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Zootherapeutic animals used by Awi, Gamo, and Konta communities in Amhara and Southern Regions of Ethiopia

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Abstract. *Biru Y, Gibru A, Temesgen Z, Hunde K, Fekensa T. 2022. Zootherapeutic animals used by Awi, Gamo, and Konta communities in Amhara and Southern Regions of Ethiopia. Asian J Ethnobiol 5: 84-91.* The use of animals and animal products in traditional medicine is less explored than that of plant-based medication. And hence, this pilot study is aimed to assess the role of zootherapeutic animals in traditional medicine among Awi, Gamo, and Konta communities, Ethiopia. Data were collected from December 2020 to March 2021 using a semi-structured questionnaire, focus group discussions, and field observations. A total of 90 informants and 37 group discussants were included in the study. We calculated the use value (UV) and relative frequency of citation (RFC) of animals used in traditional medicine. A binary Logistic Regression model using SAS (9.0) was used to identify the major factors that affected respondents' knowledge about the importance of animal-based traditional medicine. Overall, we documented 20 medicinal animals having ethnozoological importance in treating nearly 23 human diseases. Out of the 20 vertebrate species used, mammals comprised 70%, followed by birds, 20%. Among the recorded animal species, hyena, porcupine, and bushbuck were commonly reported medicinal animals in the study areas. Meat, skin, and blood were the most frequently used animal products by local communities, with a pooled RFC of 0.48, 0.28, and 0.13, respectively. Asthma, protection from the evil eye, and broken bone were most commonly treated diseases using animal-based therapeutics. The binary logistic regression model revealed that age ($\chi 2$=10.53; *df*=3; P=0.01) and region ($\chi 2$=5.11; *df*=1; P=0.02) of respondents significantly affected ethnozoological knowledge of respondents. This study confirmed that the sampled communities have rich ethnozoological knowledge concerning the use of traditional medicine. Therefore, further in-depth studies involving traditional healers are recommended to clearly understand the role of wild animals in traditional medicine and design conservation options for the threatened medicinal animals.

Keywords: Ethnozoology, human diseases, traditional healers, traditional medicine, wild animals

INTRODUCTION

Despite the advance in modern medication, traditional medicine (TM) is still being used by various communities throughout the world (Alves 2012; Albuquerque et al. 2013). Communities, especially in rural areas in different continents, use TM to ensure their primary health care (d'Avigdor et al. 2014). In most African countries, TM has been linked to people and animal health for centuries and has been evolving across generations (Caudell et al. 2017). In Ethiopia, for example, TM is a common practice in the health care system of the communities, which has a strong relationship with the enormous diversity of animal and plant genetic resources, accompanied by the higher cultural diversity of the country (Getachew et al. 2002; Elias et al. 2013). However, most of the TM is obtained from medicinal plants (MPs) (Kefalew et al. 2015). Although plants and plant derivatives have been used as a major constituent of TM, the use of animals for medicinal purposes is reported to be crucial in the management of human health (Mishra et al. 2011; Borah and Prasad 2017; Mardiastuti et al. 2021). Thus, animals and animal products such as fur, bone, meat, blood, milk, egg, and skin have been documented as medicinal substances in various cultures and remain the backbone of TM (Alves et al. 2011; Alves and Alves 2011; Altaf et al. 2015; del Valle et al. 2015; Hernandez et al. 2015).

Several types of research have been conducted on the zootherapeutic activities of animals and their products to treat various human ailments throughout the world (Alves and Alves 2011; Mishra et al. 2011; Hernandez et al. 2015). Concerning the role of wild animals in the TM, both invertebrate and vertebrate species are used by traditional healers to prepare animal-based remedies across different societies (Alves et al. 2007; Alves and Alves 2011; Mussarat et al. 2021). However, in most scientific publications vertebrate species are more dominantly reported in the TM than invertebrate species (Alves and Alves 2011; Souto et al. 2011; Mulugeta et al. 2021). Particularly, the use of mammals and birds in the TM is well elaborated than the other animal taxa (Vijayakumar et al. 2015; Kendie et al. 2018; Zarazua-Carbajal et al. 2020; Manaye et al. 2021; Mussarat et al. 2021). For instance, a total of 44 animal species were used to treat more than 40 diseases among communities around Gibbon Wildlife Sanctuary, Assam, India (Borah and Prasad 2017). In Argentina, seven animal species were used to treat 22 ailments among mestizo communities (Hernandez et al. 2015). Likewise, a study by Altaf et al. (2015) reported the use of 108 animal species having zootherapeutic importance in Pakistan.

