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Apreliminary cross sectional, retrospective survey on the Epidemiology of Anthrax, Brucellosis, Rabies and Seroprevalence of Bovine brucellosis in Asossa, Bambasi and Homoshaworedas of Asossa zone, western Ethiopia

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Abstract: Across-sectional study was conducted in Asossa, Bambasi and Homosha District from July 2020 to November, 2021 with the objectives of estimating, the seroprevalence of bovine brucellosis and epidemiological associated factors, assess awareness/knowledge, attitudes and practice towards the zoonotic disease of the society on the socio-impact and the control methods of Anthrax, Brucellosis and Rabies in animal and human beings, and assess preliminary retrospective data of the disease in the study area. Of 384 serum sample examined, 9/384 (2.34%) were positive for bovine brucellosis. The high seroprevalence of the bovine brucellosis (9.75%) was recorded in Homosha woreda whereas the low prevalence of the disease (0.09%) was recorded in Bambasi woreda and it was significantly high ($p<0.004$). The highest seroprevalence (5.12 %) of brucellosis was recorded in animals >9 years old whilst the lowest prevalence (1.97 %) was recorded in animals 3-≥5 years of old and the association was not significant among the age groups. Slightly, higher prevalence was registered in female animals (2.56%) than in male animals (0 %), which was not found to be statistically significant ($p>0.05$).The highest prevalence of brucellosis (3.33%) was found in animals with poor body condition while the lowest (2.20 %) was recorded in animals with medium body conditions respectively, and the difference was insignificant ($p>0.05$). Cattle Brucellosis was recorded across the study kebeles with the highest prevalence of (14.28%) in Gumukebele whereas in Dabus, Mender (47, 48, 41, 43, 42), Sonka, Womba, Megele (49), Komoshiga (27 and 28), N/komoshiga, Selga (24), Amba14, and Megele (33) kebeles, the lowest brucellosis prevalence (0%) was recorded in the present study and the prevalence of brucellosis was not significant across the study sites. In Gumu, Dunga, Mutsakosa, Megele (39), Komoshiga (26), (14.28%, 5%, 9.09%, 2.27%, 3.03%) brucellosis prevalence was recorded in the studied kebeles respectively, but the association is not significant ($P>0.05$). In Asossa, Bambasi and Homosha selected kebeles, 340 respondent farmers, 34 animal health workers and health extensions, kebele leaders were interviewed and retrospective data, up on communicable animal diseases (rabies, anthrax and brucellosis) and the respondent rate was assessed in the study areas. The respondents were assessed for the existing problems in 34 selected kebeles, from community farmers, animal health workers, health extensions and kebele leaders. They were interviewed for their perception of communicable animal disease occurrence, symptoms, causative agent, the possible factors contributing for the occurrence of problems, activities to be taken for control measures, habit of using animal product (milk, meat) and the risk /exposure groups, number of sick, died and their preference of treated cases were assessed, vaccination habit of dog, cattle, sheep and goats; number and duration of aborted ruminants; use of (aborted, anthrax suspected) animal products cases and pain felling situation; awareness of zoonotic disease and occurrence of acute and sudden killer cattle disease in the area were assessed in this study. According to Asossa, General hospital retrospective data, of the total 434 unspecified human cases, 272 male cases and 162 female victims cases were recorded in the 2018-2021 year. The rabies in human cases were varies in age categories, that was 4, 38, 170, 133, 82, 7 cases were reported in <1yr, 1-4 yr, 5-14 yr, 15-29yr,30-64 yr and >=65 years of age respectively. Therefore, based on the findings, appropriate recommendations were forwarded to reduce the impact of the zoonotic diseases in the study area. Evidence of brucellosis in various cattle and the associated human population illustrates the need for a coordinated One Health approach to controlling brucellosis so as to improve public health and livestock productivity.

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Key words: Asossa, Anthrax, Bovine, Bambasi, Brucellosis and Homosha, Serum, farmers, rabies

1. Introduction

In rapidly changing societies such as Ethiopia, it is imperative that decision makers at all levels appreciate the current and future impact of the livestock sector on public health, the environment and livelihoods. This allows decision makers to take actions now that will ensure sustainable development of the livestock sector in the coming decades – a development that benefits producers, consumers and society in general – with limited negative effects on public health and the environment. Good quality data are essential for formulating policies and programmers that support sustainable development of the livestock sector. However, livestock stakeholders, particularly the Ministries in charge of animal and public health, often face what is referred to as "the zoonotic disease and antimicrobial resistance (AMR) information trap". As there is little robust evidence to quantify the negative impacts of zoonotic disease and AMR on society, stakeholders find it hard to sufficiently demonstrate the returns of programmes and investments that tackle zoonoses and AMR. This in turn makes it difficult to secure resources to tackle zoonotic disease and AMR, and create the necessary partnerships between the government and the governed to address issues that cross all sectors of society (FAO, 2018).

Anthrax is a zoonotic disease caused by the Gram-positive bacterium Bacillus anthracis, a generalist soil-transmitted pathogen found on every inhabited continent, and several islands including Haiti and parts of the Philippines and Indonesia. Worldwide, an estimated 20,000 to 100,000 cases of anthrax occur annually, mostly in poor rural areas. In clinical presentations of anthrax, case fatality rates are a function of exposure pathway. Respiratory exposure from spore inhalation is important in the context of bioterrorism, but is highly uncommon, and accounts for a negligible fraction of the global burden of anthrax cases. Cutaneous exposure to B. anthracis accounts for the majority of human cases worldwide, and typically presents with low mortality; gastrointestinal exposure accounts for the remainder and presents with intermediate to high fatality rates. Cutaneous and gastrointestinal cases of anthrax are most commonly caused by handling and slaughtering infected livestock, or butchering and eating contaminated meat; untreated gastrointestinal cases probably account for most human mortality from anthrax1–3. https://doi.org/10.1038/s41564-019-0435-4.

Brucellosis is another infectious bacterial disease caused by members of the genus Brucella. Brucelloses caused by Brucellamelitensis and Brucellaabortusbelongs to the world's major zoonoses (Seifert H.S.H., 1996), causing great economic losses in the ruminant production systems and representing a serious health issue for the farming community. In livestock, they cause abortion, late first calving age, long calving interval time, low herd fertility and comparatively low milk production (Asfaw Y *et al*., 1998). Carpal hygroma is also a common clinical manifestation in cattle (Seifert H.S.H., 1996). Brucellosis is a true zoonosis in that all human cases are acquired from animals and, more specifically, from domestic ruminants as far as B. abortus and B. melitensis are concerned.

Rabies, fatal but neglected disease, constitutes a major public health problem worldwide (WHO, 2005 and OIE, 2016). The burden is so high in developing countries where access of preventive treatment is limited (Barecha CB *et al*., 2017) with an annual mortality rate of over 60,000 of which Asia and Africa accounts 56 and 44% cases, respectively (OIE 2016, Adedeji AO *et al*., 2010 and Aga AM *et al*., 2016). With this, rabies imposes an immense cost and hinders economic development with an estimated loss of 1.7 million daily adjusted life years and a global cost of 584 million US dollars (WHO, 2005, Knobel DL *et al*., 2005). Rabies is a zoonotic disease affecting a wide range of wild and domestic animals, including livestocks (Barecha CB *et al*., 2017, Adedeji *et al*., 2010). Domestic dogs are the main sources of exposure and primary transmitter of human rabies, especially in African and Asian where there is no or inadequate dog rabies control strategies (Bogle K and Motschwiller E, 1986;Mattos CCDE *et al*.,1996).

In general, Benishangul Gumuz Regionalstate is in the Abay basin belt, bordering to Sudan, and it was highly vulnerable to different contagious and zoonotic disease, inAsossa, Bambasi and Homoshaworedas' of Asossa zone, zoonotic diseases that transmit from animal to human (rabies, anthrax, and brucella) were found to be one of the factors that hampered community, livestock production and productivity in the region as different reports indicated. Therefore, a study on the status of the zoonotic disease and investigating the causative agent and their relative abundance, level of community attitude, awareness /knowledge and practice towards the disease, is crucial for a successful control and prevention in the area. In three woredas, no any investigations were conducted to assess or to magnify the problem yet. So that, the present study was used to investigate the seroprevalence of the brucellosis in bovine, and preliminary retrospective survey and epidemiological associated risk factors using questionnaire survey.

