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ORIGINAL ARTICLE

Community Knowledge, Attitude and Practice on Rabies, Incidence in Humans and Animals and Risk Factors to Rabies in Selected Districts of Tigray Region, Ethiopia

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SUMMARY

Community awareness and assessing the trend of suspected rabies cases play a significant role in preventing its fatality. Therefore, a cross-sectional study design was employed (October 2016 - April 2017) to assess community knowledge, attitude and practice (KAP), and Incidence and risk factors to rabies (human and animal) in the study area. A semi-structured questionnaire was employed to collect required information from 1440 study participants. Retrospective data of five-year (2012-2016) from hospitals and health centers (human cases), and veterinary clinics (animal cases) was used. Majority of the study participants (64.3%) were rural residents, 95.2% have heard about rabies and 50.1% were found dog owners. Among the study participants, 72.2%, 66.0%, and 62.4% have a good level of knowledge, attitude, and practices about rabies, respectively. A strong association between knowledge, attitude and practice with sex; educational level; occupation, dog ownership and rural/urban dwellers ($p<0.05$) was recorded. Furthermore, a total dog bite cases of 398 domestic animals and 4617 humans were found registered on casebooks of both veterinary and human health service centers of the study districts during the five years study period among which the highest percentage (36.4%) was recorded from canines. The highest anti-rabies vaccine coverage recorded was 36.0% in the year 2016, and higher human dog bite cases recorded was 50.1% on individuals aged between 5-15 years (both male and female). Hence, the current findings suggest that there is a need for coordinated and integrated effort of government, professionals (medical and veterinarians), community and other stake holders towards rabies control and prevention.

Key words: Animal, Human, Tigray, Rabies, Status

INTRODUCTION

Rabies is an acute viral infection affecting mainly the low and middle-income countries (Abraham *et al.,* 2013). Dog is the principal source causing rabies through bite for more than 94% cases of rabies to human beings and other warm-blooded animals (Abebe *et al.,* 2011; Deressa *et al.,* 2010). Rabies potentially threatens over three billion people in Africa and Asia (WHO, 2013). People living in rural areas are at risk as vaccines and immunoglobulin are not readily available (WHO, 2013). The disease occurs in more than 150 countries with annual estimated death of more than 55,000 people from rabies each year (Andrea and Jesse, 2012) among which 31,000 and 24,000 are from Asia and Africa, respectively (Knoble *et al.,* 2005). It is also responsible for 1.7 million global disability adjusted life years (DALYs) annually (Knoble *et al.,* 2005; WHO, 2011). In Africa and Asia, the annual cost of livestock losses due to rabies is estimated to be US$ 12.3 Million (Knoble *et al.,* 2005) Besides, over 15 million people receive post-exposure preventive regimen to avert the disease (WHO, 2010a) though is not accessible and affordable for the poor rural inhabitants. Hence, incidence of the disease is high in low socio-economic and illiterate group (with less awareness about its consequences and seriousness) coupled with inadequate facilities for the post-exposure vaccine (Fagbami *et al.,* 1981; WHO, 2010b).

Rabies ("mad dog diseases" known since 1903) is endemic in Ethiopia with an estimated annual death of 2,700 (CDC, 2016), and is among the high rabies risk countries in Africa (Yousaf *et al.,* 2012). In Ethiopia, it is expected to have one dog per five households (Deressa *et al.,* 2010) with poor management (most freely rooming). Furthermore, in Ethiopia, individuals who are exposed to rabies virus often see traditional healers for medical intervention and most (rural residents) seek post-exposure prophylaxis (PEP) treatment after exhausting the traditional medicinal intervention (Deressa *et al.,* 2010). As a result, rabies remains to be one of the most feared infectious diseases in the country (Fekadu, 1997; Pankhrust, 1990). Currently, the incidence of dog bite and rabies is increasing and become significant in the country due to the increasing stray dog population, and lack of dog movement control and irregular vaccination program (Deressa *et al.,* 2010) and then is an important disease both in human and animals (Deressa *et al.,* 2010; Yimer *et al.,* 2002; Tschopp et al., 2016; Alem, 2017; Teklu et al., 2017).

Despite the endemic nature of rabies in Ethiopia in general and Tigray in particular, little is known about knowledge, attitude and practice level of the local community. Furthermore, there is lack of quantitative information on rabies in both human and animals to understand the epidemiological situation of rabies. Hence, the objective of the study was to assess community knowledge, attitude and practices on rabies, incidence of rabies in human and animal, and risk factors associated with its distribution in both humans and animals.

