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Ethnozoological Study of Traditional Medicinal Animals in Dangila District, North Western Ethiopia

Yihenew Arega Nibrit[1,2] and Mohammed Kasso[1*]

[1]Department of Biology, College of Natural and Computational Sciences, Dire Dawa University, Dire Dawa, Ethiopia

[2] Department of Biology, Demo Secondary School, Dolo, Ethiopia

Abstract

There is evidence that human beings are familiar with the use of animals and plants for food, cloth and medicine. In Ethiopia, many ethnic communities have been dependent on local traditional medicinal system for their health care. Thus, the aim of this study was to carry out animal based traditional medicinal use of Dangila people. In order to document the ethno zoological information about animal and their products a study was carried out from May to July, 2022.The data was collected through semi-structured questionnaire and interview from the 80 selected respondents. Then the name of animal and other ethno zoological information were documented. A total of 52 animal species were reported to be used to cure 65 human ailment including swelling, malaria, tumor, cough, paralysis and joint pain and for other religious/and ritual purposes. Based on the ethno-zoological survey, 28 mammals, 10 birds, 7 reptiles, 4 arthropods 2 fishes and 1 annelid are used in traditional zootherauptics in the study area. Furthermore, the skin of hyena that used to relieved evil eye has the highest fidelity level (FL) (64%) whereas Colobus monkey has the lowest FL (3%) used treat mumps. The overall results indicated that ethno-zoological practices have been an important alternative medicinal practice for the people residing in the study area. It is hoped that this information will be useful for further research in the field of ethno-zoology, ethno- pharmacology and conservation point of view.

Keybord: Biodiversity, Dangila, Ethnozoology, Zootherapy

2. Introduction

Since the ancient time, people have used animals for multiple purposes like as sources of food and medicines by the accumulated knowledge of significance interaction with animals and plants (Martin, 1995; Chaudhury *et al.*, 2016). World Health Organization (WHO, 2000) reported that around 70-80% of the world's rural population relies for primary health care on traditional medicine. The application of traditional medicine that derived from plant, animal and minerals as medicines, spiritual therapies, manual techniques and exercises has is used to treat, diagnose and prevent illnesses (WHO, 2003). The treatment of human diseases using animals and animal-derived treatments is known as zoo-therapy (Costa-Neto, 1999).

**Corresponding author: Mohammed Kasso; Email: muhesofi@yahoo.com; Mobile:+251911015198*

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Using animals and their products to treat patients suffering from various health problems has a long tradition and is still popular in many parts of the world (Jugli *et al*., 2019). Knowledge on traditional medicines by indigenous communities around the world that help them to heal, avoid and mitigate diseases is derived from their cultural traditions, indigenous values, ideas, and rituals (Young, 1983). Animal-based treatments have been shown to be successful in several applications and in recent times they constitute a significant part of traditional pharmaceutical products. Anageletti *et al.*, (1992) and Rosner (1992) reported that in traditional treatments, animals and their products have been used internationally, playing significant roles in healing practices, magic rituals, and religious practices amongst various cultures and communities.

Faunal resources have played significant roles in human life from the earliest days of recorded history for medicinal purposes to treat and cure diseases and to improve the health and well-being of humans and livestock. Since prehistoric time's animals, their parts, and products have been used as part of an inventory of medicine in numerous cultures (Lev and Amar, 2000). Ethnozoology to be a discipline, referring to it as the study of existing cultures and their relationships with the animals and their environments. Overall ethnozoology viewed as the study of human knowledge of the uses of animals. Marques (1997) considered it as the trans-disciplinary study of the thoughts and perceptions (knowledge and beliefs), sentiments (affective representations), and behaviors (attitudes) that intermediate the relationships between human populations and the species of animals in the surrounding ecosystems. Although animals have played important roles in all human cultures since ancient times, specific studies about the uses of animals have always lagged behind similar studies devoted to plants. A pioneering work by Henderson and Harrington first used the term ethnozoology combined with ethnobotany (the latter being a much older name). Although this work did not stimulate much additional research when it was first published, a considerable body of knowledge about the utilization of animals by primitive societies could still be found in a variety of publications.