Therefore, the **Objective** of the present study were;

- To assess the epidemiological factors and the preliminary retrospective base line data on anthrax, brucella and rabies in animal and human beings;
- To assess the awareness /knowledge, attitudes and practice towards the zoonotic disease of the society on the socio impact and the control methods of Anthrax, Brucellosis and Rabies in animal and human beings;
- To determine the seroprevalence of the bovine brucellosis, and to assess problems in-line with communicable animal disease occurrence and to design the best control and prevention measures.

2. Material and methods

2.1 Study Areas

The study area is located in the Benishangul-Gumuz Regional State where mixed farming system is dominant, in which about 92.5% of the population is engaged in agriculture as a major means of subsistence. The Benishangul-Gumuzregional state is found 687 km away from the capital city of the country, Addis Ababa, in the west. It is located at 9^{o} 30′- 11^{o} 30′ latitude North and 34^{o} 20′- 36^{o} 30′ longitudes East and its altitude range is 700-1560 meter above sea level. The region is bordered with the Sudan in the West, Amhara Regional State in the East and North, Oromia Regional State in the East and South east and Gambella Regional State in the South (MoARD, 2007).

The study was conducted in Asossa, Bambasi and Homosha Districts of Asossazone from July to November, 2021.Asossa zone has 214 peasant association, stretching over an area of 18,340.55 kilometer square, with human population of 270,980. Annual rain fall is between 900-1500 mm with uni modal type of rain fall that occurs between April and October. Annual temperature ranges between 25- 35^{0}c. The livelihood of the society largely depends on mixed livestock and crop production having livestock population of 77,688 Cattle, 167281 Goat, 9651 Sheep, 27638 Equines, 279098 Poultry and 66019 beehives (CSA, 2016).

2.2 Study Design

The study was conducted using preliminary cross - sectional study and questionnaire survey, on animal and human anthrax, brucellosis and rabies exposure cases from July to November, 2021. Retrospective secondary data source were extrapolated from animal and human health post/clinics and hospitals. Structural questionnaire survey were gathered from community farmers, animal health workers, health extensions and community kebele leaders on communicable animal diseases.

The questionnaire was designed to assess the occurrence of communicable animal disease in the area, retrospective cases (rabies, brucellosis, anthrax), symptoms and causes of the diseases, vaccination, community based zoonotic cases, control and prevention measures, morbidity, mortality of the diseases, abortion cases, rabied cases, anthrax cases, in the community farmers, animal health workers and health extension workers were interviewed. During the questionnaire survey, it was attempted to correlate farmers' local perception of disease signs and symptoms with scientific contexts. For individuals in veterinary services (public), and farmers population of cattle, dog, shoats were assessed, the method used to control the rabied dogs, care to be taken for risk families and dogs were surveyed, treatment used for rabies, anthrax, brucellosis cases were investigated, This data was collected by professionals.

2.3 Study population, Data collection and Transportation

The study populations were animals, anthrax, brucellosis and rabies exposure cases, and suspected animals, including human beings, which come or referred to Health post and clinics. Questionnaire survey was conducted to340 randomly selected respondents/community farmers/, 34 animal health workers and health extension workers to assess communicable animal disease (brucellosis, rabies and anthrax diseases).

384 Bovine blood samples were collected from 20 kebeles of Assosa, Bambasi and Homoshaworedas.10ml of blood samples were collected from jugular vein of cattle using sterile plain vacuitainer tubes from each selected kebeles. The samples were properly labeled, kept in icebox and transported to the Asossa, Regional Veterinary Laboratory. After arrival, blood sample were centrifuged at 1500 × g for 10 min to obtain the serum. Sera were decanted into cryovials, identified and stored at deep freeze (−20˚C) until it was processed or being transported in cold chain using ice packs.

Rose Bengal test (RBT). All sera samples collected were initially screened by RBT using RBT antigen (Animal and Plant Health Agency (APHA), United Kingdom) according to described procedures (OIE, 2004). Briefly, sera and antigen were taken from refrigerator and left at room temperature for half an hour before the test to reach room temperature. RBT antigen (30ml) was added onto a clean plate next to an equal volume of test serum sample (cattle). The antigen and test serum were mixed thoroughly with a plastic applicator, shaken for 4 min, and the result (presence of agglutination or not)was read immediately.

Competitive - ELISA. All RBT positive sera were further tested at National Animal health Diagnostic and

investigation center, NAHDC) using the COMPELISA 160 and 400, a competitive ELISA kit for the detection of antibodies against *Brucella* in serum samples (Animaland Plant Health Agency, Addlestone, United Kingdom). The test was performed according to the manufacturer's instructions.

434 unspecified human cases of retrospective /secondary rabies data sources/ were collected from Asossa, General hospital from exposure individuals; which camefor suspected cases and get post-exposure prophylaxis in 2018-2021 years.

Case definition

An animal or human case was considered positive if it tested seropositive on both RBT and c-ELISA in serial interpretation. Similarly, a herd or flock was considered seropositive when atleast one animal in a herd tested positive. Since there is no history of vaccination against brucellosis in Ethiopia, seropositivity observed in this study was considered to be due to natural infection of *Brucella*.

2.4 Sample size Determination and sample method

Using Thrusfield's (2007) derivation, the sample size for the bovine serum sample, assumption and estimations of brucella species was determined. As the objectives of study were both qualitative and cross sectional study, because no published work was encountered, 50% was used for expected prevalence, confidence level of 95%(Z=1.96), and a5% level of precision, a design effect of two and 10% error was inferred.The following formula was used:

$$n = \frac{1.96^2 * P_{exp}(1-P_{exp})}{d^2}$$

Where n = sample size required; P_{exp}=expected prevalence; d = level of precision;

$n = (1.96)^2 (0.5) (0.5)/(0.05)^2 =$ **384.** So, **384** serum samples was collected for brucellosis cases, from randomly selected cattle.

Besides this, a total of 340 respondents from the farmers, 34 animal health workers, 34 kebele leaders, 34 health extension workers were included for questionnaire interview. The number of respondents with respective of woredas; 260 in Assosa, 156 in Bambasi, and 26 in Homoshaworedas. A structured and pre-tested questionnaire format was used to collect information from each district; kebele animal health workers (*n* =34), kebele framers (*n* =340), health extensions (n=34) available during the study period. 34 Kebeles were selected purposively as convenient and it was based on feasibility and history of(rabies, anthrax and brucella) previous outbreak cases, and treated as first and second sampling units, respectively. However; study animals were randomly selected in the selected Districts.

2.5 Study Methods

2.5.1 Kebele community farmers/ key informatives/

The questionnaire survey was used to assess the farmers on communicable animal diseases that can transfer from animal to human beings. Used to assess dog, cattle, sheep and goat risk population in the area, previous occurrence of brucella, anthrax, and rabies cases; disease symptoms on (human, animals) and causative agents; care taken for dog and risk families for rabies cases; assessed human bitten by dog, treated, died and sick cases; vaccination habit of dog, cattle, shoat and vaccines provisions; number of aborted ruminants(cattle, goat, sheep); time of occurrence of abortionin ruminants; use of aborted and anthrax suspected animal products, and pain felling conditions; awareness of society on zoonotic disease, transfer from animal to human individuals, and occurrence of acute and sudden killer cattle disease in the area.

2.5.2 Interview with kebele Animal Health workers and health extensions

Interview up on community animal health workers and health extensions in the 20 studied kebeles were assessed as:- status of capacity building/ training/ on communicable animal disease; kebeledog, cattle, goat, and sheep population; community based zonootic disease control approaches on cattle, shoats and dog were assessed; occurrence of zonootic disease inkebele; occurrence of rabied dog disease report situations, in the past three years was interviewed; humanbeingsbitten by rabied dog and at risk in community was survyed**;** Nowadays, activities to be taken for control measures of rabied dog in surveyed kebeles were assessed**;** Method of control and prevention measures of the diseases in the kebeles were assessed; in the community, habit of using milk and meat products / pasteurized milk, cooked meat) was assessed; Contact of individuals with zoonotic disease, use of animal product and exposed groups; communicable disease seasonal occurrence and its impact was assessed; Bovine Tuberculosis, mastitis, salmonellosis, and pastuerellosisetc, were other animal communicable disease that cause production loss in the community besides the prioritized zoonotic diseases as key informatives respond;

During the questionnaire survey, it was attempted to correlate farmers' local perception of disease signs and symptoms with scientific contexts. This data was collected by enumerators which have diploma level professionals in animal health workers and humanhealth extensions workers.

