



Research article

Ethnozoological study of medicinal animals and animals' products used by traditional medicinal practitioners and indigenous people in Motta city administration and Hulet Eju Enessie District, East Gojjam, Northwest Ethiopia

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ABSTRACT

Background: In Ethiopia, many ethnic communities use traditional/indigenous medicine for primary health care. However, this indigenous medicinal practice is being neglected and continued to be lost due to poor documentation as they are transferred from generation to generation through oral tradition. Therefore, this ethnozoological study aimed to assess and document the medicinal use of animals and animals' products used by traditional medicinal practitioners and indigenous people in Motta city administration and Hulet Eju Enessie Districts, East Gojjam Zone, Ethiopia.

Methods: Cross-sectional ethnozoological survey was conducted using a Semi-structured questionnaire among purposively selected respondents in Motta city administration and Hulet Eju Enessie District, East Gojjam Zone, Ethiopia from September 2020 to June 2021 GC. The ethnozoological data were analyzed using SPSS version 26 and Microsoft Excell Spreadsheet. Fidelity level, use-value, and informant consensus factor were determined.

Results: A total of 25 animal species were reported to be used for the treatment of different ailments by 33 informants. The majority of animals (64%) were mammals followed by birds (16%). The fidelity level ranged from 18.2 (Hyena for bad spirit) to 100% (stingless be for asthma, Tiger for rabies virus, Whisper for nightmare).

Conclusion: This study showed the wide use of medicinal animals and their parts/products for meeting the primary healthcare needs of the community in the study area. Therefore, this ethnozoological medicinal knowledge needs to be integrated with modern medicine to use animals/animals' products as a potential source of effective drugs for different ailments.

1. Introduction

1.1. Background

People with different cultures across the world apply their indigenous healing knowledge to prevent and treat various ailments using animal and plant derived remedies [1]. As the majority of the world population primarily relies on traditional medicinal remedies and medical practices for attaining primary health care needs, indigenous medicinal knowledge is an important alternative in the health care delivery system [2]. Different parts and products of various species of both wild and domestic

animals are used for the preparation of curative, protective, and preventive remedies for the management of various ailments [3].

Many bioactive compounds are obtained following scientific validation of traditional medicinal remedies used by traditional medicinal practitioners and indigenous people. These bioactive compounds are the lead compounds for many drugs used in the health care system [4]. For example, clinically important drugs like insulin, hormonal contraceptives, heparin, and most antiviral vaccines are isolated and obtained from animals namely pork, bovine, and horse [5].

Zootherapy is highly practiced in traditional medical practices worldwide [6, 7]. Due to the longer period of practice, traditional

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medicine using animal based remedies is deeply integrated with the culture of Ethiopians [8]. However, this medicinal practice is poorly documented resulting in the loss and underestimation of its value by the younger generation compared to ethnobotany [6]. In addition, no study was conducted on the medicinal use of animals and their parts or products in the study area. Therefore, this ethnozoological study aimed to assess and document the medicinal use of animals and animals' products by traditional medicinal practitioners and indigenous people in Motta city administration and Hulet Eju Enessie Districts, East Gojjam Zone, Ethiopia.

2. Methods

2.1. Study area description

The study was conducted in Motta city administration and Hulet Eju Enessie District, East Gojjam Zone, Amhara Regional State, Ethiopia. Motta city administration is located 371 km Northwest of Addis Ababa and 118.9 km Southwest of Bahir Dar, the regional capital. There are six urban kebeles in Motta city administration and 29 rural and 1 urban kebeles in Hulet Eju Enessie District. According to the information obtained from East Gojjam Zone Health Bureau, there are 48 licensed traditional medicinal practitioners in the zone of which 16 are found in different kebeles of Motta city administration and Hulet Eju Enessie District.

2.2. Selection of study sites

The study was conducted in all six kebeles of Motta city administration and purposively selected six kebeles of Hulet Eju Enessie District (Keraniyo, Ayen-birhan, Hibre-Selam, Abiyot-Selam, Shigie, and Tiru-Selam), East Gojjam, Amhara Regional State, Ethiopia. The Kebeles were purposively selected because of their high number of registered traditional medicinal practitioners and knowledgeable indigenous people compared to other districts of the East Gojjam Zone. This study was conducted from September 2020 to June 2021GC.