In the same context, Chemas (2010) remarked that the treatment of illnesses using animal-based remedies is an extremely old practice. These observations are in line with the view of nature as providing many things for humankind, including tools for the first attempts at therapeutic intervention (Nakanishi, 1999). The whole animals, animal parts,

and animal-derived products constitute important elements of the material-medica (Alves and Rosa, 2005; Alakbarli, 2006).

Ethiopia is endowed with a diverse set of faunal resources that are useful to human beings in one or another way. They are used to fulfil their basic requirements as the source of medicines, shelters, food, fragrances, clothes, flavors, fertilizers, and means of transportation throughout their lives (Wendimu *et al.*, 2021)

Ethiopia is the land of great topographical diversity with altitude ranging from 120 meters below sea level at Danakil Depression to about 4,620 meters above sea level at Semen Mountains. The topographical variation of the country has made diversified climatic condition (tropical, subtropical and temperate) possessing a heterogeneous and rich endemic species of vegetation (Dawit, 2001). In Ethiopia over 320 species of mammals, above 860 species of birds, 200 species of reptiles, 63 species of amphibians, and 145 species of fish diversities have been reported (Afework and Yalden, 2013). The world health organization estimates that most of the world's population relies primarily on animal and plant-based medicines (WHO, 2000). Of the 252 indispensable chemicals that are selected by the WHO, 8.7% are derived from animal resources (Alves and Rosa, 2007). However, the traditional medicinal animal's utilization in Ethiopia are limited when compared with the multiethnic cultural diversity and the diverse fauna of Ethiopia. This knowledge and usage of medicinal animals is being lost globally at a faster rate due to the impact of modern education, increase in health coverage and urbanization (WHO, 2002). According to the FAO (2009), the human population is set to reach nine billion by 2050, meaning a greater demand for food, water and energy. As a consequence, pressures on wild species and natural ecosystems are becoming increasingly severe, resulting in an increase in hunting, fishing and other exploitation of the faunal resources.

In north-western Ethiopia, the medicinal uses of 51 animal species have been identified to treat around 36 different ailments. Of the animals used therapeutically, 27 species mammals, 9 birds, 7 arthropods, 6 reptiles, and 1 species each represented fish and annelids have been used (Kendie *et al.*, 2018). In southern Ethiopia, the medical use of 21 animal species was identified to prepare remedies for 46 different ailments. Of the

animals used therapeutically, 14 species were mammals, 3 species were reptiles and 4 species were birds (Dereje and Meseret, 2014).

In Dangila District, the local people have their own indigenous medicinal knowledge with traditional practices accumulated for generations to treat both human and livestock ailments. As if our preliminary gathered information showed us there is not ethnozoological studies or written document on the traditional practice. As well as animal species of medicinal value, which is, used by the traditional healers to treat various diseases in the district is also scant.

It is important to document the traditional knowledge of human communities, since the majority of such communities are losing their socioeconomic and cultural characteristics (Alves and Rosa, 2005). In Ethiopia, many ethnic communities mainly use local traditional medicine for their health care. In this particular study area (Dangila District), documentation on ethnobotanical and ethnozoological studies were not enough as such to assess medicinal related knowledge, perception and attitude of the local communities. Therefore, this research was focused on assessing and identifying ethnozoological knowledge and practices used for maintaining the health and curing diseases of humans. In addition, the documentation of the indigenous knowledge on medicinal animals can be use as baseline information for those who want to conduct further research in ethnozoology in the area. Also it was used as sources of information on the utilization and relevance of medicinal animals for sustainable use and development in the District. Furthermore, the present study is used to document the indigenous knowledge on utilization, type of animals used to threats human and animal disease and their conservation status at Dangila Woreda, Awi Zone, Western Ethiopia.