METHODS AND MATERIALS

Study Areas

The present study was conducted in eight districts from four zones of Tigray regional State from October 2016- April 2017. The total human population of the selected districts is estimated to be about 1.1 million (Table I), representing (15.16%) of the region (CSA, 2017). The four zones included were southern (Maychew and Raya-azebo districts), Eastern (Wukro, Kilteawlaelo and Hawzen Districts), southeast (Hintalowejerat and Enderta districts) and Mekelle city (all sub-cities) (Figure 1). The study area represented urban (Mekelle, Maychew and Wukro), and rural (Raya-azebo, Kilteawlaelo, Hawzen, Hintalowejerat and Enderta) settings.

Study Design and Sample Size Determination

A cross-sectional study design was employed to achieve the stated objectives. Semi-structured questionnaire was used to collect required information. The required sample size was

calculated as per the formula for known population at 95% confidence interval and 5% absolute precision levels considering 10% none response rate and two design effect factor (multistage sampling technique) (Yemane, 1967; Thrusfield, 2005). Accordingly, 880 study participants were calculated but in the actual study, 1440 participants were selected to increase precision of the study. Besides, a five-year (2012-2016) retrospective data from human hospitals and health centers, and veterinary clinics in the selected study sites was used to see trend of the disease.

TABLE I: Geographic Locations, Size and Population of the Study Areas

Zones/ districts	Square kilometers	Coordinates	Human population	Elevation
Mekelle	24.44 Km ^{2}	13°29'N 39°28'E	363,200	2,084 m
Maychew	9.32 Km ^{2}	12°47'N 39°33'E	36,300	2,479 m
Raya-azebo	2,132.83 Km ^{2}	12° 43N' 40°2'E	181,500	2,479 m
Hintalowejerat	2,864.79 Km ^{2}	13°10'N 39°40'E	157,300	2,050 m
Kilteawlaelo	2,068.25 Km ^{2}	13°45'N 39°30'E	133,100	1,930 m
Wukro	7.07Km ^{2}	13°47'N 39°36'E	29,200	1,972 m
Enderta	3,175.31Km ^{2}	13°30'N 39°40'E	155,400	2,247 m
Hawzen	1,892.69 Km ^{2}	14°00'N 39°20'E	145,200	2,105 m

Source: CSA, 2017

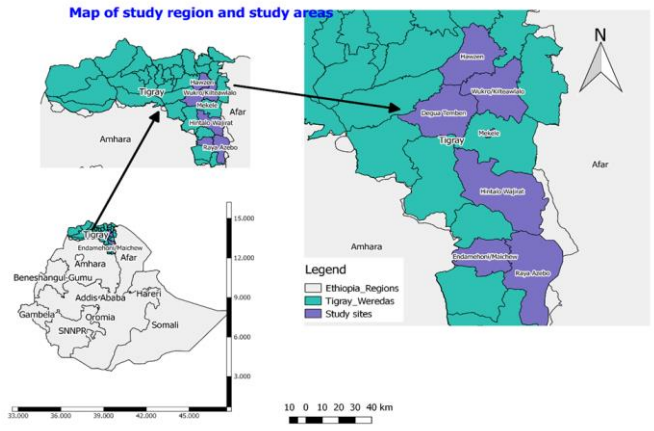

Figure 1: Map of Study region and study sites (CSA, 2016)

Sampling Method and Data Collection

Participants were selected using multistage random sampling technique. Primarily, four zones (Southern, Eastern, South East and Mekelle zone) from which eight districts namely Maychew, Raya-azebo, Wukro, Kilte-awlaelo, Hawzen, Hintalowejerat, Enderta and Mekelle in the regional state were purposively selected using proportion random sampling technique [18]. Secondly, peasant associations (PA) were selected using simple random sampling method within each district for the questionnaire-based survey. Thirdly, each household was selected using systematic random sampling. The target population was household heads who had lived in the area as permanent residents for more than six months. Accordingly, a total of 1440 participants (428, 219, 186, 183, 173, 166, 47 and 38 from Mekelle, Raya azebo, Hintalo-wejerat, Enderta, Hawzen, Kilte-awlaelo, Maychew and Wukro, respectively) were communicated during the study.

Knowledge, Attitude and Practice (KAP) Scoring

KAP scoring was used as per the technique used by Alemu *et al.* (2013)**.** For knowledge, each correct response was given a score of 1, while a wrong or unsure response was scored 0. Total knowledge scores were ranged between 0-10. Knowledge scores from 0 and 5 were considered as poor knowledge, while knowledge scores more than 5 were considered as good knowledge regarding Rabies. Attitude towards Rabies was assessed using 8 item questionnaires: attitude scores between 0 and 4 was considered as negative, whereas scores from 4 to 8 were considered as positive. Practice was also assessed using eight item questionnaire, and a score of more than 4 was considered as good practice for rabies control.