2.5.3 Interview with kebele community leaders

Kebele community leaders were assessed on communicable animal disease such as anthrax, brucellosis, and rabies secondary animal information,

previous disease occurrence, and other related data were assessed in the 34 kebeles.When disease occur in the kebele, they gave disease information as the animal health workers treat, control, forecast disease timeline, seasonal occurrence and design vaccination schedule for easily control and prevention measures. Kebele leaders gave information on anthrax, rabies, and brucella disease occurrence, as health workers took action (treatment, control measures such as vaccines), such communicable animal disease cause production loss (meat, milk, death, sick) were encountered; in the future, kebele leaders, animal health workers and livestock owners integrated and design control and prevention measures. Bovine tuberculosis and cyst, besides the anthrax, rabies and brucellosis; transfer from animal to human beings through in-contact, and animal product(milk, meat).

3. Data analysis

All the collected secondary data source of (rabies, brucella, and anthrax)and serum samples were entered into a Microsoft excel spread sheets program. Processed, coded data were transferred to Intercool STATA version 11.0 for analysis. Descriptive statistics were used for estimation of animal health workers, health extensions and kebele leaders, retrospective questionnaire information on communicable animal disease in the selected kebeles. Pearson's chi-square ($\chi 2$) was used to evaluate the association of different variables with the prevalence of brucellosis infection. In all of the statistical analysis, a confidence level of 95% is used and P-value of less than 0.05 (at 5% level of significance) was considered as statistically significant.

4. Result

4.1 Questionnaire survey result

Rabies, Farmers retrospective response result

From 340 farmers interviewed, 70.6% of the respondents possess dog in the community, whereas 29.4% of the them have not dog. Regarding occurrence of the rabies, 181/340 (78.23%) of the respondents said there was occurrence of disease, whereas 74/340 (21.76%) of the respondents said that, no occurrence of rabies in the kebeles. During the survey period, 49 dog were sick and 2 were died by different reason. As community farmers respond, rabies symptoms were excitation, excessive salivation, paralysis of muscles, tail bending, bitingevery things, and aimless movement. As respondent animal owners said; when dog infected with rabies virus in the community, care that can be taken for normal dogs (tie the normal dog, inspection of the behavior and eradicate ownerless dog), care as children should be in-house, and avoid contact of animalsa nd also risk group or exposure elders in families should take traditional medicine and/or post prophylaxis treatment. Causes for rabied dogs as respondents said were biting of rabied dogs, and wild animals (fox, hyena, 'tekula'). In this survey, as respondent farmers said, 67/340(19.7%) of the respondent were bitten by dog while 273/340 (80.29%) of the respondent said no family/ individuals/ bitten by dogs. For person bitten by dog as respondent said, traditional medicine, and post prophylaxis treatment was given so as to heal better. 265 (77.94%) respondent farmers know rabies symptoms, whilst 75 (22.05%) respondent do not know rabies symptoms. In the community, as respondent said, 13(3.82%) persons /family members/ were infected by rabies, and died where as the 327 (96.17%) respondent said none of them were infected/ risk groups. As community respondent said, 60 (17.64%) of the respondent said as the dog was vaccinated, and 280 (82.35%) respondent did not vaccinated the dog in the kebeles. From 340 community farmer respondent, 253(74.4%) of the respondent were know as the rabies vaccine was present while 87(25.58%) of the respondent were said we don't know as vaccine was present.

Brucellosis, retrospective response result

From 340 of the community farmers respondent, 328(96.47%) of the respondent havecattle, sheep and goats whereas12 (3.52%) respondent do not possess ruminants. 183(53.82%) of the respondent in the community said, the aborted cases were presented (yes) whilst 157(46.17%) of the respondent said no aborted cases encountered in their kebeles. During the survey, respondent farmers said, 113 cattle, 38 sheep, and32 goats were aborted before.90% the respondent answer as abortion occur in first pregnant period, 10% of respondent said it was also occur in rare cases at late trimester of pregnancy.329(96.76%) of the respondent said no use of /milk or meat/ from aborted animals or habit of using unpasteurized milk, and uncooked meat whereas 11(3.23%) of the respondent said, there was use of milk/meat or habit of using unpasteurized milk, uncooked meat risk of diseases.338(99.41%) of the respondent said no pain feeling when using milk or meat especially of apparently healthy animals, where as 2(0.58%) respondent said, there might be pain feeling, while consuming uncooked meat or unpasteurized milk because of the risk of the communicable diseases. 300 (88.2%) of the respondent said no syndromes shown on the product used individuals but 40(11.8%) of them indicate that, fever, joint pain,, infertility, production loss and repetitive abortions /still birth/was clinical manifestation that occur in cases of the brucellosis cases. 91(26.76%) of the respondent farmers said or /do have awareness /abortion/ brucellosis were transfer from animal to individuals and causes disease; whereas 249(73.23%) respondent said no transfer of the diseases from animal to individuals.

Anthrax, retrospective response result

123 (36.2%) respondent farmers said acute and killer animal disease occur on individual or on community cattle; 217(63.8%) respondent said no occurrence of the disease, so that anthrax, salmonellosis, tuberculosis, pastuerllosis, black leg, toxemia, bloat, and rabies are some listed killers diseases. 77 (22.64%) respondent of the farmers said there was occurrence of the anthrax cases in the kebeles; 263 (77.35%) community farmer respondent said no occurrence of the cases. Community farmers said blood oozing from orifice, unclotted blood, bloat, salivation, sudden death were listed symptoms of anthrax diseases. As community respondent said 47 animals are died by anthrax cases; whereas 243 animals were sick by suspected disease and cure by treatment.15 (4.4%) of the respondent said individual /family members may feel pain, by eating anthrax suspected cases / healthy and suddenly died animals meat, where as 325 (95.6%) respondent said no individual/ family members ate suspected meat and feel pain in their respective kebeles. 66 (19.4%) of the respondent, do have awareness as anthrax can be easily prevented or control whereas 274(80.6%) respondent do not have awareness as it was controlled. 112 (32.9%) respondent said anthrax transfer from animal to individual, causes pain and killer behavior; 228 (67.1%) respondent said no communicable diseases that transfer individual pain and killer nature in this survey.62(18.2%)respondents said yes, in the community, communicable disease that transfer from animal to individuals, cause impact. 278(81.8%) respondents said in the community, there was no communicable disease has zoonotic nature.144(42.4%) respondent said here was meat inspection in the community; 196 (57.6%) respondent of the community said no meat inspection while slaughtering for consumption purpose.

Community farmers response result as indicated in Table 1.

Table 1. Survey on communicable Animal disease for community Farmers

Variables	Farmers response rate (n=340)			
	Yes	%	No	%
Do you have dogs?	266	78.23	74	21.76
Was rabies occur on dog?	181	53.23	159	46.76
Do you know rabied dog symptoms?	265	77.94	75	22.05
Among your family, was there dog bitten?	67	19.70	273	80.29
Was there rabies infected and died person/ family members, in your community?	13	3.82	327	96.17
Do you vaccinated your dog?	60	17.64	280	82.35
Do you know rabies vaccine as present?	253	74.41	87	25.58
Do you possess cattle, sheep and goat?	328	96.47	12	3.52
If yes, was there aborted animals cases before?	183	53.82	157	46.17
Do you use(milk or meat) from aborted animals? And was society, have habit of using unpasteurized milk, uncooked meat ?	11	3.23	329	96.76
If yes, do product used individuals fell pain?	2	0.58	338	99.41
Do you have awareness, as abortion /brucellosis transfer from animal to individuals person causing disease?	91	26.76	249	73.23
Was acute and killer animal disease occur on individuals or on community cattle?	123	36.17	217	63.82
Was anthrax disease occur on cattle?	77	22.64	263	77.35
By eating (anthrax suspected, healthy and suddenly died animals meat, was there individual/ family members pain feel?	15	4.41	325	95.58
Do you have awareness as the anthrax was easily prevented / controlled?	66	19.41	274	80.58
Do you know as anthrax transfer from animal to individuals, and have pain and, killer behavior?	112	32.94	228	67.05
Nowadays, was there in the community, disease that transfer from animal to individuals, and cause impact?	62	18.23	278	81.76
As community, was there meat inspection?	144	42.35	196	57.64

Community Animal health workers response rate as shown in Table 2.