3. Materials and Methods

3.1. Materials

Dangila Woreda, is found in Awi Zone, Amhara Regional State, northwestern Ethiopia, that extends between 11°18’ N and 36° 57’ E. It is located 485 km north west of Addis Ababa and 78 km from Bahir Dar (DTADO, 2018). It ranges from an altitude of 1850m to 2350m above sea level. Dangila is bordered on the south by Faggeta Lekoma, on the southwest by Guangua, on the northwest by the Jawi, and on the northeast by the Mirab

Gojjam Zone. The total area of the Woreda is 918.40 km^2. It has37 *Kebele* administrations of which 27 are peasant associations while 10 is urban administrative.

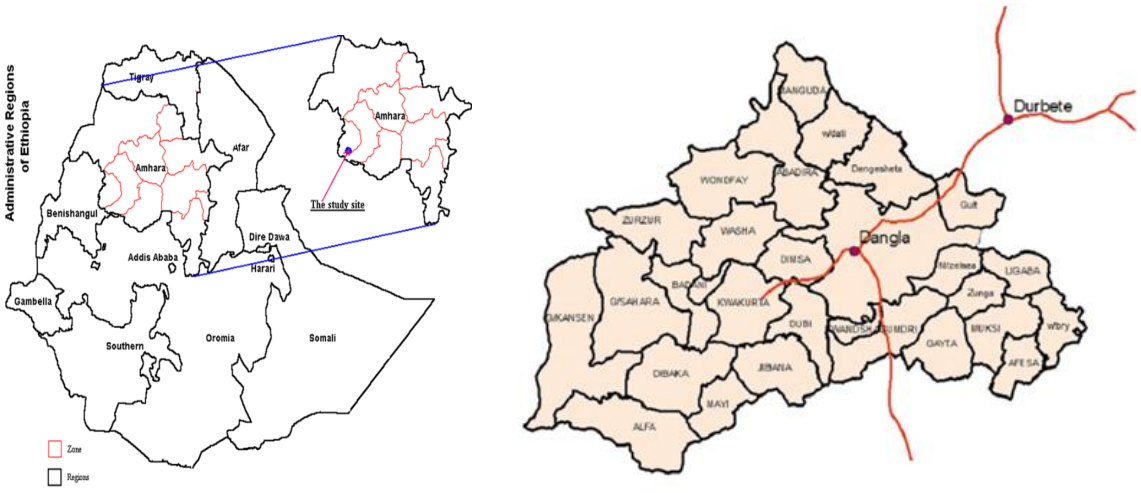

Figure 1 : Map of Dangila Woreda and Kebele Source: (DTADO, 2018)

The agro-ecology of the district comprises of *Woina Dega'* (65%) (mid-temperate-mid-high land) and "*kolla*'' (35%) (hot -temperate-low land). The district has two cropping seasons, "Belg" (short cropping season) and *Maher* (main cropping season). The *Belg* season is from January to March, while the *Maher* season is from May to September. The rain during the *Belg* season is non-consistent and inadequate. The *Maher* rain is also irregular in amount and distribution. Annual rainfall is around 1,600mm with the main rainy season occurring June-September. The mean maximum and minimum temperatures are 18.05^{o}C and 15.6^{o}C, respectively (DTADO, 2018)

Based on the 2007 national census data the total number of population is about 158,688 (male=80235 and female= 78,453) (CSA, 2007). Crop and livestock mixed subsistence farming is the basic source of livelihood to the people. The two largest ethnic groups reported in Dangila were Amhara (78.65%), and Awi (21.13). Amharic was spoken as a first language by 83.24% and 16.65spoke Awngi, the majority of population (97.9%) practice Ethiopian orthodox Christianity, while the rest practice Islam. The district *kebeles* served by 5 health care centers and 29 health posts. However, in health center there is not enough drug, equipment and knowledgeable health workers distribute in all heath center and the drug cost of private clinics are very high (DTHO, 2018). Therefore, people were forced to consult to traditional healers.