Although Ethiopia is characterized by high biodiversity and heterogeneous habitat types with intact cultural traditions by different ethnic groups, very few ethnozoological studies have been conducted (Tsegazeabe 2012; Dereje and Chane 2014; Kendie et al. 2018; Manaye et al. 2021). For instance, twenty-three animal species were reported to treat about 45 diseases in Degu'a Tembien, Tigray people (Tsegazeabe 2012). Another study in Amaro Woreda, Southern Ethiopia, documented 21 animal species to prepare remedies for 46 ailments among Kore people (Dereje and Chane 2014). A study in Northwestern Ethiopia also identified 51 animal species to treat around 36 diseases among the indigenous people in Metema Woreda (Kendie et al. 2018). A study in West Gojjam Zone, Amhara Region, Ethiopia, also reported using 33 medicinal animals to treat 26 human and livestock health problems (Manaye et al. 2021). A most recent study by Mulugeta et al. (2021) recorded the use of 20 animal species to treat about 30 different diseases in Arba Minch Zuria District Gamo Zone, Ethiopia. These few findings in Ethiopia revealed the enormous potential of animal-based TM among communities across the country.

The differences in the species used, type of diseases to cure, and preparation method imply that animal-based medicine is unique to an indigenous community, suggesting that context-specific study is necessary to add information of such knowledge of different regions in Ethiopia. Awi and Gamo zones, as well as Konta Special Woreda, have a great level of biodiversity across a variety of habitat types and strong traditional culture (Getaneh et al. 2019; Gochera et al. 2020). However, despite the great diversity of ethnic groups and cultures in these areas, ethnozoological studies of traditional medicinal animals have not yet been well addressed. The rich faunal resources, ethnic and cultural diversity in the areas call for an investigation and documenting animal-based TM used to treat different human ailments. Therefore, this study aimed to assess zootherapeutic animals used in TM among Awi, Gamo, and Konta communities in the Amhara and Southern Regions of Ethiopia.

MATERIALS AND METHODS

Study period and areas

The study was conducted between December 2020 to April 2021 in two zones (Awi and Gamo) and Konta Special Woreda (district). We used a multi-stage purposive sampling method to select the sampled areas. First, Zone and Woreda (an administrative division in Ethiopia managed by a local government) were purposively selected with the help of zonal and woreda wildlife authorities based on their wildlife potential and their experience in using animal-based traditional medicine. Accordingly, the Awi Zone from Amhara Region whereas, Gamo zone, and Konta Special Woreda from Southern Nations, Nationalities, and People's Region (SNNPR) was selected for the study (Figure 1).

The Awi zone is one of the administrative units in the Amhara Region, located at the coordinates 10°52′ to 11°3′ N latitude and 36°38′ to 37°8′ E longitude. The zone has a distance of 445 Km from Addis Ababa capital city of Ethiopia, and about 110 Km from Bahir Dar, the regional capital. The selected woreda in the Awi Zone, Guangua and Zigem, are found 57 and 140 km, respectively, from Injibara town, which is the administrative city of the zone, while Banja is located about 20 km radius south of Injibara. The administrative center of the Gamo zone is Arba Minch, located about 500 km south of Addis Ababa. The study districts Bonke and Chencha are located 60 and 42 km from Arba Minch town, respectively. In contrast, Konta Special Woreda is found in SNNPR, located between 6°30' N and 7°25' N, and 36°15' E and 36°55' E at a distance of 330 km from Hawassa, the capital of SNNPR (Bekalo et al. 2009). The Konta Special Woreda, besides its cultural diversities, has diversified wildlife and ecosystems with an enormous ecotourism potential.