Retrospective Study

All public health centers (human hospitals/health centers, veterinary clinics) were visited. Five-year (2012 to 2016) data from human hospitals/health

centers, and veterinary clinics in the study districts were reviewed. Record books and reports of each office were used as source of data. Data related to human and animal exposure to rabies (dog bite cases and rabies suspected death), and dog vaccine coverage status of the five years study period were collected. Recorded data was disaggregated by sex, age, year and place. Information of individuals included in this study was kept anonymous to protect their medical confidentiality rights.

Data Management and Analysis

Collected data were entered into an excel sheet and analyzed using STATA 11.0 statistical software. Descriptive statistics were employed to summarize the data and expressed in terms of frequencies and percentages. Association between independent variables and KAP scores on rabies were calculated using Pearson's Chi square at 95% confidence interval. For all analysis, a $P < 0.05$ was considered for significance difference.

Ethics Approval

Ethical clearance and approval was obtained from the institutional review board (IRB) of Mekelle University College of Health Sciences and Collage of Veterinary Medicine. Each participant was informed about the purpose of the study and written consent was obtained from each volunteer respondent. Participants were told to withdraw from the study at any time. Interviews were anonymous and data remained confidential throughout the study.

RESULT

Socio-Demographic Characteristics of Participants

Majority of participants (64.3%) were rural residents (Table II) and 50.1% of the total participants had owned dogs.

Community KAP about Rabies in the Study Area

The levels of KAP concerning rabies showed that 1039 (72.2%) participants had good level of knowledge, 951 (66.0%) participants had good attitude towards rabies and 898 (62.4%) participants were found with good practice level (Table III).

Knowledge of Participants

Most participants 1,371(95.2%) replied that they had heard about rabies (Table IV). However, 282(23.7%) knew rabies is caused by microorganism while 661(44.6%) participants had described starvation and thirst as causes of the disease. Rabies can be transmitted through bite and contact with saliva as known by 877 (64.8%) participants. Associated factors like residence, sex, educational status, occupation, and income status were found to be statistically associated with knowledge score of the community (Table V).

Attitude of Participants to Rabies

Majority of the participants (595; 82.8%) were in need to vaccinate their dogs, whereas 752 (54.9%) of them had strong belief on use of traditional medicine for its treatment (Table VI). Factors Residence, age, sex, educational status, occupation, and dog ownership had statistically significant difference with attitude scores of the community (Table VII).

Practice of Participants to Rabies

Among participants, 513 (71.3%) had not vaccinated their dogs against rabies (Table VIII). Furthermore, 117 (19.7%) participants had kept their pets inside their house. Males were more likely to have higher scores for preventing rabies

TABLE II: Socio-demographic information of Respondents in the study participants

Variables	Category	Frequency and percentage Rural (%)	Urban (%)	Total
Gender				
	Male	623 (67.3)	340 (66.2)	963 (66.9)
	Female	303 (32.7)	174 (33.9)	477 (33.1)
Age				
	15-35	410 (44.3)	234 (45.5)	644(44.2)
	36-55	440 (47.5)	258 (50.2)	698 (48.7)
	Above 55	76 (8.2)	22 (4.3)	98(6.8)
Education				
	Illustrate	438 (47.3)	153 (29.8)	519 (41.0)
	Primary	259 (28.0)	176 (34.2)	435 (30.2)
	Secondary	171 (18.5)	116 (22.6)	287 (19.9)
	Higher	58 (6.3)	69 (13.4)	127 (8.8)
Occupation				
	Civil servant	25 (2.7)	55 (10.7)	80(5.6)
	Farmer	505 (54.5)	56 (10.9)	561(39.0)
	Private workers	220 (23.7)	246 (47.9)	466(32.4)
	Unemployed/ housewife	176 (19.0)	157 (30.5)	333(23.1)
Monthly Income				
	Above 150 USD	65 (7.0)	54 (10.5)	119 (8.3)
	50-149 USD	416 (44.8)	171 (33.3)	586 (40.7)
	Below 50 USD	446 (48.2)	289(56.2)	735 (51.0)
Dog Ownership				
	Had Dog	520 (56.2)	201(39.1)	721(50.1)
	Had No dog	404(43.8)	313(60.9)	719 (49.9)

TABLE III: Overall community KAP on rabies in the study area

KAP Levels	Number	Percent (%)
Knowledge score levels		
Good score	1039	72.2
Poor score	401	27.9
Attitude score level		
Good score	951	66.0
Poor score	489	34.0
Practice score level		
Good score	898	62.4
Poor score	542	37.6

as compare to females. A higher practice scores was absorbed among civil servants 61 (78.8%) compared to other occupational categories (Table IX).