Preliminary survey

A preliminary study was conducted in March 2022 to select study sites in the district and to test data collection tools. Based on the preliminary survey four *kebele* were purposely selected based on the availability of many traditional healers in district. These Kebeles 04 kebele, Abadira, Dengeshita and Dubi. In the preliminary survey the sketching out of the overall status of medicinal animal use practices in study area were conducted. Based on the preliminary survey and following the Martin (1995) the informant selections method 80 informants (58 males and 22 females) with the age of 18-82 were included regarding gender, social status and educational background. Traditional healers and knowledgeable informants were selected purposefully based on the recommendations obtained from the local authorities, elders and religious leaders. The purposively selected informants were local traditional healers, elders and person who have many years of experience with traditional medicinal use in area. The other informants were selected randomly from the local people of the study area to see the perception toward the traditional medicinal animals.

Data collection method

The ethnozoological data collection was carried out from May–July, 2022. The collected information includes the local name of the animals used for medicinal purpose, mode of preparation and administration, part of the animal used and the information about the supplementing ingredients. As the data collection tool questionnaires, a semi-structured checklist and interview questions. The interviews were made at the residence of each consent. Ethnozoological data (name, mode, preparation and administration and part of the animal used) were collected through questionnaires and interview. The interviews have supported by checklist, and a few issues will be raised promptly counting on the responses of an informant. The place and time for the discussion were set based on the interest of the informants.

3.2. Methods of data analysis

The collected data were tabulated and organized and analyzed using SPSS Version 20 and results were reported using simile descriptive statistical methods like frequency distribution and percentage. Slight modification on the method of Kendie *et al*. (2018) were used to categorize the utilization of animal parts and its products based on the usage reports mentioned by the informants within the study area.

Fidelity will be calculated as the percentage of respondents claiming the use of a certain animal species for the same ailments, for the most frequently reported diseases or ailments as

Fidelity level (%) = Np/N*100

where Np is the number of respondents that claim a use of a species to treat a particular disease and N is the number of respondents that use the animals as a medicine to treat any given disease The range of fidelity level (FL) from 1 to 100% were considered. The high values indicate as the particular animal species is used by large number of people, while a low value shows that respondents disagree on the usefulness of a species in treating the stated ailments.

Relative frequency of citation (RFC) index computed following Vitalini *et al*. (2012) to show the local importance of each species. The RFC value was calculated using the formula RFC = FC/N; where FC is the number of informants mentioning the use of the species and N is the number of informants participating in the survey (This RFC index varies from 0 to 1. When the RFC index is 0, it means nobody refers to the animal as useful and when the RFC index is 1, it indicates that each one informant in the survey refers to the animal as useful (Mootsamy and Mahomoodly, 2014).

Ethical consideration

All guidelines set by the international society of ethnobiology codes of ethics were followed to collect the ethnozoological data. In addition, research permission was obtained from Dire Dawa University Institutional Review Board (IRB) and from other support and cooperative letters from different offices. From all respondents the oral consent was obtained before the interview. The researcher was explained to all respondents in brief.

4. Results

3.1. Indigenous Knowledge of the study area

In the study area, the local communities had their own indigenous medicinal knowledge. This study revealed the traditional medicinal knowledge of treating various kinds of ailments using different animals and their parts/products by local inhabitants of different *kebeles* of the study area. Many people were found to lack formal schooling education,

but they have knowledge about the use of local animal resources for traditional medicines. Socio-demographic characteristics of the respondents such as sex, age, educational level, and marital status were collected and presented (Table 1).

Table1. Socio-demographic characteristics of the respondents

Basic information		Number of respondents	Percentage (%)
Sex	Male	58	72.5
	Female	22	27.5
Age	18-35	32	40
	35-60	34	42.5
	>60	14	17.5
Educational level	Illiterate	24	30
	Literate	56	70

3.2. Human and livestock traditional medicinal animals in study area

In the study area, 52 medicinal species were documented and found to be used for the treatment of more than 65 kinds of different ailments. There were 28(53.8%) species belonging to mammals, 10(19.2%) birds, 7(13.5%) reptiles, 4 (13.5%) arthropods (7.7%),2 fishes (3.85%), and 1(1.9%) annelid (Table 2). In general, the local people in Dangila Woreda used traditional medicine for any health problem occur in both human and livestock health problem before going to modern medication.