Table 2. Interview on communicable animal disease for community animal health workers

Variables	(n=34) response rate			
	Yes	%	No	%
Do you obtain training on animal communicable disease?	28	82.35	6	17.64
Was there rabid dog occurrence in your kebele?	11	32.35	23	67.64
Was there abortion disease occurrence in your kebele?	25	73.52	9	26.47
Was there, in -contact with disease, and use milk/meat and encountered the pain or exposed?	1	2.94	33	97.05
Was there, anthrax disease suspicion in your kebele?	12	35.29	22	64.7
Was there, community individuals, in-contact with meat, carcass/ which was suspected for anthrax cases and got pain?	9	26.47	25	73.52
Do you report communicable animal disease in your kebele?	19	55.88	15	44.12
Did you report anthrax cases previously, in your kebele?	13	38.23	21	61.76

25 (73.5%) respondent of the animal health workers, has been taken training on communicable animal disease (Anthrax, Brucellosis, rabies) where as9(26.5%) respondent said no training was taken on the communicable disease in the respective kebeles. 90% of respondent said; community based (rabies, anthrax and brucellosis) mean it was sever, killer agent, and occur as community and cause impact (death, loss) on society, on animals, individuals, and pet animals. So disease surveillance, monitoring, vaccination and post prophylaxis treatment should be implemented as interviewer said. 19(55.9%) respondent (animal health workers) said, there was disease case report in the kebeles; whereas 15(44.1%) respondent said no cases in the community was reported.

Rabies, Animal health workers retrospective result

From 34 kebeles, as respondent said 1,640 dog population were presented in the community. 90% of the respondent said, rabied dog control and prevention measures were (owner less dog killing, vaccination of the risk groups, tie dog in- house, post and pre prophylaxis treatment for victims;11(32.4%) respondent of animal health workers said, there was occurrence of rabies in the kebele whereas 23(67.6%) of the respondent said no occurrence of the rabies cases in the community. 19(55.9%) respondents of health workers said within the past three years, rabied/ suspected, cases were reported to the veterinary posts; 15(44.1%) of the respondent said no report of the rabies cases to veterinary post. Respondent of the animal health workers said, there were 10 community/ society groups that was victims/ exposed/ individuals in the kebele because of rabied dogs, whereas the respondent said 32 society groups were not victims/exposed groups as the interviewer reported. As animal health workers said nowadays, in order to control rabies cases; the following activities were done: vaccination, isolation of sick animals, avoidance of contact with risk groups, awareness creation of community members, health extension workers, veterinary experts, kebele leaders), community mobilization, and sanitary measures.

Brucellosis, animal health workers retrospective response rate

90% of the respondent said, animal abortion/ brucellosis disease control measures (avoidance of contact with risk groups, don't use risk milk, and meat products, treatment, and sanitary measures.25(73.5%) of the respondent said abortion occur in their kebele. 9(26.5%) respondent said no abortion/ brucella occurrence in the kebele and about 190 animals were exposed to abortion in 34 kebeles as the animal health workers reported in this survey.

Anthrax, Animal health workers retrospective study result

Anthrax disease control and prevention measure (avoid contact, proper burring and fire of the infected cattle, properly eliminate the cases, don't use the suspected animal product, immediate treatment of the cases, regular vaccination of the healthy animals, and ring vaccination of the suspected areas. 90% of the respondent (animal health workers) said, community milk and meat eating habit were using pasteurized milk and cocked meat; 10% of the habit were both cocked/ uncocked meat, unpasteurized/ pasteurized milk. 25 (73.5%) of the community members, use meat/ milk, and not got the disease/ pain where as 9(26.5%) of the individuals use the milk/ meat and in-contact to the risk groups and encountered the disease. As the respondent

said, no individual were feel pain or exposed, 14 individuals were not victims of the cases even if they used meat or milk products as the kebele animal health workers indicated. As community animal health workers respond, 28 of the animal were died because of anthrax cases in the kebeles whereas 11 were sick. In this survey, 14 community animal health workers respond, that there was no individuals in contact with meat, carcass suspected cases and fell pain, where as 1 respondent said there was in-contact with meat/ carcass suspected cases and got pain in respective kebeles. As respondent said, none of individuals were sick of the anthrax cases, 14 individuals were in risk of the cases. As respondent said 13 (38.2%) of the anthrax cases were reported whereas 21(61.8%) cases were not reported in the community members as the survey indicated.

Table 3. Retrospective rabies unspecified (human cases) from 2010-2013 e.c

Variables		Rabies unspecified (human cases) occurrence in year (e.c)				
Sex	**Age**	**2010**	**2011**	**2012**	**2013**	**Total cases**
Male	<1yr	1	2	0	0	3
Male	1-4yr	13	13	0	0	26
Male	5-14 yr	53	56	0	0	109
Male	15-29yr	39	45	0	0	84
Male	30-64 yr	18	31	0	0	49
Male	>=65 yr	0	1	0	0	1
Female	< 1yr	1	0	0	0	1
Female	1-4yr	4	7	1	0	12
Female	5-14yr	25	36	0	0	61
Female	15-29yr	32	17	0	0	49
Female	30-64yr	10	23	0	0	33
Female	>=65yr	2	4	0	0	6
Total		198	235	1	0	434

Source: Asossa, General hospital 2010-2013 e c retrospective data

As indicated in (Table 3), 198, 235, 1, 0 rabies human cases were reported in Asossa, General hospitals in the year 2010-2013 e.c respectively. Of the total 434 unspecified human cases, 272 male cases and 162 female cases were recorded in the year 2010- 2013 e.c. The rabies in human cases were varies in age categories, that was 4, 38, 170, 133, 82, 7 cases were reported in <1 yr, 1-4 yr, 5-14 yr, 15-29yr,30-64 yr, and >=65 years of age respectively, as indicated in the Table 3.

4.2 Brucellosis prevalence in the study woredas

Out of the total cattle examined (N=384), 9 /384 (2.34%) were found to be infected with brucellosis(Table 4). 1.46%, 0.09%, and 9.75% seroprevalence of brucellosis was recorded inAsossa, Bambasi, and Homoshaworedas respectively as indicated in Table 4. The high prevalence of the bovine brucellosis (brucellaabortus) (9.75%) was recorded in Homoshaworeda whereas the lost prevalence of the disease (0.09%) was recorded in Bambasiworeda as indicated in Table 4. So the association of the factors with brucellosis was significantly high (p<0.004).

Table 4: Prevalence of Brucellosis in the Asossa, Bambasi and Homoshaworedas

Variable	**Categories**	**N**	**Positive**	**prevalence**	**Chi2**	**P –value**
Woreda	Asossa	205	3	1.46	11.01	0.004
	Bambasi	138	2	0.09		
	Homosha	41	4	9.75		
		384	9	2.24		

Nb: N= examined animals

Table 5: Prevalence of brucellosis with different potential risk factors

Risk Factors	Categories	N	Positive	prevalence	Chi2	P –value
Sex	Male	33	0	0	0.86	0.35
	Female	351	9	2.56		
Age	3-≥5yr	253	5	1.97	1.48	0.47
	>5 – 7yr	92	2	2.17		
	>9yr	39	2	5.12		
Bcs	Good	127	3	2.36	0.14	0.92
	Medium	227	5	2.20		
	Poor	30	1	3.33		

NB- N= examined animals

The highest prevalence (5.12%) of brucellaabortus was recorded in animals >9 years old whilst the lowest prevalence (1.97%) was recorded in animals 3-≥5 years of old and the association was not significant among the age groups (Table 5).