Data collection procedure

Ethnozoological data were collected using several methods, namely, interviews using a questionnaire, focus group discussions (FGDs), and direct field observations. The participants were approached and informed of the study objectives in each woreda, and those who were willing to participate in the study were recruited for the study. A total of 90 general informants (36 female and 54 male) with 15 informants per woreda were selected in different age classes for the questionnaire survey (Table 1). Moreover, 37 (23 male and 14 female) individuals were purposively selected for FGDs. One FGD was held in each study woreda, and the size of group discussants varied from 5 to 7 individuals. The people from whom the data was collected comprise old-age community members, randomly selected respondents, spiritual intellectuals, and natural resource experts. The interview and FGDs were held in respective local languages with the help of native development agents at each study site.

Open-ended questions on wildlife potential of the area, trends in wildlife population across time, community views regarding the importance of wild animals, whether they have a role in TM, common human diseases treated based on zootherapeutic animals, threats to and conservation of these medicinal animals were all discussed during the FGDs. In addition, semi-structured interviews were employed to obtain information on a list of zootherapeutic animals, their reported importance(s), involving method(s) of preparation, routes of administration, and animal parts used. Moreover, a field guide to mammals and birds of the horn of Africa was displayed for respondents to confirm the local names of animals with corresponding pictures.

Data analysis

The commonly cited animal species and their parts for TM were analyzed using relative frequency of citation (RFC) and use value (UV). The RFC is the number of informants who reported medicinal uses of each species, and its 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 (Mootsamy and Mahomoodly 2014). The use value (UV) is used to prove the relative importance of species. UV of a species is calculated using the equation:

$$UV = \Sigma U/n$$

Where; UV is the use value of a species, U refers to the number of uses mentioned by the informants for a given species, and n is the number of informants (Phillips and Gentry 1993).

To predict the important factors that affect respondents' knowledge in using wild animals for TM, we used Binary Logistic Regression Model in SAS 9.0. Potential factors, such as gender (GE), region of respondents (RE), age class (AGC), and educational status (ED), were used to develop the binary logistic regression model.