Retrospective Data

Among the total of 398 dog bite cases of domestic animals (suspected rabies cases) registered in the case book in the five years study period recorded (Table X), canine took highest number (145; 36.4%) followed by bovine (112; 28.1%). Besides, higher number of dog bite cases was recorded from Mekelle (128; 32.2 %) with lower number from Maychew (21; 5.3 %) (Fig 2).

Demographic Characteristics of Rabies Suspected Dogs

Higher proportion of rabies suspected cases were found in male dogs (98; 67.8%) as compare to female dogs (47; 32.4%) (Table XI). Majority of rabies suspect cases were stray dogs (123; 84.8%).

Dog Vaccination Coverage

A total of 30,325 dogs received anti-rabies vaccination during these five years with coverage in 2016 (10,903; 36.0%) (Table XII).

Human Exposure

Yearly distribution of dog bites of 21.6% and 21.8% were recorded in the year 2014 and 2015, respectively. Moreover, highest human death frequency was reported in the year 2015 (9; 35.0%) (Table XIII). The five-year retrospective data showed an overall higher prevalence dog bite on children aged between 5 and 15 years (2312; 50.1%) as compared to the other age categories (Table XIV). Similarly, higher proportion of dog bite was recorded in males (2,509; 54.3%) than in females (2,108; 45.7%).

Highest incidence of human rabies exposure cases was observed (1496; 87.0%) in Mekelle followed by Hawzen (57; 3.3%) (Fig 3). The incidence of human rabies exposure cases calculated per 100,000 populations was 392, 422, 278, 308, and 317 with incidence of 0.22, 0.24, 0.16, 0.17 and

0.18 with highest record in 2013 (422; 24.6%) and 2012 (392; 22.8%).

TABLE IV: Knowledge of participants on Host, cause, transmission and Signs of Rabies

Variable	Total	X^2	P-value
Awareness about rabies			
Yes	1371/95.2	16.1994	0.000
No	69/4.8		
Source of information			
Media	243/17.7	43.7611	0.000
Family/friend/ Neighbor	794/57.9		
Veterinarians and Health workers	334/24.4		
Cause of rabies			
Microorganisms	282/23.7	16.3139	0.000
Starvation and thirst	661/44.6		
Associated with sprit	120/10.5		
I don`t Known	308/16.3		
Transmit from animal to human			
Yes	1227/89.5	16.2304	0.000
No	144/10.5		
Mode of transmission			
Bite and saliva	877/64.8	22.2790	0.000
Any contact with Infected animal	280/20.2		
Inhalation	167/11.6	16.2304	0.000
Infected meat and milk	47/3.41		
Species affected by rabies			
Dog only	67/4.7	20.1182	0.000
Dog and human	133/9.7		
Human and others Animals	1171/85.4		
Species of animal transmit to humans			
Dog only	357/26.4	15.6616	0.000
Dog and other animals	1014/73.6		
Stray dogs are important in disease transmission			
Yes	1041/75.9		
No	330/24.1		
Symptom of the diseases			
Salivation	512/37.4	52.3330	0.000
Sudden change in behavior	468/35.8		
Biting any object	242/16.6		
Stop eating and drinking	149/10.1		
Is rabies fatal			
Yes	732/53.4	23.9150	0.000
No	639/46.60		

TABLE V: Risk Factors associated with community knowledge on rabies in study areas

Residence				
Rural	473 (52.0)	453 (48.0)	50.2430	0.000
urban	366 (71.0)	148 (30.0)		
Gender				
Male	847 (88.0)	116 (12.1)	29.2602	0.000
Female	377 (79.0)	100 (21.0)		
Age				
15-35	515 (80.0)	129 (20.0)	10.9304	0.671
36-55	537 (76.9)	161 (23.1)		
Above 55	76 (77.6)	22 (22.5)		
Educational status				
Illustrate	357 (68.0)	170 (32.0)	45.1176	0.000
Primary school	339 (77.0)	104 (23.0)		
Secondary school	236 (80.8)	59 (19.2)		
Higher education	117 (90.0)	18 (11.0)		
Occupation				
Civil servant	63 (85.1)	12 (15.0)	38.7190	0.000
Farmer	287 (52.0)	264 (50.0)		
Private business	355 (77.9)	96 (22.1)		
Unemployed/housewife	245 (75.1)	78 (24.9)		
Monthly income				
Above 150 USD	96 (80.7)	23 (19.3)	68.3621	0.000
50-149 USD	363 (61.9)	223 (38.1)		
Below 50 USD	412 (56.1)	323 (44.0)		
Dog Ownership				
Had Dog	367 (51.0)	352 (49.0)	21.3320	0.349
Had No dog	461 (63.9)	260 (36.1)		