Table 2. Animal groups and number of species used for traditional medicine in the study area

Animal group	Number of species	percentage
Mammal	28	53.8
Bird	10	19.2
Reptiles	7	13.5
Arthropods	4	7.7
Annelids	1	1.9
Fish	2	3.85

3.3. Animal parts or products used for traditional medicine in the study area

In the study area, traditional medicine was prepared by using various medicinal animals' parts. The animals and their parts/products were found to be used for the treatment of more than 65 different kinds of ailments including evil eye, malaria, tumor, joint pain, pneumonia, ulcer, hypertension, rabies, tuberculosis, hepatitis, trachoma, gastritis,

asthma, paralysis, and cough. The animals were used as whole or their products like milk, blood, organ, meat, teeth, and honey for the treatment of various ailments (Table 3). The product or part-wise utilization of the grouping of animals as traditional medicine indicated as the use of various parts and products of the animals in the preparation of traditional remedies for different types of ailments in the study area. For instance, meat/fat was the most widely used medicinal parts/products of animals in traditional medicine, followed by animal products and external body parts, and visceral organs. On the other hand, excreta, blood, hole body and bone/teeth were found to be the least used medicinal parts/products of animals.

Table 3. Animal parts or products used to traditional medicine in the study area

Medicinal parts/products of animals	**No. of parts/ products used**	**Percentage (%)**
Meat/fat	44	34.1
Products (honey, venom, milk, butter)	29	22.5
External Body part (head, tail, leg, skin, horn, spine/thorn)	24	18.6
Visceral organ (liver, spleen, Bile, stomach/intestine)	13	10.1
Excreta (stool and urine)	12	9.3
Blood	3	2.3
Whole body	2	1.55
Bone/teeth	2	1.55
Total	**129**	**100**

3.4. Mode of application/administrations of traditional medicines in the study area

The traditional remedies were administrated through different routes viz. oral, dermal and nasal. The most frequently used route was oral (46%), followed by dermal (36.39%) and nasal with (8.55 %) (Table 4). The application methods of prepared remedies vary depending on the nature, size, and shape of the animals, part of animals, and products. The traditional medicines were administrated via different modes like eating that followed by anointing, drinking, tying, fumigation and massaging and biting and sitting on it were the major modes of application (Table 4). Solids and liquids were administered orally, whereas sitting on the back, biting, anointing, and massaging materials were applied to the skin. Medicinal fumes were allowed to enter the body via the nose, while some parts of animals like bones, skin, and teeth were believed to serve a healing purpose by tying them on the neck or other parts of the body.

Table 4. Mode of application/administrations of traditional medicines

Mode of application	No. of application	Percentage (%)	Mode of application
Eating	47	36.4	oral
Anointing	43	33.3	dermal
Drinking	13	10.1	oral
Tying	11	8.55	Not entry
Fumigation	11	8.55	nasal
Massaging	2	1.55	dermal
Biting	1	0.77	dermal
Sitting on the back	1	0.77	dermal

3.5. Methods of preparation of traditional medicinal in the study area

In Dangila Woreda, there are different methods of preparation traditional medicine. Preparations varied according to ailment and involved cooking, burning, crushing/grinding, and drying or the use of fresh animal parts/products (Table 5).

Table 5. Methods of preparation of traditional medicinal in the study area

Types of preparation	No. of preparation	Percentage (%)
Fresh	68	52.7
Cooking	34	26.3
Drying	12	9.3
Burning	9	6.97
Crushing/grinding	6	4.65

3.6. Relative frequency of citation

The Relative Frequency of Citation (RFC) index was calculated to determine the local importance of each species. The most cited animal was: Spotted hyena (RFC = 0.86), Cow (*Bos taurus*) (RFC = 0.66), Francolin (RFC = 0.64), bats (RFC = 0.56), honey bee (*Apis mellifera*) (RFC = 0.54) and Stingless bee (*Trigona spp*) (RFC = 0.51). The highest value of the RFC index was scored by Spotted hyena which demonstrates the importance of this animal species in the study area as it was mentioned by a higher number of informants. However, animal species with low RFC value for instance Tortoise (RFC = 0.025) and Colobus monkey (*Colobus guereza*) (RFC = 0.012) do not mean that they are not important locally but it may be that most of the people are not aware of their therapeutic properties (Table 6). The detail RFC for each animal and disease was provided on Table 6.