Slightly, higher prevalence was registered in female animals (2.56 %) than in male animals (0 %), which was not found to be statistically significant (p> 0.05) (Table 5).The highest prevalence of brucellosis (3.33%) was found in animals with poor body condition while the lowest (2.20 %) was recorded in animals with medium body conditions respectively, and the difference was insignificant (p>0.05) as indicated in Table 5.

Table 6. Origin based Prevalence of Bovine brucellosis in selected kebeles

Kebele	No. examined	Positive	Prevalence	Chi2	P value
Gumu	21	3	14.28	23.27	0.22
Dunga	20	1	5		
Mutsakosa	22	2	9.09		
Dabus	22	0	0		
M47	15	0	0		
M48	15	0	0		
Sonka	16	0	0		
M41	12	0	0		
M43	10	0	0		
M42	11	0	0		
Womba	10	0	0		
M49	5	0	0		
Komoshiga27	8	0	0		
Komoshiga28	8	0	0		
Megel39	44	1	2.27		
N/komoshiga	12	0	0		
Selga 24	8	0	0		
Komoshiga26	66	2	3.03		
Amba14	33	0	0		
megel33	26	0	0		
Total	384	9	2.34		

Nb. M*: mender, k: komoshiga*

In this cross sectional survey, 384 serum samples were collected from 20 kebeles of three woredas, that was, 8 kebeles of Assosa districts, 10 kebeles of Bambasi districts and 2kebeles of Homosha districts. 3/205 (1.46%), 2/138(1.44%), 4/41(9.75%) brucellosis prevalence were recorded from Asossa (8 kebeles), Bambasi(10 kebeles) and Homosha (2 kebeles) respectively as indicated in Table 6.Comparably, in this survey high prevalence of brucellosis (9.75%) was reported in Homosha (Dunga

and Gumu) kebeles whilst the low prevalence (1.44%) was registered in Bambasidistricts of 10 kebeles as reported in Table 6. Cattle Brucellosis was recorded across the study kebeles with the highest prevalence of(14.28%)in Gumukebelewhereas in Dabus, Mender (M47, M48, M41, M43, M42),Sonka, Womba, Megele/49, Komoshiga (27, K28), N/komoshiga, Selga/24, Amba 14, and Megele/33, the lowest brucellosis prevalence (0%) was recorded in present study and the prevalence of brucellosis was not significant across the study sites (Table 6). InGumu, Dunga, Mutsakosa, Megele 39, Komoshiga 26, (14.28%, 5%, 9.09%, 2.27%, 3.03%) Brucellosis prevalence was recorded in the studied kebeles respectively as shown in Tables 6.However, the association is not significant (P>0.05).

5. Discussion

5.1 Bovine brucellosis seroprevalence

The present study showed that, overall sero-prevalence of bovine brucellosis was 2.24% (9/384). This finding is inline with the earlier report of Hagos A *et al*. (2016) who reported, 2.4% of overall sero prevalence of bovine brucellosis in and around Alage District of Ethiopia; which was statistically significant (p<0.05). Similarly, the present survey was consistent with the previous findings of Jergefa T *et al*. (2008) who showed that, 2.9% of overall seroprevalence of bovine brucellosis at theindividual animal level,in three agro-ecological areas of central Oromiya, Ethiopia. Similarly, the present findings were consistent with the earlier result of Bedaso M *et al*. (2020) reported that, the overall animal level prevalence of 2.4% in cattle, 3.2% in sheep and goats, and 2.6% inhumans occupationally linked to livestock production systems, inBorena, Southern Ethiopia.

However, there were reports with a relatively lowersero-prevalence rate of bovine brucellosis in other parts of the country;1% (Kang'Ethe EK, 2007) in the BenishangulGumuz region of north-western Ethiopia, and 1% (Degefu H *et al*.,2011) in Nairobi, Kenya. It is comparable with other previous reports from different part of Ethiopia; 1.38% (Gumi B *et al*., 2013) in Jijjiga zone of Somalia regional state, 1.4% (Poester MA *et al*., 2013) in Bishoftu and Asella, central Ethiopia, 1.5% (Tolosa T *et al*., 2008) in Addis Ababa, 1.66% (Berhe G *et al*., 2007) in Sidama Zone, Southern Ethiopia, 1.49 % (Dinka H and Chala R., 2009) in Tigray region, and 1.4 % (Haileselassie M., 2011) in Southeastern pastoral livestock of the country.

On the other hand, there were reports with a relatively higher sero-prevalence rate of bovine brucellosis in other parts of the country; 11.2% (Berhe G.,2005) in pastoral and agro pastoral areas of East Showa Zone, 3.5% (Megresa B *et al*., 2012) in Southern and Eastern Ethiopia, Oromia region, 3.1% (Thrus field., 2018) in Jimma zone of Oromia region, 4.9% (Jergefa T *et al*., 2009) in Western Tigray, Northern part of the country, 8.0% (Shiferaw Y *et al*., 2003) pastoral region of the country; 2.9% (Tibesso G *et al*., 2014) in three agro ecological areas of central Oromia, 3.19% (Tolosa T *et al*., 2008) in the extensive cattle production system of Tigray region, and 4.3 % (Matope G *et al*., 2011) in Adami Tulu, central Ethiopia. However, most of these reports were from the area were herds were managed under extensive system, where cattle from different owners were mingled at communal grazing and watering points. Hence, the low prevalence observed in the present serological investigation could possibly be due the using of AI services, culling of infected animals and, and the prevailing management systems differences among intensive, semi-intensive and extensive production system (Mc Dermott JJ *et al*., 2013; Matope G *et al*., 2010). Similarly, relatively higher sero-prevalence were reported in other African countries; 24.5% (Mai HM *et al*., 2012) from Sudan; 24.0% (Sarba EJ *et al*., 2016) from Nigeria, 5.5% (Angere TEE *et al*.,2004) from Zimbabwe.The observed disparity could be attributed to various factors including differences in testing protocols, cattle rearing systems, and herd size.

With regard to associated risk factors, 0.09%, 1.46%, and 9.75% brucellosis in cattle were detected in Bambasi, Asossa and Homosha districts respectively during the study period. So, the high prevalence of bovine brucellosis (9.75%) was recorded in Homoshaworeda whereas the lost prevalence of the disease (0.09%) was recorded in Bambasiworeda. So the association of the factors with bovinebrucellosis was significant (p<0.004). The present findings were in line with the previous findings of Bedaso M *et al*. (2020) who reported, 1.6%, 6.8% and 2.9% of brucellaseropositivity of cattle in Dubuluk, Eleweye and Gomole districts respectively, inBorena, Southern Ethiopia.

In the present study, it is well known that sexually mature cows are more susceptible to Brucellaabortus infection, which could be explained by the fact that susceptibility increased during sexual maturity and pregnancy due to the influence of sex hormones and placental erythritol on the pathogenesis of brucellosis (Radostitis *et al*.,1989).The highest sero-prevalence (5.12%) of brucellosis was recorded in animals greater than>9 years old while the lowest prevalence (1.97%) was recorded in animals 3-≥5 years of old, and hence, the association was not significant among the age groups. As compared to the present results, Bedaso M *et al.* (2020) indicated, 1.2 % of brucella seropositive in cattle age of < = 5 years old and 5.1% brucellasero positive in age of greater than > 5 year of cattle species, inBorena, Southern Ethiopia. In contrast to this findings, Hagos A *et al.* (2016)

indicated that, the presence of significant associations between age and sero-positivity of brucellosis. This finding was supported by a previous report from Ethiopia (Asmare *et al*., 2010). Growth stimulating factors for *Brucella* organisms become abundant when the animal becomes sexually matured (Radostits *et al*., 2007). Besides, higher prevalence of brucellosis in older cattle can be attributed to the constant exposure of the cattle over time to the agent. Hagos *et al*. (2016) said that, very high seropositivity (33.3 %) was observed in cows which gave birth above 2 years interval. This is supported by earlier reports from Ethiopia (Musa *et al*., 1990 & Hileselassie *et al*., 2008). The possible reason could be the effects of the disease on reproductive tract causing retained fetal membrane that usually leads to uterine infection and hence poor conception rate.Comparably, Begna B *et al*., (2020) reported that, a higher sero-prevalence (1.27%) in older age category (greater than 2 years) and sero negativity in younger age category (6 months - 2 years), in and Around Adama Town, Oromia Regional State, Central Ethiopia;This finding was inconsistent with report of (Swell MM *et al*., 1990; Abebe *et al*., 2008).

