of feed source for their animals mentioned by the respondents was concentrated plus grazing (53.6%) natural pasture (grazing) also used in the study area (31.2%). Regarding the estrous cycle (92.2%) of the respondents do not know how to detect the early estrous sign and only half (51.6%) of respondents bring their animals to the veterinary clinic at the proper time in search of the AI service.

Table 2  
 Veterinary extension service and production management practice in the area

Variable	Category	Frequency	Percent (%)
Animals owned	Cattle	117	30.5
	Sheep	30	7.8
	Goat	23	6
	Horse	9	2.3
	Mule	1	0.3
	Donkey	1	0.3
	sheep and goat	30	7.8
	Equine	4	1
	Cattle sheep and goat	134	34.9
	Equine cattle	35	9.1
	Breed	Local	310
Exotic		74	19.3
Trained about animal production and management	Yes	130	33.9
	No	254	66.1
	Total	384	100
Trained about animal health	Yes	112	29.2
	No	272	70.8
clean the animal house	Yes	380	99
	No	4	1
Presence of consultant	Yes	44	11.5
	No	340	88.5
The necessity of animal health extension service	Yes	100	100
	No	0	0
Feed type	Concentrate	13	3.4
	Roughage	35	9.1
	Grazing	15	3.9

Variable	Category	Frequency	Percent (%)
	Concentrate + grazing	206	53.6
	Concentrate +roughage + grazing	10	2.6
	Roughage + grazing	105	27.3
Know estrus detection	yes	30	7.8
	No	354	92.2
Artificial insemination	Yes	198	51.6
	No	102	26.6
	Missing	84	21.9

### ***Major animal problem***

The largest problem they faced for their animals mentioned by the respondents ( 92%) were shortage (expensiveness) of feed followed by disease problem (3%) and unavailability of vaccine (1%) (Figure 2).

## **Perception of the society about the major infectious and zoonotic disease**

**Rabies:** About 9.6.6% of respondents are aware of Rabies. They all well have known as that Rabies was transmitted by dog-bites. The awareness level of the respondent about Rabies indicates that its transmission through dog bites was a well-known fact. The knowledge of Rabies as a zoonotic disease was 96.6% (Table 3).

**Anthrax:** Anthrax was known about 33.03% of respondents and the transmission route mentioned by the respondent 43.3% was ingestion.

**Tuberculosis:** About only 5.2% of respondents had known Tuberculosis. The knowledge and awareness of Tuberculosis as a zoonotic disease in the respondents interviewed was very low.

**Foot and mouth disease:** Of the total respondents only 0.3% of them know about foot and mouth disease.

**Trypanosomiasis:**The overall proportion of respondents that know Trypanosomiasis was 0.6%, few of them described Trypanosomiasis as a zoonotic disease that transmits to humans.

Table 3  
perception on infectious and zoonotic disease

Variables	Category	number	Percent (%)
Perception on animal disease	Yes	372	96.9
	No	12	3.1
If yes mention them	Rabies	233	60.7
	Anthrax	98	25.5
	Rabies+ Anthrax	27	7
	Rabies+Anthrax+TB	14	3.6
	Rabies+Anthrax+FMD	372	96.9
	system	12	3.1
Do u know their transmission	Yes	369	96.1
	No	15	3.9
How	Biting	199	50.5
	Biting +touching saliva	57	14.7
	Biting + ingestion	61	15.9
	Biting+ingestion+inhalation	1	0.3
	biting don't know	51	13.3
	system	15	3.
Have u ever infected or you know someone infected by zoonotic disease	Yes	112	29.2
	No	272	70.8
Do you know TB is zoonotic	Yes	20	5.2
	No	364	94.8
Do you know Rabies is zoonotic	Yes	371	96.6
	No	13	3.4

## Practical assessment of the respondent about veterinary clinic, vaccination & slaughter house

All of the respondents agreed to treat their animal when they get sick out of which 96.4% of them have brought their animal into the veterinary clinic, while still, 3.6% prefers to use traditional medicine to cure the diseased animal. Regarding vaccination more than half of the respondents (63.5%) fail to vaccinate their animals regularly and (83.6%) have lack information/awareness about its importance.