2.3. Sampling and data collection

All traditional medicinal practitioners and selected indigenous people older than 18 years, practicing traditional medicine, living in the selected kebeles of the study area, and available during the data collection period were taken as the study population. Indigenous people recognized as knowledgeable ("Experts") by the local community for their knowledge of traditional medicinal services were purposively selected with the help of community leaders, health extension workers, and local authorities of the respective kebeles. In addition, a snowball sampling technique was also employed to identify other potential informants from the people living in selected kebeles. Ethnozoological data (Local name, indication, parts of the animal used, mode of preparation, route of administration) were collected from each informant using a semi-structured questionnaire.

2.4. Quality assurance of the study

A semi-structured questionnaire was prepared in English version by reviewing different literatures. To maintain its originality, the questionnaire was translated into the local language (Amharic) from its English version and then back to English. A pretest was conducted on September 2020 among five informants in Yejube town, East Gojjam Zone Amhara Regional State Ethiopia to test the data collection checklist. In addition, one-day training was given for data collectors by the investigators. Supervision was made during the data collection period. Data were checked for completeness and consistency throughout the data collection period.

2.5. Data analysis

Data were cleaned, entered, and analyzed using SPSS version 26 and Microsoft Excel spreadsheet. Quantitative data were analyzed with descriptive statistics. From the collected data, fidelity level [9], Informants' Consensus Factor [10], and use-values [11] were determined based on the following formula.

$$\text{Fidelity level (FL)} = \left(\frac{NP}{N} * 100 \right) \% \quad (1)$$

Where N_p is the number of informants that mentioned the specific animal species used to treat certain ailments and N is the total number of the informants who utilized the animals as medicine for treating any given ailments.

$$\text{Informants' Consensus Factor (ICF)} = \left(\frac{(Nur - Nt)}{(Nur - 1)} \right) \quad (2)$$

Where Nur is the number of use reports from informants for a particular animal-use category and Nt is the number of taxa or species that are used for that animal-use category for all informants. ICF Values range between 0 and 1, where '1' indicates the highest level of informant consent.

$$\text{Use - values (Uv)} = \frac{\sum iUvi}{N} \quad (3)$$

Where Uvi is the number of use reports cited by the informants for that particular species and N is the total number of respondents interviewed.

2.6. Ethical considerations

Data was collected after getting permission letter from research technical evaluation committee of Haddis Alemayehu cultural studies institute and the respective health office of Motta city administration and Hulet Eju Enessie district. All the study participants were informed about the purpose of the study; their right to refuse was maintained. Ethical conduct will be maintained throughout the data collection period. Privacy and confidentiality were ensured throughout the study period.

3. Results

3.1. Sociodemographic characteristics of informants

In this study, 33 informants participated of which 32 (97%) were Male and 1 (3%) Female. The majority of informants (54.5%) were in the age group of 55–64 years followed by 18.2% aged 65 years and older. Most of the informants (84.8%) were married. The majority of the informants 23 (67.7%) live in the rural area whereas 10 (30.3) live in urban areas. More than half of the informants (57.6%) can't read and write. The majority of the informants 20 (60.6%) are farmers who provide private traditional health services (Table 1).

3.2. Ethnozoological data

The majority of the informants 11 (33.3%) obtain their knowledge on the medicinal use of animal and animal products from their father. Most of the informants (69.7%) were interested to transfer their medicinal knowledge to the next generation (Table 2).

3.3. Class of animals medicinally used in the study area

In the present study, A total of 25 species that belong to five classes (Mammals, Bird, Reptiles, Amphibia, and insects) were used for the management of 38 health conditions. Mammals were the most frequently (64%) used medicinal animals by traditional medicinal practitioners and indigenous people in the study area (Table 3). Among the total medicinal

Table 1. Sociodemographic characteristics of Informants.

Characteristics		Frequency	Percentage
Sex	Male	32	97.0
	Female	1	3.0
Residence	Rural	23	69.7
	Urban	10	30.3
Age(years)	35–44	5	15.2
	45–54	4	12.1
	55–64	18	54.5
	≥65	6	18.2
Marital status	Single	2	6.1
	Married	28	84.8
	Divorced	1	3.0
	Widowed	2	6.1
Educational level	Unable to read and write	19	57.6
	Read and write	13	39.4
	College diploma and above	1	3.0
Occupation	Farmer	5	15.2
	Merchant	1	3.0
	private traditional health service	2	6.1
	Non-governmental organization	1	3.0
	Farmer & private traditional health service	20	60.6
	Merchant & private traditional health service	1	3.0
	Governmental organization & private traditional health service	2	6.1
	Non-governmental organization & private traditional health service	1	3.0

Table 2. Source of Knowledge, the attitude of community and Practice related information.