3.7. Fidelity level

Fidelity levels (FL) demonstrate the percentage of respondents claiming the use of a certain animal or its product for the same ailments (Table 6).

Table 6. Medicinal animals, their parts/products used, fidelity level and relative frequency of citation of the selected animals

Common names	Parts used	Aliments treated	FL	RFC
Bush pig	**Meat**	**Evil sprit**	**26**	**0.51**
	Meat	Wising	13	
	Meat	Hypertension	3	
	Blood	Joint pain	6	
	fat	Discoloration	4	
Cow	Horn	Malaria	3	0.66
	Yoghurt	Poisoning	13	
	Yoghurt	Alcohol intoxication	10	
	Yoghurt	Thunder storm	4	
	Butter	Constipation	8	
	Butter	Urticaria	2	
	Butter	Cough	1	
	Cheese	Abdominal distension for human	1	
	Cheese	Malaria	11	
	Cheese	Abdominal distension for cattle	3	
	Urine	Scabies	1	
	Liver	Heart problem	3	
	Intestine	Sole fissure	4	
Porcupine	Thorn	Tumor	9	0.41
	Thorn	Hemorrhoid	16	
	Thorn	Urticaria	8	
	Thorn	Melasma	5	
	Dry meat	scar	4	
Hyena	Skin	Evil eye	64	0.86
	Liver	Evil eye	5	
	Bile	Evil eye	18	
Bat	Meat	Hepatitis	56	0.56
Camel	Bile	Watery eye	6	0.46
	Excrement	Urticaria	1	
	Excrement	Asthma	28	
	Excrement	Dandruff	1	
	Hair	Enuresis	4	
Chicken	Broth	Swelling	16	0.31
	Egg	Cough	3	
	Intestine	Swelling	9	
	Shank	Baldness	4	
Francolin	Meat	Asthma	58	0.64
	Bile	Ophthalmic disease	4	
	Blood	Gastric	3	
Guinea fowl	Meat	Asthma	31	0.46
	Skin	Acne	5	
	Dry meat	Tuberculosis	9	
Honey bee	Larva	Paralysis leg	14	0.54
	Bee	Paralysis leg	13	
	Honey	Anthraxes	10	
	Honey	Cough	4	
	Honey	Abdominal pain	5	
	Honey	Cellulites	6	
	Drone hole body	Vocal problem	3	
Stingless bee	Honey	Swelling	24	0.51
	Honey	Cellulites	14	
	Honey	Anthraxes	9	
	Honey	Cough	5	

The skin of Spotted Hyena (*Crocuta crocuta*) to relieve evil eye had the highest FL (n = 51, 64%) followed by meat of Francolin (*Perdix perdix*) to treat asthma (n = 46, 58%), meat of bat treat hepatitis (n = 45, 56%), meat of Guinea Fowl (*Numida meleagris*) to treat asthma (n = 25, 31%), excrement of camel (*Camelus dromedaries*) to treat asthma (n = 22, 28%), (Table 6). The detail medicinal animals, their parts/products used, frequency of citation and fidelity level is provided on Table 6.

5. Discussions

Many cultures still employ traditional medicine incorporating animal-derived remedies. Probably the most famous of these are the Chinese, who use animals to treat a variety of ailments. Although less known and less frequently studied, Latin America and Africa both have a long tradition of using their equally varied and rich fauna, including many endangered species, to treat all kinds of ailments. For example, in Traditional Chinese Medicine (TCM), more than 1,500 animal species have been recorded as being of some medicinal use (Yinfeng *et al.*, 1997). In India nearly 15–20 % of Ayurvedic medicine is based on animal derived substances (Unnikrishnan, 1998). In Latin America, at least 584 animal species have been used in traditional medicine (Alves and Rosa, 2011). Zootherapeutic practices are also found in Europe (Quave *et al.*, 2010; Voultsiadou, 2010). Mammals, fish, reptiles, birds, molluscs and insects, including threatened species, are prominent amongst the main animals used in traditional medicine (Alves *et al.*, 2010) substantiating the importance of understanding such uses in the context of animal conservation.