Based on questions raised concerning the practical assessment of participants in the questionnaire, almost all 364 (94.8%) of the respondents have the habit of consuming raw meat and the majority of them practiced (99.2%) backyard slaughter in their home. In addition 360 (93.8%) of them consume raw milk (Table 4).

Table 4

Practical assessment of the respondent about veterinary clinic, vaccination &amp; slaughterhouse

<b>Variables</b>	<b>number</b>	<b>Percentage (%)</b>
Do you treat your animal	-	-
Yes	100	100
No	-	-
If yes what measure do you take	-	-
Treat with traditional medicine	14	3.6
Sell them	-	-
Bring to the vet clinic	370	96.4
Do you take your animal to the vet clinic quickly once it becomes sick	-	-
Yes	100	
No	-	
Who bring the animal to the clinic	-	-
Father	365	95.
Mother	19	4.9
Do you have information about vaccination and their importance	-	-
Yes	63	16.4
No	321	83.6
Do you vaccinate your animal regularly	-	-
Yes	140	36.5
No	244	63.5
Do you know the importance of slaughterhouse (Abattoir)	-	-
Yes	95	24.8
No	289	75.2
During holy day where you slaughter your animal	-	-
Backyard	381	99.2
Abattoir	3	0.8
Do you consume raw milk or meat	-	-
Meat	4	1

Variables	number	Percentage (%)
Milk	1	0.3
Both	360	93.8
None	19	4.9

## Evaluation of factors affecting KAP on Veterinary Extension Service

From Table 5 KAP of the participant were evaluated based on their demography include their sex, age, education level, occupation, and marital status. The result showed that knowledge-related vaccination male participants had better knowledge than females and participants who attained secondary and college had better awareness and perception on the advantage of vaccination this association was statistically significant ( $P < 0.05$ ). The current study also revealed that there is significant variation among the respondent ( $P < 0.05$ ) towards the zoonotic disease of Rabies in which widowed and illiterate had lower knowledge and awareness (Table 6).

Table 5

Factors associated with awareness towards animal vaccination among study participants

Variables	Category	Aware			$\chi^2$ value	P-value
		Yes	No	Total		
Owner Gender	Male	120	180	300	7.426	0.006
	Female	20	64	84		
	Total	140	244	384		
Kebele	Kebele 01	15	6	21	17.947	0.001
	Kebele 02	18	20	38		
	Kebele 03	20	25	45		
	kebele 04	10	19	29		
	Around Robe	77	174	251		
	Total	140	244	384		
Educational status	Illiterate	25	54	79	12.206	0.016
	Read and write	40	69	109		
	Primary school	33	82	115		
	Secondary school	32	31	63		
	College and University	10	8	18		
	Total	140	244	384		
Occupation	Farmer	57	97	154	21.311	0.001
	Merchant	51	77	128		
	Employee	12	5	17		
	Housewife	3	26	29		
	Daily labor	17	33	50		
	Students	0	6	6		
	Total	140	244	384		

Table 6  
Factors associated with knowledge towards zoonotic disease among study participants

Variables	Category	Knowledge on Rabies as zoonotic disease			$\chi^2$ value	P-value
		Yes	No	Total		
Owner Gender	Male	298	2	300	30.993	0.0001
	Female	73	11	84		
	Total	371	13	384		
Age Category	less than 20	9	0	9	13.864	0.001
	20 to 40	212	1	213		
	Above 40	150	12	162		
	Total	371	13	384		
Marital status	Married	237	10	247	26.439	0.0001
	Divorced	18	0	18		
	Unmarried	109	0	10		
	widowed	7	3	109		
	Total	371	13	384		
Educational status	Illiterate	69	10	79	26.633	0.0001
	Read and write	107	2	109		
	Primary school	114	1	115		
	Secondary school	63	0	63		
	College and University	18	0	18		
	Total	371	13	384		

## Discussion

Based on the questionnaire surveyed employed about animal production, animal management, animal health and how to control the animal disease as well as the veterinary health extension services in the study area the result revealed that the majority of the respondent had their own local and more than one species at a time. Regarding training and presence of consultants, highest number of respondents explains the absence of good and accessible training about animal production and health. Respondents confirmed that shortage (expensiveness) of feed and presence of diseases are the front constraints of their livestock production and had a knowledge of estrous cycle and user of artificial insemination as well

as they used natural pastures and frequently feed supplement. Almost the entire respondent argued that the presence of animal extension services.