Source of Knowledge		Frequency	Percentage
Source of Knowledge	Father	11	33.3
	Mother	2	6.1
	Grand Father	4	12.1
	Religious source	4	12.1
	Friends	8	24.2
	Trial and error	2	6.1
	Others (oral tradition)	2	6.1
Acceptability of the traditional medicinal service by the community	Acceptable	23	69.7
	Not acceptable	10	30.3
Interest to transfer the medicinal knowledge to the next generation	Interested	23	69.7
	Not interested	10	30.3
The benefit obtained from traditional medicinal service	Income source	24	72.7
	Free service/satisfaction	9	27.3
Do you use standard dose measurement?	Yes	12	36.4
	No	21	63.6
	Yes	7	21.2
	No	26	78.8
	Yes	2	6
	No	31	94

animals/products used traditionally, 18 species (72%) were from wild sources as compared to those obtained domestically (Table 4).

3.4. Animal parts/products used as traditional medicine

In the present study, meat or fatty meat (27.5% was highly used followed by that of the liver (7.5%), skin (7.5%), and excreta of animals

Table 3. Class of animals used traditionally in Motta and Hulet Eju Enessie, 2021.

S. No	Class of animals	Frequency	Percentage
1	Mammals	16	64
2	Birds	4	16
3	Reptiles	2	8
4	Amphibia	1	4
5	Insects	2	8
	Total	25	100

(7.5%) (feces and urine). In addition, honey, bone, whole body, blood, teeth, bile, and milk were reported to have medicinal values (Table 5).

3.5. Modes of preparations of animals and animals' products remedy in the study area

The study revealed that most of the animals or their products are used directly (36.3%) without adding other ingredients or without any further modification of the natural resources. In addition, mixing with other ingredients, preparing in the form of soup/stew and drying methods respectively accounted for 21.3%, 10%, and 8.8% of the mode of preparation of remedies used by the traditional medicinal practitioners and indigenous people in the study community (Table 6).

3.6. Routes of application medicinal animal remedies at the study area

The medicinal animal products or treatment remedies were reported to be used in different ways of administration. Half of the prepared animal medicinal remedies are administered orally followed by the topical routes (30.8%) and inhalational routes (14.1%) (Figure 1). The preparation of amulet, sitting on, tying, or hanging off the animal products were reported to be the least method using medicinal animal remedies.

3.7. Relative importance and fidelity level medicinal animal or animal products

In the present study, hyena (36%) was the most frequently used animal species to prepare the animal remedies for different ailments in the study area followed by that of snake (18%). The other mostly used species next to hyena and snake were porcupine, goat, and hen which accounted equally (15%) to the animal remedies used for the treatment of different ailments (Table 7).

3.8. Fidelity level of a medicinal animal or animal products

The present study revealed that fidelity level ranges from 18.2 (Hyena for bad spirit) to 100% (for species that are used to prepare remedies for specific disease). The animal species with 100% fidelity level for the most reported ailments were Honey bees, stingless bees, whisper, and Tiger (Table 8).

3.9. Informant consensus factor

In this study, the level of agreement between interviewees over which animal to use for each illness category was determined using the Informant consensus factor (ICF). This study revealed that informants have a high level of agreement (ICF = 1) in the treatment of bad spirit, Tuberculosis, Impotency, Chills (Wurch), Measles, and postpartum hemorrhage. However, the informants have a high level of heterogeneity (ICF = 0.5) in the treatment of rabies and asthma (Table 9).

Table 4. Medicinal animals, parts/products used, diseases treated, mode of preparation and routes of administration in the study area, 2021.