In the present study,slightly, higher prevalence was registered in female animals (2.56 %) than in male animals (0 %), which was not significant (p> 0.05). However, Hagos A *et al*. (2016) indicated that,a significant association between sex and seroprevalence of brucellosi*s* was observed. 94.7 % of the seropositive animals were female. This result was in agreement with earlier studies in Ethiopia where absence of male seroreactors was reported (Berhe *et al*., 2007; Tolosa., 2004), which was comparable with present findings.

5.2 Questionnaire survey

In this survey, the respondents or key informants such as farmers, animal health workers, health extension, and kebele leaderswere assessed, for the existing problems in Asossa, Bambasi and Homosha of 34 kebeles.Key in formatives (KI) were interviewed for their perception of communicable animal disease occurrence, symptoms, causative agent, the possible factors contributing for the occurrence of disease, habit of using animal product (milk, meat) and the risk /exposure groups, number of sick, and died animals in the community and their preference of cases for treatment, vaccination habit of community for dog, cattle, and shoats; number and duration of aborted ruminants; use of aborted and anthrax suspected animal products (milk, meat) cases and pain felling situation and the knowledge, awareness and attitudes of community on Anthrax, brucellosis and rabies zoonotic disease in the area were assessed in the present study.

With regard to Anthrax,anthrax is a neglected tropical disease, and it is seldom studied in Ethiopia. Pieracci *et al*.(2016) have prioritized anthrax as the second most significant zoonotic disease in Ethiopia based on its negative impacts at the house- hold level due to causing disease and production loss in livestock, as well as severe disease in human. This survey confirms that anthrax had yet been prioritized in Ethiopia.key informants from Asossa, Bambasi and Homoshakebeles reported that, anthrax had been a problem in their community, having caused human death and socio economic crisis. In our survey, socio demographic/ social difference of the study community were(animal ownership/ farmers/, Animal health workers, health extensions, kebele leaders, and Districts) significantly associated with the knowledge/ awareness/ attitude/ of the disease.

During the survey, respondents said that they did know anthrax in animals as abdominal cramp, shivering, and others described clinical signs like blood oozing from orifice/bleeding /unclotted blood in dead animals, andsudden death).These circumstances indicated the absence of consistent of health education in the study area. Consistent with this study, Opare *et al*. (2000) showed that most respondents do not know the causes of anthrax but recognize the signs of the disease. Moreover, in the questionnaire survey, the number of respondents who knew the clinical signs was higher than that of respondents who knew the cause of the disease. In the present findings, 22.6% respondent of the farmers observed/ knew, the occurrence of the anthrax cases in the kebeles; whereas 77.4%of the community farmers did not observed, the occurrence of the diseases in communities. And also 4.4% of the respondent said individual /family members feel pain, by eating anthrax suspected cases and suddenly died animals meat, whereas 95.6% respondent said no individual/ family members ate suspected meat and feel pain in their respective kebeles as the current survey indicated.

As the current research indicated, about 36.2% respondent farmers said acute and killer animal disease occur on individual or on community cattle whereas 63.8 % respondent said no occurrence of the disease, so that anthrax and other co- infections were killers diseases.In addition to this, at the time of survey, community animal health workers reported that, 28 of the animal were died because of anthrax cases in the kebeles whereas 11 were sick. Similarly, as animal owners said that, 38.2% of the anthrax cases were reported in the kebeles whereas 61.8% cases were not reported in the community members as the survey indicated. 73.5% of the community members, use meat/milk, and not acquired the disease/ pain whereas 26.5% of the individuals use the milk/meat and in-contact to the risk groups and encountered the disease. Besides this, 90% of the animal health worker respondents reported, community milk and meat eating habit were using pasteurized milk and cocked meat; while 10% of the habit were both cocked/ uncocked

meat, unpasteurized/ pasteurized milk. In general, regarding the respondents on anthrax, we observed that knowledge was better than attitude, and attitude was better than practice.This is supported by a study conducted in Ghana which indicated that high levels of knowledge of the farmers on vaccination had not been realized as practices (Opare *et al*., 2000). In fact, practice might be influenced by culture and socio-economic factors. The deep- rooted belief could be changed unless the Health Belief Model variables are successful inoculated in community. This model suggested that individuals who perceived a risk which can cause low health problems are unlikely to engage in behaviors to reduce their risk of developing that particular health problem, hence, optimal behavioral change is achieved if the Health Belief Model successfully target perceived barriers, benefits, self-efficacy, and threat (Jones *et al*., 2015).

As present study indicated that, 19.4% of the respondent, had awareness/ knowledge/ as anthrax can be easily prevented or control whereas 80.6% respondent did not have awareness.32.9% respondent said anthrax transfer from animal to individual(human beings), causes pain and killer behavior; while 67.1% respondent said no communicable diseases that transfer individual pain and killer nature in this survey. 18.2%respondents said that, in the community, communicable diseasethat transfer from animal to individuals, cause impact; whereas81.8% respondents said in the community, there was no communicable disease has zoonotic nature.However, Wilkinson *et al*. (2017) reported that, the respondent reported reluctance towards heeding the public health messages provided. The control and prevention programs was finally successful when the community was made part of the program using social mobilization action. Other reports indicated that how notions of the community can be problematic if used uncritically (Espino *et al*.,2004; parker *et al*., 2016). On the other hand, socio-economic factors could affect a practice made to avoid a given risk. According to other key informants, the community resisted burying the carcasses of dead animals. Consumption and selling of carcasses in which the animals died from anthrax was reported by other studies; this is not only to make financial return but also as a source of protein(Munang'andu *et al*., 2012; Opare *et al*., 2000; Sitali *et al*., 2017). Key informants also said that there were remote and inaccessibility areas which could not obtain veterinary services. Sitali *et al*. (2018 and 2017) reported that, practices that can be used to prevent anthrax have been impacted by infrastructure. Bruce and Phelan.(1995) postulates that the essential features of fundamental social causes involves access to resources (eg. Money, knowledge, power, prestige) that can be used to avoid risks or to minimize the consequences of disease once it occurs. Likewise, asimilar theory was formulated by phelan *et al*. (2010) which states that differences in socio economic status bring inequality in health.

Qualitative results demonstrate a poor understanding of the anthrax disease overall among the study community. In fact, similar findings were reported from Zambia; quantitative results showed good awareness among respondents while qualitative results indicated poor knowledge concerning the disease in the same communities, and education influences one's access to information and ability to comprehend health messages (Sitali *et al*., 2017). And also involvement of an educated familymembers in farming practices can create awareness and improve knowledge about zoonotic disease(Rajkumar k *et al*., 2016). Indeed, in the present study community was not adequately exposed to public health messages. Sitali *et al*. (2017) claimed that,information regarding the disease from family, friends and neighbours/ colleagues, which increase the likelihood that community members are exposed to mis conceptions and myths surroundings the disease.

The result of current study has revealed that the importance of rabies in the study area. The questionnaire survey on public awareness indicated that community is familiar with the disease, but many fallacies regarding the cause, means and sourceof transmission were observed. Bite was correctly indicated as a means of transmission of the disease by majority of respondents. In the present survey, as respondent farmers said, 19.7% of respondents were bitten by dog while 80.29% respondent said no family/ individuals/was bitten by dogs. In addition to this, 77.94% of the respondent farmers knew/ awared/ rabies clinical signs, whilst 22.05% of the respondent didn't know/ awared/ of rabies symptoms. Comparably, Gebeyaw S. & Teshome D. (2016) in and around Dessie city, reported that, 21.6% of the respondents believed that, any direct or indirect saliva contact (irrespective of skin condition) could serve as means of transmission. However, a simple contact of saliva with intact skin doses not pose risk of rabies virus exposure.