The current study revealed that the knowledge of the respondent in the study area about zoonotic disease is good in which comparable finding was observed by Girma et al. [27] who indicated that all respondents knew animals' disease can also affect humans. The most frequently known zoonotic diseases among the respondents in the study area were Rabies (96.6%), followed by Anthrax (33.07%), Tuberculosis (4.52%), Trypanosomiasis (0.6%) and foot and mouth disease (0.3%). A similar finding has been reported in other parts of the country [28].

In the current study about (96.1%) respondents have a high level of knowledge about Rabies that the modes of transmission mentioned by respondents were bites (51.8%), bites and contact with saliva (14.7%). The current result agrees with the previous finding from Shashemene [29] and the finding in Dodola Town that was reported by Gezmu et al., [30]. In contrast, there is a low level of awareness about the zoonotic nature of Tuberculosis (4.2%) as compared to the report of Girma et al., [27] who indicated that respondents in Addis Ababa mentioned bovine Tuberculosis (88.54%). The present finding is also lower than the finding by T. Dawit et al., [31] Jimma town who reported that the perception on the dog bite reaches 94.3%. The difference comes out due to information might be acquired more easily through media and human health extension service agents than in the current study area and extension service in the study area is low.

Concerning the treatment, they prefer for their animal about (3.6%) of the study participants use modern (veterinary clinic) in which had high variation with the report of Digafe et al., [32] studies conducted in and around Gondar town, reported about (62.2%) of the study participants had strong beliefs in traditional medicine.

Regarding consumption of animal products like raw milk and raw meat, the present study revealed that the majority of participants (93.8%) and (94.8%) were used respectively, similar findings were observed by Wario et al., [33] with (89.8%) and (99%) respectively. According to the current study, the perception of vaccination among study participants includes gender, age, kebele, educational status and occupation there was significantly ( $P < 0.05$ ) associated. Concerning the perception of Rabies as a zoonotic disease, there was a significantly ( $P < 0.05$ ) different level of awareness among the different respondent groups which can imply that they have different levels of knowledge about zoonotic perception of Rabies and transmission to humans by biting of dog. In conclusion, the present study indicated that all the stakeholders' should have to fulfill their responsibility to improve and distribute extension service among the community and awareness creation and training programs of Zoonotic disease transmission, treatment, prevention, and control should be provided to communities.

## Conclusion And Recommendation

The study shows that veterinarians were not much involved in veterinary extension services. As a result, the awareness of animal owners about animal production improvement and animal health and zoonotic

risks of infectious animal diseases was not satisfactory. This is reflected by the malpractice of animal owners which exposes them to zoonotic diseases like consuming raw milk and raw meat and backyard animal slaughtering practices. There was no one-health approach implemented so far. Hence, to control zoonotic disease veterinary extension services and disease control programs need to be implemented. Scheduled animal vaccination, raising community awareness about sanitary conditions and disposal of food of animal origin, understanding the epidemiology of disease and transmission and prevention should be applied. On top of this, multispectral collaborative one-health efforts need to be made among veterinarians and public health specialists to combat zoonotic disease.

## **Declarations**

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### **Availability of data and materials**

The data supporting the findings are presented in the manuscript. The corresponding author can also be reached for any data inquiry.

### **Authors' contributions**

SAN was involved in the conception of the study, supervision, editing and approval of the manuscript. AA was involved in sample collection, laboratory investigation, data analysis and preparation of the draft manuscript. All authors read and approved the final manuscript.