Local name (Amharic)	English name	Scientific name	Habitat	Indication	Part used	Condition/preparation	Dosage	Route
Sew	Human	<i>Homo sapiens</i>	Domestic	Evil eye	Faeces	Drying the faeces of the evil man and burning	—————	Inhalational
				Wound	Faeces and urine	Faeces and urine mixed with Goat dung and cabbage are then stored in a room for a week before use	Applying the mixture to the affected area	Topical
						Faeces and urine mixed with sheep dung and left to stand for one week	Applied on the wound for one week	Topical
					Urine	The urine left to stand for five days in a room and mixed with milled cattle dung	Applying the mixture to the affected area	Topical
Jib	Hyena	<i>Crocuta crocuta</i>	Wild	Evil eye	Skin	Drying the skin and hanging at a place in the house	—————	Hanging on the house
						Dried skin	Letting the victim sit on the dried skin	Sitting on the skin
					Liver	Liver mixed with plants like <i>Cucumis ficifolius</i> ("yemdir embuay"), <i>Artemisia abyssinica</i> ("Chiqugn"), and <i>Ajuga integrifolia</i> ("Etse libawit")	Smelling a spoonful of the preparation once	Inhalational
				Epilepsy	Left leg meat	Drying the meat from the left leg	Tying on the neck	Tying
						Skin	Piece of skin	Fumigating the patient with smoke of burned skin when required
					Bad spirit	Bone	Burning the bone	Smoking the bone
				Dried bone is mixed with powdered fox teeth and <i>Cucumis ficifolius</i> ("yemdir embuay")			Smelling the preparation once	Inhalational
				Mental illness	Brain and eye	Brain and eye mixed with <i>Ajuga integrifolia</i> ("Etse libawit")	Smelling the preparation	Inhalational
				Eye disease	Eye	Drying and grinding to powder	Applying the preparation on the affected eye	Topical
Jart	Porcupine	<i>Hystrix cristata</i>	Wild	Tuberculosis	Meat	Cooking the fresh meat	Eating the cooked meat for three days	Oral
						Eating the meat until cured	Oral	
				Asthma	Meat	Preparing wat from the meat	Eating the stew once per day for three days	Oral
						Preparing the meat in the form of stew	Eating the stew with injera once a day for 3 days	Oral
Lung and kidney disease	Meat	The meat dried and mixed with hen meat to prepare stew	Eating with half injera once	Oral				
Lam	Cow	<i>Bos Taurus</i>	Domestic	Malaria	Butter/cheese	Mixing with <i>Ruta chalepensis</i> ("tenadam"), garlic, and sugar cane	Drinking two glasses per day	Oral
				Wound	Urine	—————	Washing the wound with urine	Topical
				Abdominal pain	Milk	Fresh milk	Drinking fresh milk	Oral
Fiyel	Goat	<i>Capra aegagrus Hircus L.</i>	Domestic	Anxiety	Tongue	Eating the fresh tongue of the goat	—————	Oral
				Febrile illness (mich)	Bile	—————	Drinking the bile	Oral
				Hemorrhoid	Gastric content ('fers')	Fresh gastric content mixed with water	Washing the affected area with the preparation for one day	Topical
				Scabies	Stomach	The stomach with its content soaked in a mixture of lemon, orange, and lemongrass	Placing the affected body in the mixture for three days	Topical
				Anemia	Blood	Blood mixed with sugar	Drinking one glass for a day	Oral

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Table 4 (continued)