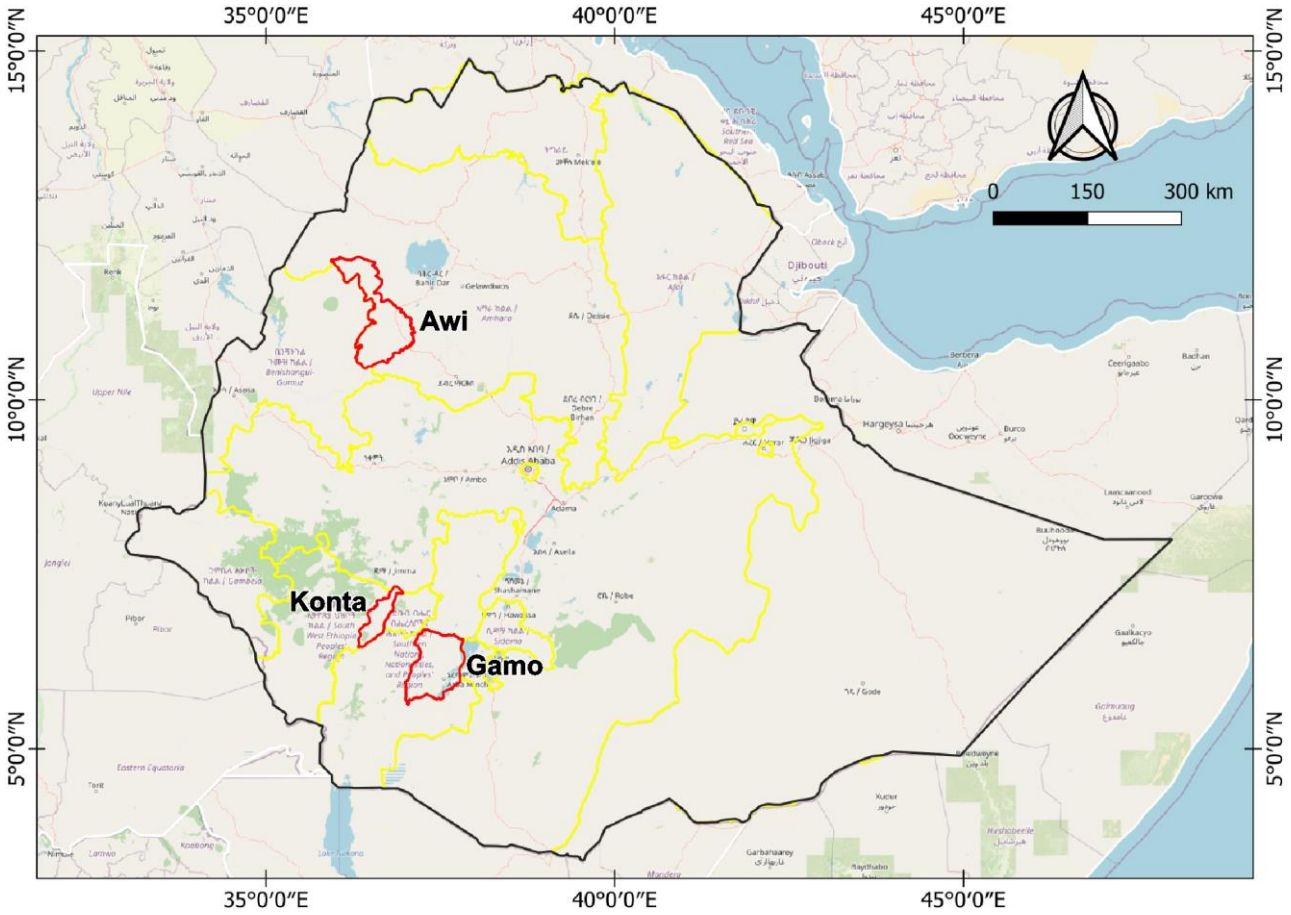

Figure 1. Map of the study area showing the sampled zones in Ethiopia

Table 1. The general profile of respondents by region, woreda, gender, and level of education

Variable region	1	1	1	2	2	2	Overall (*n* = 90)
Woreda	Banja	Guangua	Zigem	Bonke	Chencha	Konta	Total
Number of Respondents	15	15	15	15	15	15	90
Male	10	6	10	8	9	11	54
Female	5	9	5	7	6	4	36
Mean household age	38.3	44.3	41.6	34.8	39.4	42.4	40.1±1.2
Educational status							
No formal education	4	9	6	4	3	9	35
Primary education	3	1	5	3	6	4	22
Secondary education	1	3	2	5	2	1	14
College and above	7	2	2	3	4	1	19

Region 1= Amhara; Region 2= SNNP

RESULTS AND DISCUSSION

Zootherapeutic animals and animal products used by people in the sampled areas

In this study, 20 vertebrate species belonging to 11 orders, in 15 families, and 19 genera were recorded to cure nearly 23 human aliments by Awi, Gamo, and Konta communities. The species and their uses, mode of remedy preparation, common English, local and scientific names, and their conservation status can be seen in Table 2. Ethnozoological studies in different parts of the world revealed the use of animal species and their products as a cure for human and livestock diseases in diverse cultural and tribal settings (Alves and Rosa 2005; Alves 2012; Altaf et al. 2018). Considering a few recently published findings, Budjaj et al. (2021) reported the use of 31 species in Northwestern Africa. Twenty-three (23) medicinal animal species was reported in the Tehuacan-Cuicatlan Valley, Mexico (Zarazua-Carbajal et al. 2020). Our study revealed the use of 20 vertebrate animal species to treat nearly 23 different human diseases, which is closer to the findings reported in different regions of Ethiopia (Tsegazeabe 2012; Dereje and Chane 2014; Mulugeta et al. 2021). However, variations in the number of medicinal animals were common in different corners of the country. For instance, 51 species were reported by Kendie et al. (2018) in Metema Woreda, while Mekides and Mosissa (2020) reported 17 species around Leka Dullecha District, Western Ethiopia. The relatively lower number of medicinal animals in our study might be related to the lack of traditional healers as key informants in the study.