### **Ethics approval and consent to participate**

The study was approved by the research proposal review committee of the faculty of veterinary medicine, Hawassa University. Written informed consent was obtained for the questionnaires interview and the study was carried out in accordance with relevant guidelines and regulations.

### **Consent for publication**

Not applicable.

### **Competing interests**

The authors declare that they have no competing interests.

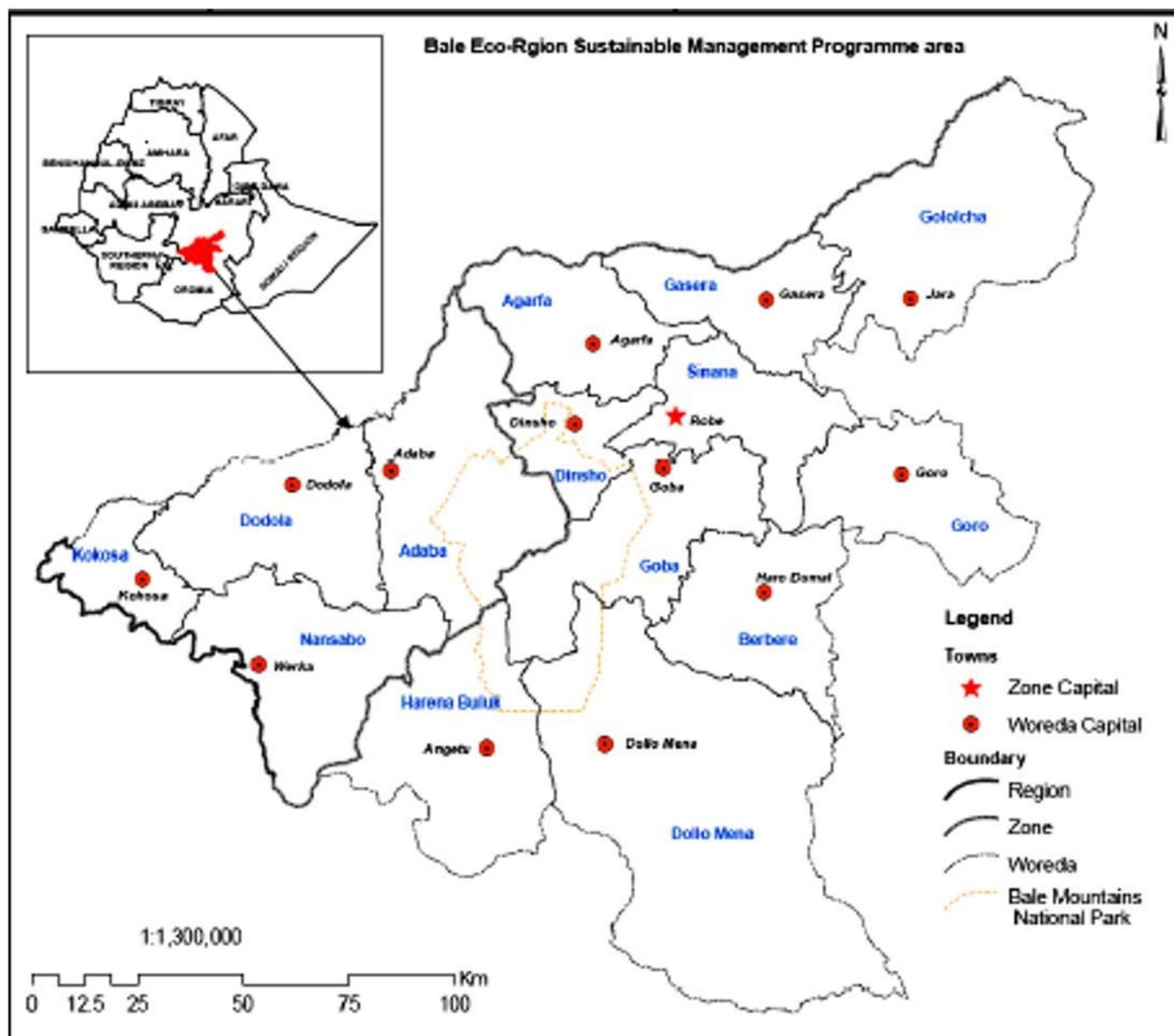