In the current survey, 78.23% respondents said there was occurrence of disease, whereas 21.76% respondent said no occurrence of rabies in the interviewed kebeles. Similarly, as respondent said, 3.8% persons /family members/ were infected by rabies, and died whereas the 96.2% of respondent were not infected or risk groups. Besides this, 32.35% of the respondent of animal health workers said, there was occurrence of rabies in the kebele whereas 67.65% of the respondent said no occurrence of the rabies cases in the community. 55.88% of the respondents of health workers said within the past three years, rabied suspected cases were reported to the veterinary posts, whereas 44.12% of the respondent said no report of the

rabies cases reported to veterinary post. Respondent of the animal health workers during the survey said, there were 10 community/ society groups that was victims/ exposed individuals in the kebeles because of rabied dogs, whereas 32 society groups were not victims/exposed groups as the interviewer reported.

As community farmers said, clinical signs like excitation, paralysisof muscle and excessive salivation, tail bending, biting and aimless movement were reported syndromes in the surveyed kebeles. Comparably, Gebeyaw S. & Teshome D.(2016) reported that, 49.6% respondent indicated that, starvationand thirst were mentioned as the cause of the disease, in and around Dessie city. This idea could probably explained by the opinion of asymptomatic rabies carries dogs in which stressors like starvation and thirst might induce development of clinical rabies in these carrier dogs. But the idea of asymptomatic rabies carrier dogs by itself is a controversial issue (Deressa *et al*., 2010) and the association of stressors to the development of clinical rabies might be an implausible claim.

According to respondents report, reservoirs of rabies in the community were rabied dogs, and wild animals such as fox, hyena and 'tekula' in the kebeles. Comparably, Gebeyaw S. &Teshome D.(2016) in and around Dessie city indicated that, Dogs were mentioned as the cause of infection for most fatal human rabies cases and cat also mentioned as second important source of human infection. In addition, rabies in other domestic animals like cattle, sheep, goats and equines were also mentioned as risk for human.These findings were also reported by Bingham (2005). Domestic dogs have been reservoir of rabies and a source of rabies infection to human and other animals (Joo *et al*., 2011; Tang *et a*l., 2005). In many parts of the world, especially in Africa and Asia, 85-95% of human rabies cases being caused by dog bite (Pitzpatrick *et al*., 2012; Assefa *et al*., 2010).

As respondent community farmers said; in-house tie of the normal dog, killing of the ownerless dogs, provision of traditional treatment for risk groups were measures taken when dog infected with rabies virus for children in families than adult human beings/ elders. In line with this, Gebeyaw S. &Teshome D.(2016) in and around Dessie city showed that, 98.6% of majority of the respondent, groups of populations more risky to the disease were children. This could be due to the fact that children are closely playing with dog at home and even in stress. In addition elders are well aware of the danger of rabies and look for medical care than children (Aworth *et al*., 2011).

The current findings showed that, 17.64% of the community respondents said as the dog was vaccinated, whereas 82.35% respondent did not vaccinated their dog in the kebeles. Similarly, 74.4% of the respondents were know as the rabies vaccine was present while 25.6% of the respondent were said as they didn't know as vaccine was present. However, Gebeyaw S. & Teshome D. (2016) in and around Dessiecity, showed that, 95.3% of the respondent in peri- urban area did not vaccinate their dogs. The reason for low dog vaccination practice in peri–urban area could bedue to large dependency on the traditional treatment using herbs, limitation of on availability, and high cost of vaccines. This is in agreement with Eshetu *et al*. (2002) who noted that, dog vaccination practices was generally very low and totally non existence in rural district of the current study area. Relatively high percentage (50%) of the respondent fromurban areas were found to have a habit of vaccination. But the vaccination program did not meet the expected level. The management system of most respondents in urban areas were kept in door where as almost half of respondent from peri–urban area were let free their dogs. This all indicates that the presence of high risk of rabies. However, in the present research, 90% of the respondent of animal health workers said, rabied dog control and prevention measures were (owner less dog killing, vaccination of the risk groups, tie dog in-house, post and pre prophylaxis treatment for victims of the individuals.

In the present study, for person bitten by dog, the respondent community members said, provision of traditional medicine, and post prophylactic treatment would be better, so traditional method of treatment was mentioned as the best option for treatment for victims of dog bites in most of the respondent both from urban and peri–urban areas. This could be attributed to the low level of education and awareness of the respondents. The practice of traditional treatment was also explained by Jemberu *et al*.(2013) and Eshetu *et al*. (2002). This exclusively demonstrated the importance of extensive public education and improving the accesses to modern treatment to reduce the high dependency of victims on traditional treatment.

On the other hand, the current study illustrated that, 25 respondent of the animal health workers, has taken training on communicable animal disease (Anthrax, Brucellosis, rabies) where as 6 respondent health workers did not take training on the communicable disease in the respective kebeles. However, training on rabies related aspect has not been given at community level. Therefore public extensive education about rabies should be given to community to increase their awareness. Raising community awareness level has been mentioned as important tool to control rabies by many scholars (Bingham.,2005; Eshetu *et al*.,2002). Raising awareness about dog vaccination and improving access and affordability of the vaccine should be considred in control of the

disease as dog are the main reservoir of the disease. Besides this, strategic vaccination programs, isolation of sick animals, avoidance of contact with risk groups, awareness creation of community members, health extension workers, veterinary experts, kebele leaders, community/ social mobilization, sanitary measures, surveillance, and monitoring should be implemented in order to mitigate the risks as animal health workers reported.

Knowledge and perception about brucellosis among farmers are crucial in controlling disease transmission. In this study, we interviewed farm workers, animal health worker, and health extension herd owners to assess their awareness levels about brucellosis and occupational risks using structured questionnaire.

In the current study, 73.52% of the respondent animal health workers said that abortion occurred in their kebele, whereas 26.47% of the respondent said no abortion /brucella occurrence in the kebele and about 190 animals were exposed to abortion in 34 kebeles as the animal health workers reported.96.47% of the respondent farmers possessed cattle, sheep and goats whereas 3.52% respondent did not possess ruminants. 53.8% of the respondent in the community said, as the aborted cases were present while46.2% of the respondent said no abortion cases encountered in their kebeles. Beside this, as respondent farmers said, 113 cattle, 38 sheep, and32 goats were aborted before.90% the respondent answered as abortion occurred in first pregnant period, while 10% of respondent said as it occurred in rare cases in late trimaster.88.23% of the respondent said no syndromes/clinical signs/ shown on the product used individuals but11.76% of them indicated that, undulant fever, joint cramp and bone pain, infertility, production loss and repetitive abortions/still birth / were clinical manifestation that occurred in cases of the brucellosis.26.76% of the respondent farmers said or /do have awareness as abortion/ brucellosis was transfer from animal to individuals and causes disease; while 73.23% respondent said no transfer of the diseases from animal to individuals. This finding was comparable with previous findings of Jergefa, *et al*. (2008) who reported in lowland, midland and highland (15.3%,10.3% and 10.3%) of the respondent had awareness about the brucellosis respectively while 84.7%, 89.7% and 89.8% of the respondent did not have awareness about brucellosis in the agro ecology, in three agro-ecological areas of central Oromiya, Ethiopia. Similarly, Jergefa, *et al*. (2008) reported, lowland, midland and highland (6.8%, 10.3% and 8.5%) of occurrence of abortion respectively while 93.2%, 89.7%, and 91.5% of the respondent did not know the occurrence of the abortion, respectively, in three agro-ecological areas of central Oromiya. The present survey was relatively inconsistent with Begna B *et al*. (2020) who reported that, 16.7% of respondent as had awareness about brucellosis and 83.3% did not have awareness about brucellosis in herd level, in and Around Adama Town, Oromia Regional State, Central Ethiopia. Similarly, the authors studied, 52.38% of respondent said as zoonotic disease transmitted via milk consumption and 47.62% of respondent said as it could not transmitted. And also 14.28% of the respondent said that human infected with brucella whereas 85.72% said human not infected by brucella in the herd while managing them.