Local name (Amharic)	English name	Scientific name	Habitat	Indication	Part used	Condition/preparation	Dosage	Route
Zinjero	Monkey	<i>Papio anubis</i>	Wild	Pneumonia	Lung	Eating the fresh lung	—————	Oral
				Impotency	Fatty meat	The meat mixed with the leaf and root of both <i>Schiflera abyssinica</i> ('getem') and <i>Cucumis ficifolius</i>	Eating the mixture	Oral
						The meat mixed with <i>Cucumis ficifolius</i>	Eating the mixture	Oral
				Fracture	Fatty meat	Used in fresh	Dressing the fracture site with the fatty meat for three days	Topical
Tota	Vervet monkey	<i>Chlorocebus pygerythrus</i>	Wild	Body swelling	Liver	Fresh liver	Eating the fresh liver	Oral
Nib	Bee	<i>Apis mellifera</i>	Wild	Chills (wurch)	Honey	Mixing honey with garlic and water	Drinking three cups a day for a week	Oral
Tazma nib	Stingless bee	<i>Trigona spp</i>	Wild	Asthma	Honey (tasma)	—————	Taking a spoonful of honey once a day for two days	Oral
						Warming honey with water	Drinking one glass of the preparation for one day	Oral
						—————	One carafe per day	Oral
Zendo	Python	<i>Python spp</i>	Wild	Tumor ('neqersa')	Fatty meat	Fresh meat	Applying on the tumor for 7 days	Topical
				Swelling	Fatty meat	—————	Applying the fatty meat on the area once a day for two days	Topical
				Wound	Fatty meat	—————	Applying the fatty meat on the area	Topical
Ebab	Snake	<i>Snake Spp</i>	Wild	Tumor ('neqersa')	Whole	—————	Applying the whole snake on the tumor	Topical
						Drying and grinding	Applying the preparation on the wound	Topical
				Mental illness	Head	Dried head	Fumigating the dried head	Inhalational
				Nightmare in babies	Head	The head dried and powdered wrapped clean cloth. An amulet is prepared using Fox skin	Tying on the neck	Tying
Doro	Chicken	<i>Gallus gallus domesticus</i>	Domestic	Fracture	Meat	Preparing stew from the meat	Drinking the stew	Oral
				Kidney disease	Meat	Preparing stew from the meat of hen and Porcupine	Eating the stew with injera	Oral
				Eczema ('chife')	Eggshell	Powdered eggshell mixed with cow milk and 3 lemons	The preparation applied to the affected area.	Topical
				Infection on the sole (yemdir mich)	Fatty meat	—————	Melting the fat on the affected sole by applying heat	Topical
				Cough	Egg	Fresh egg Yolk	Taking yolk of two eggs twice daily for five days	Oral
Gurt	Frog	<i>Afrivalus enseticola</i>	Wild	Loss of consciousness due to postpartum hemorrhage	Whole	—————	The frog alive is placed on the chest of the mother	Topical
Eshkokula	Whisper		Wild	Nightmare	Heart	Fresh heart meat used	Three pieces of fresh meat for a day	Oral
				Nightmare in babies	Skin	Preparing amulet	Tying on the neck	Topical
Midako	gazelle	<i>Gazella soemmerringii</i>	Wild	Kidney disease	Meat	Dried meat	Eating the dried meat for three days	Oral
				Rabies virus	Meat	Preparing stew with Tiger meat	Eating the stew with one injera once a day for a week	Oral
Ahya	Donkey	<i>Equus asinus</i>	Domestic	Ringworm	Milk	Fresh milk from a donkey similar to its offspring in color or sex	Drinking the milk for five days	Oral
				Measles	Milk	—————	Drinking the milk	Oral

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Table 4 (continued)

Local name (Amharic)	English name	Scientific name	Habitat	Indication	Part used	Condition/preparation	Dosage	Route
Qebero	Fox	<i>Vulpes vulpes</i>	Wild	Epilepsy	Teeth	—————	Holding the teeth on the mouth	Oral
				Postpartum hemorrhage	Skin	Preparing amulet from dried skin using a red pen	Tying on the neck till menopause	Tying
				Menta illness	Teeth	—————	Holding the teeth on the mouth or fumigating the patient	Oral or Inhalational
Bere	ox	<i>Bos taurus</i>	Domestic	Anemia	Liver	Fresh liver	Eating the fresh liver	Oral
				Swelling	Horn and nail	Burning the horn and nail	Warming the swollen body part over the fire from horn and nail	Topical
				Fracture and sprain	Bone marrow	Forging the bone containing marrow.	Massaging the affected area with the forged marrow till it heals	Topical
Nebir	Tiger	<i>Panthera tigris</i>	Wild	Rabis virus	Meat	Dried meat	Eating one piece of dried meat for two days	Oral
							Preparing stew from the meat	Eating the stew with injera
yelelit wof	Bat	<i>Cynopterus sphinx</i>	Wild	Affection	Whole	Drying and grinding	Rubbing on the body of the beloved one	Topical
				Liver disease	Meat and bone	After drying and grinding the powder mixed with water, oil, and pepper	Drinking one coffee cup once	Oral
Beg	Sheep	<i>Ovis aries</i>	Domestic	Social phobia	Bile	Fresh bile	Drinking the bile	Oral
				Anemia	Blood	Fresh blood mixed with sugar	Drinking the fresh blood	Oral
Ses	klipspringer	<i>Oreotragus oreotragus</i>	Wild	Heart failure	Liver	Fresh liver	Eating the freshly sliced liver once a week for three weeks	Oral
Dikula	Impala		Wild	Infection on the sole	Fatty meat	—————	Melting the fat on the affected sole by applying heat	Topical
Debenie	Pigeon	<i>Columba arquatrix</i>	Wild	Burn	Blood	—————	Applying the blood on the burned surface	Topical
Qoqe	Partridge	<i>Pternistis erckelii</i>	Wild	Asthma	Meat	Preparing soup	Drinking the soup	Oral

Table 5. Proportions of Parts/products of medicinal animals used in the study area, 2021.