In Ethiopia, 70% of human and 90% of livestock population depend on traditional medicine (Birhanu, 2013). In this study, 52 animal species and their products were collected and identified that were believed to be a cure/prevention of around 65 different kinds of ailments. Other studies reported in Ethiopia showed that approximately 23 animals and/or their parts were identified to be used in traditional medicines in Degu tribes in Tigray Regional State (Haileselasie, 2012). Sixteen species of medicinal animals were collected and identified for treating 18 different human ailments in the Kafta-Humera District, Northern Ethiopia (Gidey *et al.*, 2011). The study conducted by Borah and Prasad (2017) also recorded a total of 44 different species of animals which are used for the treatments of 40 different ailments in gibbon wild life. In South Africa, 147 medicinal vertebrate species representing 60 mammal species, 33 reptile species,

53 bird species and 1 amphibian species were recorded (CNCTHM,1995). Assegid (2014) also described 23 animal species that used as traditional medicines (. In the same way Melesse *et al.* (2015) of a total 36 vertebrate species used in the treatment of ailments and disease, mammals comprised 50%; they were birds, fishes, reptile, and amphibians.

The inhabitants of the study area were found to use different parts/products of animals for the treatment of different kinds of ailments. Animals and the products derived from their body organs constitute part of the inventory of medicinal substances (Alves and Rosa, 2005). Meyer-Rochow also reported different organs of invertebrate animals used as traditional medicines (Costa-Neto, 1999). In this study, parts/products of medicinal animals were grouped under meat/fat, blood, visceral organ, whole body, excreta, bone/teeth, and product categories and these categories were similar to ones reported by Haileselasie (2012). Other research result conducted by Anyinam (1996) also stated that the wild and domestic animals and their by-products such as hooves, skins, bones, feathers, and tusks are important ingredients in the preparation of curative, protective, and preventive medicine.

The preparation and uses of medicinal animals accomplished in various formulations. Ethnozoological studies done so far showed that most common methods of medicinal preparations are cooking, burning, crushing/grinding, wrapping, powdering, and drying or the use of fresh animal parts/products (Kendie *et al.*, 2018). Researches on medicinal animals in various parts of Ethiopia, for instance, reports in Metema area by (Kendie *et al.*, 2018), depicted the existence of application in which oral (53.2%), dermal (27.1%), tying (16.8%), nasal (2.8%) are common. The dosage or amount and unit of measurement of medicinal animals used by traditional healers vary according to the type of health problem. Gidey *et al.* (2011) showed medicinal animals have various methods of preparation for different types of ailments like crushing, powdering, squeezing, direct use, and cooking. Haileselasie (2012) reported that animals are used as whole or body parts or by products like milk, blood, organ, flesh, antler, and feathers for the treatments of different kinds of human ailments including cough, asthma, tuberculosis, paralysis, ear-ache, herpes, weakness, and muscular pain. Preparations varied according to ailment and involved cooking, burning, crushing/grinding and drying (Costa-Neto,1999). In this

study, egg is considered as one of the products of animals. In present study the egg of Great Cattle Egret (*Ardea alba*) was mentioned as a traditional medicine that used to treat cough, phenomena. Gidey *et al*. (2011) showed medicinal animals have various methods of preparation for different types of ailments like crushing, powdering, squeezing, direct use, and cooking. Haileselasie (2012) reported that animals are used as whole or body parts or by products like milk, blood, organ, flesh, antler, and feathers for the treatments of different kinds of human ailments including cough, asthma, tuberculosis, paralysis, ear-ache, herpes, weakness, and muscular pain.

This study showed that traditional medicines were administrated by drinking, eating, anointing, tying, biting, sitting, fumigation, and massaging. The study conducted by Gidey *et al*. (2011) showed most of traditional medicines were administrated orally and through dermal. Fumigating materials such as smokes were also entering into the body using nasal opening to treat different ailments. The similar application for some parts of animals such as bones, skin, and teeth as medicine by tying on the neck or other parts of the body were also recorded in the study conducted by Jaroli *et al*. (2010).