Mammals (n= 14) were among the most commonly used zootherapeutic species, followed by birds (n= 4) (Figure 2 and Table 2). Among them, hyena, bushbuck, and francolin were the commonly used medicinal animals in the Amhara region, while porcupine, warthog, and hyena were commonly reported in SNNPR (Figure 3). However, hyena, porcupine, and bushbuck remained important medicinal animals in the study areas, with the overall use value of 0.33, 0.31, and 0.26, respectively (Table 2). The dominant use of mammals and their parts for zootherapeutic purposes across the study localities in our study is comparable with the results reported in Northwestern Africa (Budjaj et al. 2021), Southern Regions of Pakistan (Mussarat et al. 2021), Brazil (Alves et al. 2011), India (Borah and Prasad 2017), Mexico (del Valle et al. 2015; Zarazua-Carbajal et al. 2020), Pakistan (Altaf et al. 2018) and Nepal (Adhikari et al. 2020). Similarly, a higher frequency of mammalian use in the TM among diverse communities was also reported in different parts of Ethiopia (Tsegazeabe 2012; Dereje and Chane 2014; Kendie et al. 2018; Manaye et al. 2021; Mulugeta et al. 2021). As reported by multiple authors (e.g., Altaf et al. 2018; Budjaj et al. 2021; Adhikari et al. 2020), avian species have more traditional medicinal importance next to mammals, which is in line with our findings. The higher medicinal use value of mammals and birds might be attributed to the higher degree of interaction with humans in the cultural and traditional ceremonies (Vijayakumar et al. 2015; Zarazua-Carbajal et al. 2020). Although reptiles are broadly used animal resources in the TM (Alves et al. 2007; Nijman and Bergin 2017; D'Cruze et al. 2020; Boakye et al. 2021), we found only one species (python) to treat rabies and general body swellings. This might be attributed to the lack of involvement of traditional healers in our study.

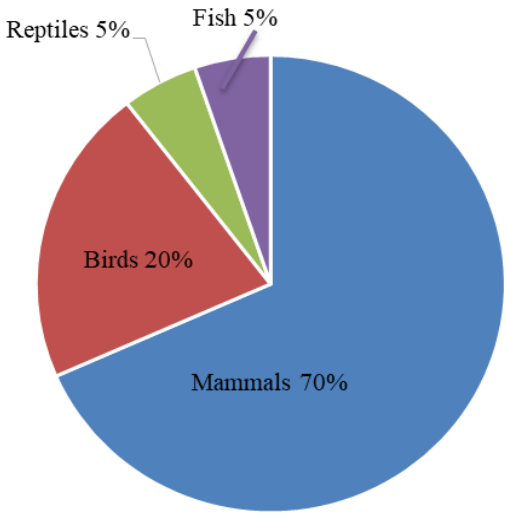

Figure 2. The proportion of commonly used zootherapeutic vertebrate classes for traditional medicine

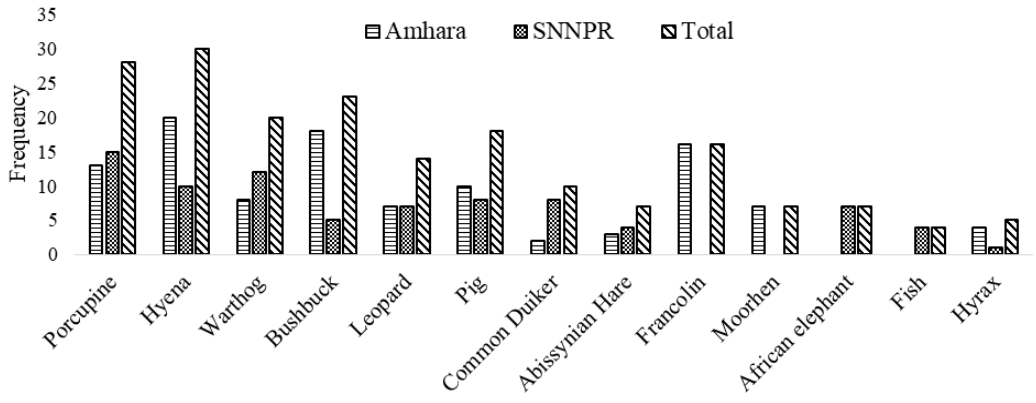

Figure 3. Frequency of commonly used zootherapeutic animals for traditional medicine across sampled regions

Table 2. Ethnomedicinal knowledge of animal resources among communities in the study areas