TABLE VI: Attitude to rabies by Respondents in the study areas

Variable	Value (%)	X^2	P-Value
Opinion on stray dogs			
Should be eradicated	834/57.9	16.5044	0.000
Should be vaccinated	176/12.2		
I don't care	430/29.9		
Prevention of rabies through			
Vaccination	845/61.9	78.7853	0.000
Restrict movement	174/14.5		
Killing stray dogs	159/11.4		
Not aware	193/11.1		
Willingness to vaccinate			
Positive	595/82.8	1.2126	0.545
Not committed	124/17.2		
Willingness to pay vaccine			
Positive	560/77.9		
Not committed	159/22.1		
Want to get training			
Yes	1338/92.9	4.2290	0.040
No	102/7.1		
Dog registration can help in control of rabies			
Yes	267/20.1	50.7568	0.000
No	687/48.5		
I don`t know	417/31.8		
Preferable treatment after human bitten			
Medical seek	573/41.7	122.5141	0.000
Traditional medicine	752/54.9		
Holy water	46/3.3		
Opinion on rabid animal			
Kill	1089/81.0	493025	0.000
Tie	187/12.3		
Rx/tradition/holy spirit	95/6.6		

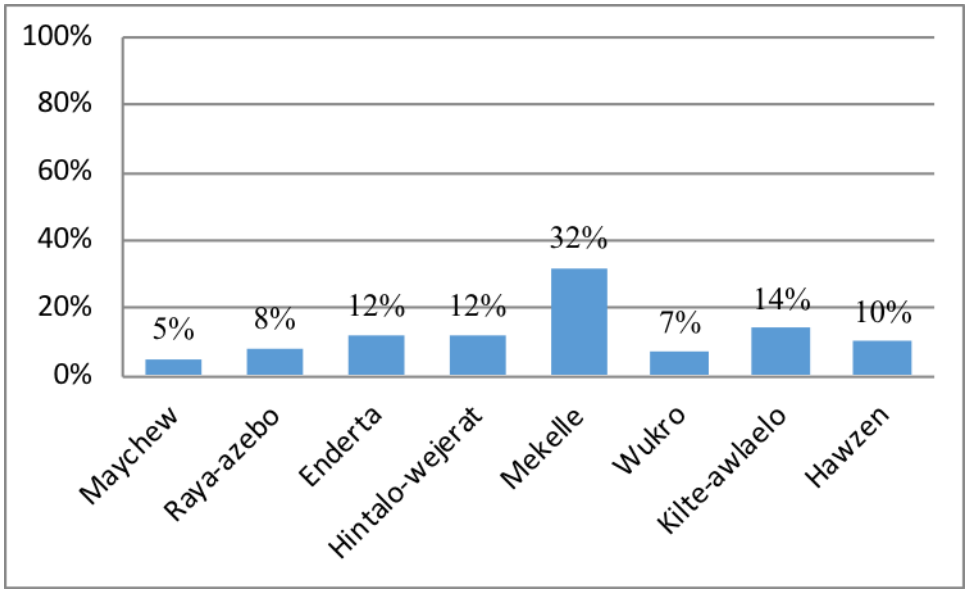

Figure 2: Place basis distribution of rabies suspected cases

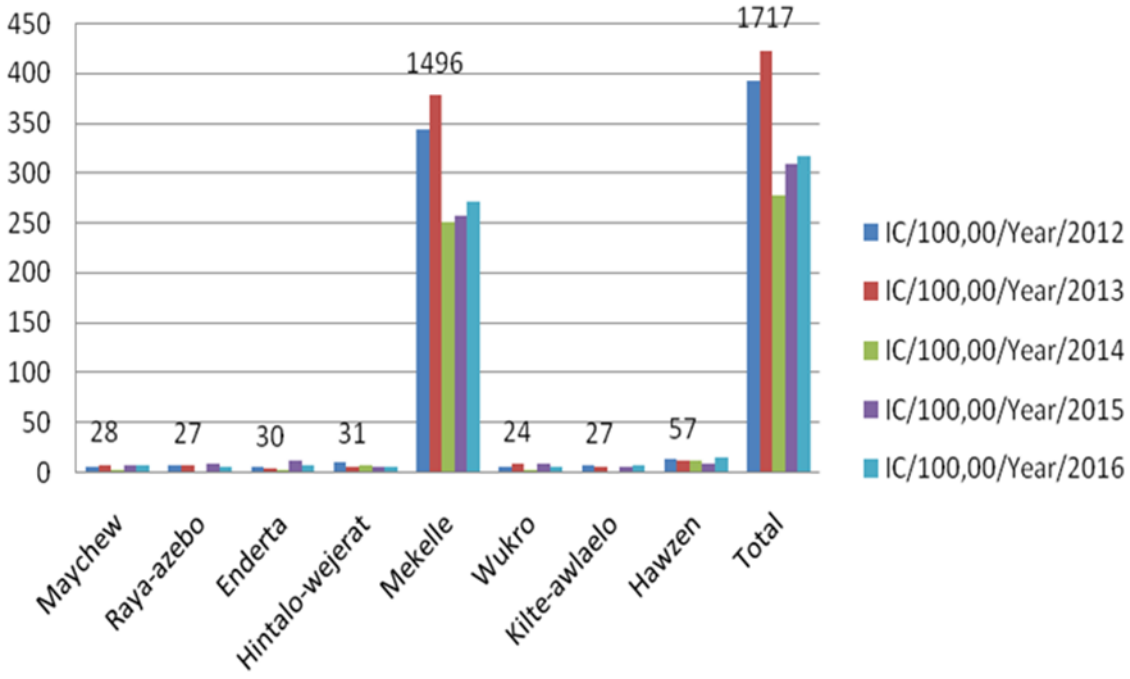

Figure 3: Trend of human rabies incidence in place and year (2012 - 2016)

TABLE VII: Risk Factors associated with attitude on rabies in the Community

Variables	Good (%))	Poor (%)	X^2	P-value
Residence				
Rural	536 (57.9)	390 (42.1)	39.7961	0.000
urban	329 (64.0)	185 (36.0)		
Gender				
Male	703 (73.0)	260 (29.0)	27.9340	0.015
Female	291 (61.8)	186 (38.2)		
Age				
15-35	442 (68.6)	202 (31.4)	19.4892	0.036
36-55	502 (71.9)	197 (28.1)		
Above 55	61 (63.3)	36 (36.7)		
Educational status				
Illustrate	279 (53.0)	248 (47.01)	98.2055	0.000
Primary school	290 (66.4)	153 (35.6)		
Secondary school	215 (73.5)	80 (26.5)		
Higher education	110 (83.5)	25 (16.5)		
Occupation				
Civil servant	68 (88.8)	7 (11.3)	76.9213	0.000
Farmer	277 (51.5)	259 (48.5)		
Private business	348 (76.2)	103 (25.0)		
Unemployed/housewife	231 (70.9)	92 (29.1)		
Monthly income				
Above 150 USD	76 (63.9)	43 (36.1)	2.1634	0.208
50-149 USD	363 (61.9)	223 (38.1)		
Below 50 USD	430 (58.5)	305 (41.5)		
Dog Ownership				
Had Dog	350 (48.7)	369 (51.3)	87.1360	0.000
Had No dog	458 (63.5)	263 (36.5)		