Comparably, Hagos A *et al*. (2016) reported that, 70 % of the respondents were regarded as having good knowledge/awareness/about brucellosis in the intensivediary farms, in and around Alage District, Ethiopia. In contrast to this, Hagos A *et al*. (2016) said that, the awareness level of the farmers was significantly lower in extensive farms. 78.3 % of the farmers were regarded as having poor knowledge and observed poor hygienic practices and uncontrolled animal movements. These could pose high risks of transmitting the disease within and in between the herds. This is in agreement with previous studies in extensive livestock production system in Ethiopia (Ragassa *et al*. 2009; Megersa *et al*. 2011). The occurrence of brucellosis in humans is associated with contact with domestic animals (Alballa.,1995), and exposure to aborted animals and assisting animal parturition (Cooper.,1992; Kozukeev *et al*., 2006).

On other hand, Begna B *et al*. (2020) who studied that, the existence of previous history of abortion and retained fetal membrane was, significantly associated with animal level sero-positivity in the present study, in and Around Adama Town, Oromia Regional State, Central Ethiopia. This could be explained by the fact that, abortions and/or retained placenta are typical outcomes of brucellosis (Abebe A *et al*., 2008 and Alemu F *et al*., 2014). Other studies have also shown a significant association between sero-positivity, and history of abortion and retained fetal membrane (Tesfaye G *et al*.,2011; Kubau for DK *et al*., 2000). Similarly, a number of studies in different African countries also show that individual animal brucellosis sero-prevalence correlates with the presence of abortions (Muma JB et al., 2012 and Bekele A *et al*., 2000).

99.4% of the respondent members said no pain feeling when using milk or meat especially of apparently healthy animals, whereas 0.6% of the respondent said, there might be pain feeling, while consuming uncooked meat or unpasteurized milk because of the risk of the communicable diseases. 96.76% of the respondent of the community members said that, no use of /milk or meat/ from aborted animals or habit of using unpasteurized milk, and uncooked meat whereas 3.23% of the respondent said that, there

was use of milk/meat/ or habit of using unpasteurized milk, uncooked meat. As compared to the present findings, the previous findings of Hagos A *et al*. (2016) indicated that, the majority of the participants in both types of farms have the habit of drinking raw milk or eating raw meat. Prevalence of brucellosis in humans is attributed to the culture and tradition of consuming raw milk and milk products (Omore *et al*., 1999). 90% of the respondent of animal health workers said that, animal abortion/ brucellosis disease control measures are avoidance of contact with risk groups, didn't use milk and meat products of exposure groups, proper treatment and sanitary measures.

6. Conclusion

In present study, 34 animal health workers, health extension, and kebele leaders were interviewed on 34 kebeles of Asossa, Bambasi and Homoshaworedas. The retrospective secondary data source of rabies, anthrax and brucellosis were assessed. Overall 9/384 (2.34%) sero prevalence of bovine brucellosis was recorded in the 20kebeles. The highest brucella prevalence was recorded in Homoshaworeda(9.75%) and lowest prevalence was seen in Bambasiworeda (1.44%), significant association was observed($p<0.00$). Sex, body conditions, and age were not significantly associated in this study. 14.28 % bovine brucellosis prevalence was registered whist relatively 5%, 9.09%, 2.27%, 3.03% prevalence were recorded in Dunga, Mutsakosa, Megel39, Komoshiga26 respectively in the studied kebeles of the woredas. The respondents were assessed for the existing problems in 34 selected kebeles, from community farmers, animal health workers, health extensions and kebele leaders. They were interviewed for their perception of communicable animal disease occurrence, symptoms, causative agent, the possible factors contributing for the occurrence of disease, habit of using animal product (milk, meat) and the risk /exposure groups, rabies suspicion care for dog and risk families, number of sick, died animals in the community and their preference of treated cases were assessed, vaccination habit of community for dog, cattle, and shoats; number and duration of aborted ruminants; use of aborted and anthrax suspected animal products (milk, meat) cases and pain felling situation and the knowledge, awareness and attitudes of community on Anthrax, brucellosis and rabies zoonotic disease in the area were assessed in this study.

7. Recommendation

Based on the conclusion, the following points are forwarded

- On the identified risk factors, the best control and prevention measures should be designed;
- For assessed cases of Rabies, anthrax, and brucellosis strategic prevention and control measures should be scheduled before their occurrence;
- Community farmer's awareness, attitudes, knowledge's on the communicable animal diseases should be improved;
- Community animal health workers, health extension workers, and kebele leaders should be trained on communicable animal disease so as to minimize the risk of the disease;
- Vaccination programs should be scheduled based on seasonal occurrence of the kebeles;
- Retrospective data should be updated every year so as to design control strategy;
- Human and animal health workers should be strengthen their link on one health approaches for best disease control strategy;
- Anthrax disease occurrence information should be assessed further due to its killer and per acute nature, zoonotic and global bioterrorism nature;
- Other communicable disease(Bovine tuberculosis) that easily transfer from animal product to consumers via milk and meat cases should be further studied;
- Strategic control measures on brucellosis, anthrax and rabies should be implemented in one health approach.
- Awareness creation should be conducted continuously as community for farmers and professionals in general.

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9. Questionnaire survey for means of Data collection

Region…zone…woreda….kebele…respondent name

- **Questionnaire survey on communicable animal diseases**

Table A:Closed interview on communicable animal disease for Farmers

- Do you have dogs, if yes, how many?
- Was there rabies virus occurrence on dog, if so, how many were sick and died?
- Did you knewrabied dog symptoms? If yes list them.
- Whendogwas infected with rabies, precautions taken/ action taken/ for dogs and risk families?
- What was causes for rabied dog?
- Among your family, was there dog bitten? If so, list them
- What kind of treatment was given for dog bit man?
- Was there rabies infected and died man, in your community members?
- Do youvaccinated your dog?
- Do you know as rabies vaccinewas present?
- Do you possess cattle, sheep and goat?
- If yes, how many cattle, sheep and goat aborted before?
- In what period of month, the pregnant animals were aborted?
- Do you use/milk or meat/ from aborted animals /, habit of using products/ of community?
- If yes, product used, have they pain feeling?
- With brucella cases, sick persons, symptoms

- Do you have awareness, as brucella cases transfer from animal to human causing disease?
- Was acute and killer animal disease occur in you or oncommunity cattle?
- If yes, list down the disease
- Did anthrax disease occur on cattle?
- If yes, how many animals died on this disease
- List, symptoms of anthrax disease on cattle
- Did community /farmers/ use meat from anthrax suspect/sudden death/ animals
- If yes, how many family members sick by using the product?
- Did you have awareness as the anthrax easily prevented/ control?
- Did you know as anthrax transfer from animal to human and pain, cause impact?
- Nowadays, was there in the community, disease that transfer from animal to human, and cause impact
- If yes, in community nomination what was it? List the symptoms?
- As community, was there meat inspection?

Table B*:* Interview on communicable animal disease for community Animal Health Workers and Health Extensions

- Do you obtain training on communicable disease?
- As kebele how many dog was there?
- What do mean Community based rabid dog disease?
- List rabid dog disease control measures
- Was there rabid dog occurrence in your kebele?
- In past three years, rabied dog cases were reported
- List rabies virus risk groups in your community
- Nowadays, what was doing to control rabies cases
- What do mean community based brucella / abortion/ disease
- What are animal abortion disease control measures
- Was there abortion disease occurrence in your kebele
- If yes, how many animals exposed to abortion
- How was community, milk and meat feeding system
- Was there, contact with disease, and use milk/meat and risk groups
- If yes, how many human was victims
- What do mean community based anthrax disease
- List anthrax disease control and prevention measures
- Was there, anthrax disease suspicion in your kebele?
- If yes, how many animals were sick /died
- Was there community, contact with suspected case of anthrax /meat, carcass /animals and sick
- How many human were sick in this suspected anthrax cases
- List comment on; communicable disease (seasonal occurrence, impact and future measures taken)
- Do you report communicable animal disease in your kebele
- If yes, list the disease types and reporting to whom
- Except those three disease, list communicable disease that transmit from animal to human

Table C: Closed interview on communicable animal disease for kebele leaders

❖ How was the occurrence of anthrax, brucella, and rabies and response way of community in kebele ?

❖ The communicable animal disease, impact and future, community based activities for control and prevention ……. ……;

❖ In community, how was communicable disease contact with animal product, and cause disease;

12/21/2021