The skin of Spotted Hyena (*Crocuta crocuta*) to relieve evil eye had the highest fidelity level, whereas ear of colobus monkey (Colobus guereza) to cure mumps, tail of Python (*Python sebae*) to treat evil spirit, the whole body of tortoise (Testudinidae) to cure infertility, and meat of lizard (Lacertilia) to cure cattle health have the lowest fidelity level. On the other hand, Jaroli *et al.* (2010) stated that the uses of animals have higher fidelity levels than less common known species. He reported the cooked flesh of the bat species named *Cynopterus sphinx* as used to relieved cough and fever has the highest fidelity level followed by blood of pigeon (*Columba livia*) to treat paralysis and urine of cow (*Bos taurus*) for wound healing, while the flesh of the pig (*Suss crofa*) to relieve muscular pain and elephant (*Elephas maximus*) for pimples have the lowest fidelity level.

The relative frequency of citation (RFC) index was calculated to work out the local importance of every species. The (RFC index was calculated to determine the local importance of each species. The most cited animal species were: Spotted Hyena (RFC = 0.86), cow (*Bos taurus*) (RFC = 0.66), Francolin (RFC = 0.64), bats (RFC = 0.56), Honey bee (RFC = 0.54) and Stingless bee (RFC = 0.51) The highest value of the RFC

index was scored by Spotted Hyena which demonstrates the importance of this animal species in the study area as it was mentioned by a higher number of informants. However, animal species with low RFC Values for instance *Testudo spp* (RFC = 0.025) and *Colobus guereza* (RFC = 0.012) do not mean that they are not important locally but it may be most of the people are not aware of their therapeutic properties.

The finding of this study suggested that the traditional zootherapeutic remedial measures followed by the native people of Dangila Woreda plays an important role in their primary healthcare. The documentation of this indigenous knowledge on animal-based medicines should be very helpful in the formulations of strategies for sustainable management and conservation of bio-resource as well as providing potential for novel drug discoveries

6. Conclusion and Recommendation

6.1.Conclusions

Animal-derived medicines are an alternative to treat various ailments in both rural and urban areas. Thus, the results of this study described the 52 animals' parts and/or products used as a traditional zoo therapeutic remedial measure followed by the native people of Dangila to treat around 65 different ailments in the study area. The result shows that animals and their parts/products occupy key positions in the traditional medicine and medical practices to treat different ailments. Whole bodies or parts/products of traditional medicinal animals were used as medicine. It is obvious that the members of the local communities studied possessed considerable knowledge related to preparation, administration, parts/products used, ingredients added, and other issues of traditional remedies. The finding of this study suggested that the traditional zootherapeutic remedial measures followed by the native people of Dangila Wereda plays an important role in their primary healthcare. However, efforts to document, conserve, and manage the indigenous knowledge and skills were very scarce, and important indigenous knowledge is getting lost together with the elders and experts. Hence, it is important to document, conserve, and manage the indigenous knowledge, and further research should be done to test the products scientifically for product development.

6.2. Recommendations

Large proportions of both urban and rural inhabitants in the study area use traditional medicine. This indicates that traditional medicine plays a significant role in filling the gap in modern health services and help to replace expensive treatment and drugs not available for users nearby. In general, based on the result of the study the following recommendations are forwarded:

- Providing awareness about the benefit of traditional medicine to young and educated people is urgently required
- Giving awareness to traditional healers to transfer indigenous knowledge for local people also providing support to be organized in association and trained by concerned bodies to upgrade their skills
- By using this baseline data for future reference other interested scholars needed to undergo further and detailed study on the analysis of active ingredients and other pharmacological and ethno zoological aspects of animals in Dangila District
- Comparative study on ethno medicinal animal population abundance should be conducted at different geographic areas to see the local effect of the traditional medicinal practices.

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8. Conflict of interest

There is no any conflict of interest

9. References

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