DISCUSSION

Higher proportion of the participants had indicated that they had heard about rabies and its public health importance. Similar findings had reported in various part of the country such as Delo district of Jimma zone (Abdela *et al.*, 2017), Debark district of North Gondar (Yalemebrat *et al.,* 2016), Gondar (Digaf *et al.*, 2015), and in Addis Ababa (Ali *et al.*, 2013). However, the variation among all data might be due to living status of the community (Ali *et al.*, 2013), difference on health education programs, low media accessibility to remote rural area and education coverage.

Low access to mass media observed in the current finding and supported by other findings in Bahirdar (Guadu *et al.,* 2014) and in Debark (Yalemebrat *et al.,* 2016) which could be due to absence of community-based radio station and television programs. Awareness of the community on dynamics of the disease and its treatment was traditional and hence, could hide and aggravate the status of the disease in the area and to the global community. More than 44% of the participant associated the cause of the disease to starvation and thirst. This was supported by the findings of in Dessie (Yalemebrat *et al.*, 2016), Bahirdar (Guadu *et al.,* 2014), Gondar (Jemberu *et al.,* 2013) and Debark (Yalemebrat

TABLE VIII: Communities practice to rabies in the Study Area

Variable	Total	X^2	P-Value
Do you have a dog			
Yes	719 (49.9)	38.4365	0.000
No	721 (50.1)		
Purpose of kept			
Guard at home	582(80.9)		
Home pet	57(7.9)		
Hunting	80(11.1)		
Dog management practice			
Kept in door	117 (19.7)	67.1506	0.000
Roaming day/night	371 (50.6)		
Let free	231 (29.7)		
Do you vaccinate your dog			
Yes	206 (28.7)	68.3416	0.000
No	513 (71.3)		
Do you have a vaccine certificate			
Yes	128 (62.1)	0.6140	0.736
No	76 (72.9)		
Ever participate in control programme			
Yes	64 (4.7)	21.6193	0.000
No	1307 (95.3)		
Immediate action after bite			
Wash with water and soap	355 (25.9)	288.0705	0.000
Tie with close	216 (15.7)		
Herbal extracts	386 (28.1)		
Do nothing	414 (30.1)		
Availability of vaccine			
Always	9 (1.2)	52.6800	0.000
Sometimes	498 (69.3)		
No	212 (29.5)		