S.No	Parts/product of animals	Frequency	Percentage
1	Meat or fatty meat	22	27.5
2	Liver	6	7.5
3	Skin	6	7.5
4	Excreta of animals (urine, feces)	6	7.5
5	Bone or bone marrow	4	5.0
6	Honey or Tasma honey	5	6.25
7	Whole body	4	5.0
8	Blood	3	3.8
9	Teeth	3	3.8
10	Bile	2	2.5
11	Egg	2	2.5
12	Head	2	2.5
13	Others	15	18.75

N.B: Others include kidney, bone and meat, eye, horn and nail, heart, lung, stomach, tongue, brain and eye, butter/cheese, gastric content which occurs in a unit frequency.

4. Discussion

According to World Health Organization (WHO) report, about 80% of the world's people rely primarily on traditional medical practices where the use of animals for medicinal purposes is significant [2]. Ethiopia is

Table 6. Mode of preparation of medicinal animal/animals' products at the study area, 2021.

S.No	Mode of preparation	No of preparation	Percentage
1	Direct use	29	36.3
2	Mixing	17	21.3
3	Preparing soup or stew	8	10
4	Drying	7	8.8
5	Warming or melting	4	5.0
6	Drying, powdering and mixing other ingredients	3	3.6
7	Drying and powdering	3	3.6
8	Drying and smoking/burning	7	8.8
9	Cooking	2	2.5

known for having wide climatic and ecologic conditions which possess a wide range of fauna and flora of different species that are used for medicinal purpose [3]. In Ethiopia, more than half of the human population depends on traditional medicine for meeting their primary health care needs [12].

In the present ethnozoological survey 25 animal species and their parts/products that belong to a class of mammals, birds, reptiles, amphibians, and insects were reported to be used for the treatment of 38 kinds of health conditions by traditional medicinal practitioners and indigenous people of Motta city administration and Hulet Eju Enessie District. This finding is in line with a study conducted in the semi-arid

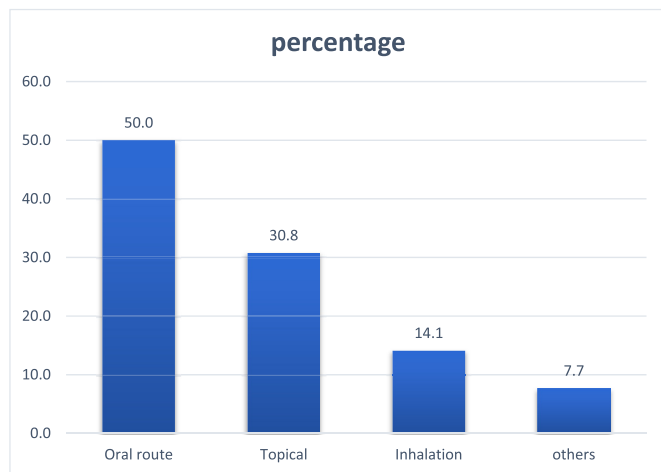


Figure 1. Routes of administration for medicinal preparations of animals and animal products by traditional medicinal practitioners and indigenous people at Motta and Hulet Eju Enessie Districts, 2021. NB: Others include tying, hanging, and sitting on animal remedies.

Table 7. Use-value of medicinal animal species for treating the commonly reported diseases in Motta and Hulet Eju Enessie, 2021.

S. No	Scientific name	English name	Local name (Amharic)	$\sum iU_{vi}$	U_v	% UV
1	<i>Crocota crocuta</i>	Hyena	Jib	12	0.36	36
2	<i>Snake Spp</i>	Snake	Ebab	6	0.18	18
3	<i>Hystrix cristata</i>	Porcupine	Jart	5	0.15	15
4	<i>Capra aegagrus Hircus L.</i>	Goat	Fiyel	5	0.15	15
5	<i>Gallus domesticus</i>	Chicken	Doro	5	0.15	15
6	<i>Homo sapiens</i>	Human	Sew	4	0.12	12
7	<i>Bos Taurus</i>	Cow	Lam	4	0.12	12
8	<i>Papio Anubis</i>	Olive Baboon	Zingero	4	0.12	12
9	<i>Python spp</i>	Python	Zendo	4	0.12	12
10	<i>Vulpes vulpes</i>	Fox	Qebero	4	0.12	12
11	<i>Trigona spp</i>	Stingless bee	tazma nib	3	0.09	9
12	<i>Crocufey crocufey</i>	Donkey	Ahya	3	0.09	9
13	<i>Bos Taurus</i>	Ox	Bere	3	0.09	9
14	<i>Apis mellifera</i>	Bee	Nib	2	0.06	6
15		Whisper	Eshkokula	2	0.06	6
16	<i>Gazella soemmeringii</i>	gazelle	Midako	2	0.06	6
17	<i>Panthera pardus</i>	Tiger	Nebir	2	0.06	6
18	<i>Cynopterus sphinx</i>	Bat	yelelit wof	2	0.06	6
19	<i>ovis aries</i>	Sheep	Beg	2	0.06	6
20	<i>Chlora</i>	Vervet monkey	Tota	1	0.03	3
13	<i>Afrivalus enseticola</i>	Frog	Gurt	1	0.03	3
22	<i>Oreotragus oreotragus</i>	klipspringer	Ses	1	0.03	3
23	<i>Aepyceros melampus</i>	Impala	Dikula	1	0.03	3
24	<i>Columba arquatrix</i>	Pigeon	Debenie	1	0.03	3
25	<i>Pternistis erckelii</i>	Partridge	Qoqe	1	0.03	3