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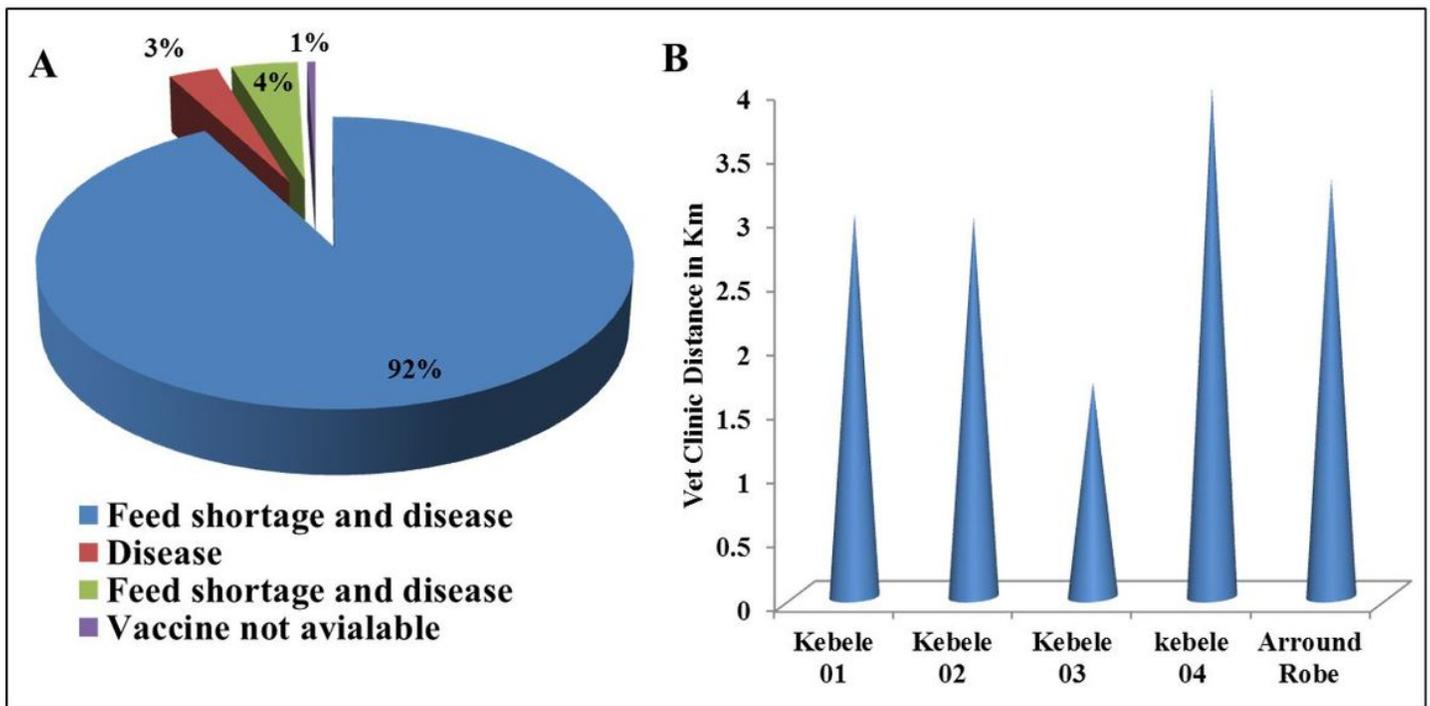
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## Figures



**Figure 1**

Map of Bale Zone. Source: Duressa et al. [24].



**Figure 2**

Major animal production and health constraints in the area. A) The Pie-chart was drawn using the percent of respondents who selected each constraint. B) The Bar-chart shows the pattern of veterinary clinic distance from the residents. The average veterinary clinic distance from the farmer's resident was calculated.