TABLE IX: Risk Factors associated with practice on rabies by the Community

	Variables	Good	Poor	X^2	P Values
Residence	Rural	500 (54.0)	426 (46.0)	112.49	0.000
	Urban	185 (36.0)	329 (64.0)		
Gender	Male	674 (70.0)	289 (30.0)	27.93	0.037
	Female	304 (63.8)	173 (36.2)		
Age	15-35	412 (64.0)	232 (36.0)	6.34	0.103
	36-55	495 (70.9)	203 (29.1)		
	Above 55	62 (63.3)	36 (36.7)		
Educational s	Illiterate	248 (47.0)	279 (53.0)	53.94	0.000
	Primary school	287 (65.1)	156 (35.0)		
	Secondary school	210 (71.8)	85 (28.2)		
	Higher education	105 (79.5)	31 (11.0)		
Occupation	Civil servant	61 (78.8)	14 (21.3)	94.80	0.000
	Farmer	269 (50.1)	267 (49.9)		
	Private business	342 (75.1)	19 (25.0)		
	Unemployed/housewife	231 (70.9)	92 (29.1)		
Monthly income	Above 150 USD	71 (59.7)	48 (40.3)	2.30	0.401
	50-149 USD	353 (60.2)	233 (39.8)		
	Below 50 USD	401 (54.1)	334 (45.9)		
Dog Ownersh	Had Dog	354 (49.2)	365 (50.8)	28.48	0.007
	Had No dog	449 (62.3)	272 (37.7)		

TABLE X: Distributions of dog bite cases in different animal species (2012 - 2016)

Year	Frequency (%)	Canine	Bovine	Ovine	Equine	Swine
2012	86 (21.6)	32 (37.2)	25(29.1)	21(24.4)	6 (7.0)	1(1.1)
2013	70 (17.6)	21 (30.0)	23 (32.8)	13(18.6)	11 (15.7)	2 (2.3)
2014	59 (14.8)	19 (32.2)	11 (18.6)	23 (39.0)	5(8.3)	-
2015	106 (26.6)	41(38.7)	32(31.1)	20(18.9)	10 (9.4)	1 (0.9)
2016	77 (19.3)	27(35.1)	21(27.3)	24 (31.1)	4 (5.2)	-

TABLE XI: Demographic characteristics of suspected Rabid dogs during 2012 - 2016

Characteristic	No. Suspected Case	Percent (%)
Sex		
Male	98	67.8
Female	47	32.4
Age		
≤ 6months	48	33.1
6- 18 months	73	50.3
Above 18 months	24	16.6
Dog ownership		
Owned and roaming	22	15.2
Stray/ownerless	123	84.8

TABLE XII: Vaccination coverage of dogs in different districts during 2012 – 2016

	Number of vaccinated dogs in years					
Zones/Wereda	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**
Mekelle	1792	885	300	3780	4836	12093
Maychew	387	450	490	270	90	1687
Raya-azebo	144	101	147	403	320	1115
H/wejerat	99	459	151	502	1500	2711
K/awlaelo	306	894	1450	752	1251	4653
Wukro	306	894	1450	640	1251	4541
Enderta	18	257	190	205	550	1220
Hawzen	141	506	449	604	1105	2805
Total	**3193**	**4446**	**4627**	**7156**	**10903**	**30325**

TABLE XIII: Five years Occurrence of suspected cases of human rabies and death in place and year (2012 to 2016 GC).

Zones/ weredas	Five years data										
	2012		**2013**		**2014**		**2015**		**2016**		**Total Case**
	Suspected Cases (%)	**Deaths**	**Suspected Cases (%)**	**Deaths**	**Suspected Cases (%)**	**Deaths**	**Suspected Cases (%)**	**Deaths**	**Suspected Cases (%)**	**Deaths**	**(%)**
South Zone											
Maichew	12 (1.5)	**1**	14 (1.6)	0	15(1.5)	0	18(1.8)	**1**	16 (1.7)	0	75(1.6)
Raya-azebo	14(1.8)	**0**	15 (1.7)	1	12 (1.2)	0	16(1.6)	**2**	15(1.6)	1	74(1.6)
South east zone											
Enderta	12 (1.5)	**0**	6 (0.7)	1	14 (1.4)	0	25(2.5)	**0**	16 (1.7)	1	73(1.6)
Hintalo-wajerat	19(2.4)	**1**	15(1.7)	0	25 (2.5)	2	17(1.7)	**1**	17 (1.8)	0	94(2.0)
Eastern zone											
Kilte-awlalo	34(4.3)	**2**	30 (3.5)	0	43 (4.3)	1	28(2.8)	**0**	40(4.3)	0	176(3.8)
Wukro	13(1.6)	**0**	17 (2.0)	0	14 (1.4)	0	18(1.8)	**1**	11(1.2)	0	73(1.6)
Hawzen	25(3.1)	**1**	16 (1.9)	0	25 (2.5)	0	15(1.5)	**2**	26(2.8)	1	109(2.4)
Mekelle											
	670 (84.0)	**1**	750 (86.9)	0	850 (85.2)	1	870 (86.4)	**2**	801 (85.0)	2	3943 (85.4)
Total (%)	**799** (17.3)	**6 (0.8)**	**863** (18.7)	**2** (0.2)	**998** (21.6)	**4** (0.4)	**1007** (21.8)	**9 (0.8)**	**942** (20.4)	**5** (0.3)	**4617** (100)