regions of Northern Brazil that reported 25 medicinal animals species used for the treatment of 43 different ailments [13]. Similarly, a study conducted in West Gojjam Ethiopia also revealed the use of 26 animal species for the treatment of 33 different ailments [14]. The presented

Table 8. Fidelity level of medicinal animal species for treating the commonly reported diseases in Motta and Hulet Eju Enessie, 2021.

S. No	Animal species	Indication	Number of informants for the indication	Total number of informants using the animals/products	Fidelity level
1	Human	Wound	3	4	75.0
2	Hyena	Bad spirit	2	11	18.2
3	Hyena	Evil eye	6	11	54.5
4	Porcupine	Tuberculosis	2	5	40.0
5	Cow	Wound	2	4	50.0
6	Olive baboon	Impotency	2	4	50.0
7	Honey bee	Chills (wurch)	2	2	100.0
8	Stingless bee	Asthma	3	3	100.0
9	Python	Tumor (neqersa)	2	4	50.0
10	Snake	Tumor (neqersa)	4	6	66.7
11	Whisper	Night mare	2	2	100.0
12	Donkey	Measles	2	3	66.7
13	Fox	Postpartum hemorrhage	2	4	50.0
14	Tiger	Rabies virus	2	2	100.0

Table 9. Informant consensus factor for the common indications that the medicinal animals and animals' products used by traditional medicinal practitioners and indigenous people at motta and Hulet Eju Enessie districts, 2021.

S.No	Indication	Number of use reports	Number of species for the indication	ICF
1	Bad spirit	2	1	1
2	Tuberculosis	2	1	1
3	Impotency	2	1	1
4	Chills (wurch)	2	1	1
5	Measles	2	1	1
6	Postpartum hemorrhage	2	1	1
7	Evil eye	7	2	0.8
8	Tumor	6	2	0.8
9	Wound	6	3	0.6
10	Asthma	5	3	0.5
11	Rabies	3	2	0.5

study revealed that the use of a higher number of medicinal animal species compared to studies conducted in Arba Minch Zuria District [15] and Kafta-Humar [3] that reported the use of 19 and 16 animal species respectively. In this study majority of the medicinal animals (72%) were wild animals. This finding is concordant with the study conducted in Semi-arid Regions of Northern Brazil which reported wild animals as the major (77.7%) source of animal-based complementary medicines [7]. Similarly, the findings of the study conducted by Kebebew and his co-workers in Arba Minch District also reported that more than half (65%) of the medicinal animals were obtained from wild sources [15]. Besides, the study conducted in Kafta-Humera District of Northern Ethiopia also reported that more than half of the medicinal animals were obtained from wild sources [3]. This finding indicated that traditional medicinal practitioners and indigenous people are mostly dependent on the wild sources which might be related to the preference of the community for wild animals.

In this study, Mammals were the most commonly (64%) used class of animals followed by birds (16%) and reptiles (8%). This finding is in line with the review conducted in the Mexican traditional system that

reported mammals as the most commonly used medicinal class of animal species followed by birds and reptiles [16]. The study conducted in the semi-arid region of Northern Brazil also reported mammals as the most commonly used class of medicinal species [13]. Similarly, the study conducted among the indigenous people of Metema Woreda North-western Ethiopia also reported mammals as the most commonly used animal species followed by birds and reptiles [17]. The present study is also concordant with the study conducted at Arba Minch Zuria District that reported mammals (60%) as the most commonly used class of animals compared to other medicinal species used by the study informants [15].

The present study indicated that different parts/products of medicinal animals are used for their healing values. Based on the finding from this study meat or fatty meat was the most commonly (27.5%) used animals' part for its medicinal value followed by liver, skin, and excreta (urine and feces) (7.5% each). Similarly, other studies also reported the meat/flesh of different animals as most commonly used for its medicinal value for the management of different ailments [15, 17, 18, 19]. In this study, the informants mentioned using different parts/products of the medicinal animals in different forms. Direct use of the medicinal animal is the most common (36.3%) mode for the use of the medicinal animal followed by mixing with other ingredients (10%) and preparation of soup/stew (8.8%). This study is concordant with the study conducted in Arba Minch Zuria District that reported direct use, preparation of soup, and mixing with other ingredients as the most frequently used modes of preparation of medicinal animals [15]. This study also reported the oral route as the most commonly (50.0%) used route for administration of medicinal preparations followed by the dermal route (30.8%). Similarly, other studies also reported the oral route as the major route for administration of the medicinal preparations [3, 20, 21]. However, contrary to our study finding the study conducted in Arba Minch Zuria District reported the dermal route as the major route compared to the oral route of administration [15].

The relative importance of a species cited by the informants was determined using use-value. The present study reported Hyena (*Crocuta Crocuta*) as the commonly (%UV = 36%) cited medicinal animal followed by a snake (*Snake Spp*) (%UV = 18%). The higher use-value of some of the species might be related to the preparation of different remedies from the different parts of a single animal species to treat different ailments [22]. However, the study conducted in the semi-arid region of Northern Brazil reported Bee (*Apis mellifera*) as the most commonly cited (%UV = 56%) species [13].

The fidelity level of medicinal animal species was determined for the most commonly reported disease by the informants. In the present study, the fidelity level values of medicinal animal species range from 18.2% to 100%. Honey bee for chills, stingless bee for asthma, whisper for nightmare, and Tiger for rabies virus has a fidelity level of 100% each. This high fidelity level is due to the use of the species/product only for the claimed indication (Table 8). The least fidelity level is observed hyena for the treatment/prevention of bad spirit. However, a large proportion of informants claimed the use of hyena for the treatment/prevention of more indications than other species.

The level of agreement between the informants of the study was determined using informant consensus factor. This study revealed that informants have a high level of agreement (ICF = 1) in the treatment of bad spirit, tuberculosis, impotency, chills (Wurch), measles, and postpartum hemorrhage. However, the informants have a high level of heterogeneity (ICF = 0.5) in the treatment of rabies virus and asthma (Table 9) due to the disagreement among the informants on the use of medicinal animal species. From the present study, we found that only one species is used for the management of bad spirit, tuberculosis, impotency, chills, measles, and postpartum hemorrhage.

In this study, from a total of 33 informants, only 7 (21.2%) know about zoonotic disease. This finding is in line with the study conducted in Amaro Woreda, Southern Ethiopia [19]. However, a high proportion of informants (78.8%) didn't know about zoonotic disease. The reason for

this might be because of inability of the majority (57.6%) of the informants to read and write. Two out of seven informants use herbal preparations for the prevention of zoonotic disease transmission from medicinal animals.

The informants of the study mentioned that most of the medicinal animal species are being lost due to deforestation and over-exploitation. The loss of medicinal animals might be associated with slaughtering the animal species to collect the meat, organ, blood, and other parts which were commonly reported to prepare most of the medicinal remedies. The present study revealed that the attempt of conserving animals from extinction in the study area was rare. Among the respondents, a few (6%) have responded that they are trying to maintain medicinal animals by planting trees.

5. Conclusion and recommendations

Developing countries commonly used traditional medicines as one of the alternative medicinal practices. In Motta city administration and Hulet Eju Enessie district, Traditional medicinal practitioners and indigenous people practiced traditional medicine using animal based remedies. In this study 25 animal species that belong to mammals, birds, reptiles, amphibia, and insects were used for the management of 38 types of ailments. Mammals were the most frequently used. Although the traditional medicinal practitioners and indigenous people are skilled with the preparation and administration of animal based remedies, less effort has been made to conserve the medicinal animals. Therefore, the local community should be alerted on the significance of biodiversity and sustainable use of species identified as sources of ethnozoological medicine in the study area. Besides, Multi-disciplinary scholarly experimental studies need to be conducted on the medical uses of animals and their products to identify potential lead compounds to modern drugs.

Declarations

Author contribution statement

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Data will be made available on request.

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The authors declare no conflict of interest.

Additional information

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