Table XIV: Five years Incidence of dog bite cases in humans by age and sex (2012 to 2016 GC)

Zone/Wereda`s	Age group			Sex	
	<5 (%)	5 to 15	>15	Male	Female
Eastern Zone					
Kilit awilealo	**37** (5.0)	**52**(2.2)	**87**(5.6)	**99** (3.9)	**77** (3.7)
K/Wukro	**11**(1.5)	**28**(1.2)	**34**(2.2)	**34** (1.4)	**39**(1.9)
Hawizen	**25**(3.4)	**34**(1.5)	**50**(3.2)	**66** (2.6)	**43**(2.0)
South Zone					
K/mychew	**10** (1.3)	**24**(1.0)	**41**(2.6)	**34** (1.4)	**41**(1.9)
R/azebo	**9** (1.2)	**19**(0.8)	**46**(3.0)	**40** (1.6)	**34**(1.6)
South East Zone					
Hinitalo wajirat	**13** (1.7)	**24**(1.0)	**57**(3.7)	**51**(2.0)	**43**(2.0)
Enderta	**7** (1.0)	**31**(1.3)	**35** (2.2)	**31**(1.2)	**42** (2.0)
Mekelle Zone					
Mekelle	**634** (85.0)	**2100**(90.8)	**1209**(77.5)	**2154**(85.9)	**1789** (84.9)
Total	**746** (16.2)	**2312**(50.1)	**1559** (33.8)	**2509** (54.3)	**2108** (45.7)

et al., 2016). The current finding had indicated that only 53.4% participants recognized rabies as a fatal disease as found in other part of the country such as Nekemte (Tolessa and Mengistu, 2017) and Addis Ababa (Ali *et al.*, 2013). This could have impact on mortality rate, distribution of the disease and challenge for implementation of control strategies. This is also in line with the low access too modern treatment but usual habitat of the community towards traditional medication. Majority of the participants (82.75%) had indicated their willingness to vaccinate their pets. However, most participants showed going to traditional healer after exposing to suspected dog bite. This finding is supported by Yalemebrat *et al.* (2016) in Debark although was found higher than report by Jemberu *et al* (2013) in Dabat and Gondar. On the other hand, more than 98% participants from Addis Ababa agreed to consult health professional in case of animal bite (Ali *et al.*, 2013). The variation on community preference to modern medicine could be due various factors including lack of awareness, inaccessibility to modern treatment (post exposure anti-rabies vaccine), an affordable vaccine price, long duration of treatment and unavailability of qualified professionals.

A few of the dog owners had indicated they were concerned about restraining of their dogs. A significant number of households in Sub-Saharan Africa countries are less likely to confine their dogs both in urban and rural areas (Butler and Bingham, 2000). However, only 28.71% of the pet owners had vaccinated their animals to control rabies which is much below the figure 70% as recommended by WHO (2005). The reason could be due to minimal awareness about the importance of vaccine, low access to vaccine, low and irregular vaccination service, absence or poorly enforced legislation/guidelines about responsibility of dog ownership. Major

constraints for effective vaccination in dogs are inadequate availability of vaccines, poor public awareness, irregular vaccination and the relative high cost of vaccines (WHO, 2014; *Perry et al.*, 1995). The current retrospective data result indicated highest proportion (84.8%) of confirmed rabies cases in stray dogs as compared to owned with no restraint. This could indicate the risk of exposure of stray dogs and/or free rooming dogs to wild reservoirs.

The highest proportion of children (5-15 years old) were affected and may be due to frequent contact with dogs resulting in the high rate of exposure to dog bites. It may also be attributed to their limited awareness about the disease.

CONCLUSION

Attitude and practice of participants towards rabies management, control and prevention were not encouraging although majority had knowledge about its public health consequence. Educational status, sex, and rural/urban residence of participants found to have relationship with good KAP score. Data collected from health centers and veterinary clinics had indicated number of rabies exposure in both humans and animals. A stress on controlling of stray dog population, public education, dog registration and traceability need to be established to control rabies in future.

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