Scientific name	Common name (E)	Local name (A/Am/G/K)	Class	Parts used	Uses in Amhara	Uses in SNNPR	Mode of preparation	Use value (UV)	IUCN* Conservation status
Hystrix cristata (Linnaeus, 1758)	Crested porcupine	Giretsa (A); Quttarssa (G, K)	Mammals	Meat	Asthma, coughing horse	Asthma, pneumonia	Soup/ meat dried, crushed and given to infected horses	0.31	LC
Crocuta crocuta (Erxleben, 1777)	Spotted hyena	Ehuy (A); Godare (G)	Mammals	Eyelash,skin, bile	Protection from evil eye & bad sprit	Protection from evil eye	Skin dried and placed in the house/tying on the body, bile given for the patient	0.33	LC
Phacochoerus aethiopicus (Pallas, 1766)	Desert warthog	Tsigini (A); Gashoo (K)	Mammals	Meat	Broken bone	Breast infection, broken bone, bone ache	Soup	0.22	LC
Tragelaphus scriptus (Pallas, 1766)	Bushbuck	Dekuli (A)	Mammals	Meat	Broken bone	Source of bush meat	Roasted meat, soup,	0.26	LC
Panthera pardus (Linnaeus, 1758)	Leopard	Tsaneh (A)	Mammals	Meat	Rabies	---	Fatty part of fresh meat is roasted and given to the infected person	0.16	VU
Potamochoerus larvatus (F.Cuvier, 1822)	Bushpig	Geremi (A); Gudunttaa (K)	Mammals	Meat	Broken bone, leg swelling due to kidney infection	Body swellings due to infections, TB	Soup	0.2	LC
Sylvicapra grimmia (Linnaeus, 1758)	Common Duiker	Kupetsa (A); Gense (G)	Mammals	Soup	Asthma	Bone ache	Soup	0.11	LC
Lepus habessinicus Hemprich & Ehrenberg, 1832	Abyssinian Hare	Shenetili (A); Azzo (G)	Mammals	Meat/fur	Skin burn, cattle fattening	Kidney infection, heart failure	Fur is placed in a burnt skin, soup for emaciated cattle	0.08	LC
Pternistis erckelii (Ruppell, 1835)	Erckel's Francolin	Gogocha (A)	Birds	Meat	Asthma, cough	---	Soup	0.18	LC
Paragallinula angulata (Sundevall, 1851)	Moorhen	Ahudera (A)	Birds	Fresh blood	Bleeding skin infections	---	Fresh blood poured over the infected skin surface	0.08	LC
Lates niloticus (Linnaeus, 1758)	Nile perch	Nech Assa (Am)	Fish	Meat	---	Common cold, flu	Roasted meat, soup	0.04	LC
Procavia capensis (Pallas, 1766)	Rock hyrax	Kokach (A)	Mammals	Soup	Asthma, pneumonia	General body illness	Soup, roasted meat	0.06	LC
Numida meleagris (Linnaeus, 1758)	Guinea fowl	Jigra (Am)	Birds	Meat, egg	---	Ritual purpose,	Meat, egg	0.04	LC
Tragelaphus strepsiceros (Pallas, 1766)	Grater Kudu	BerahiwAgazen (A)	Mammals	Meat	Broken bone	Broken bone	Meat, soup	0.04	LC
Syncerus caffer (Sparrman, 1779)	Buffalo	Gosh (Am); Mentta (K)	Mammals	Meat	---	Source of bush meat	Meat, soup is consumed	0.02	NT
Leptailurus serval (Schreber, 1776)	Serval cat	Mahe (G)	Mammals	Meat	---	High fever	---	0.03	LC
Civettictis civetta (Schreber, 1776)	African Civet	Tirigne (Am)	Mammals	Meat/ musk	---	Headache	Smelling fresh musk	0.01	LC
Milvus migrans (Boddaert, 1783)	Black kite	Tsila (A)	Birds	Feather	Ear infection	---	Cleaning the infected ear using soft feather	0.01	LC
Python sebae (Gmelin, 1789)	Python	Dawe (G)	Reptiles	Meat, bone	---	Rabies, body swellings	Soup, heated bone will placed on the swellings	0.01	CE
Loxodonta africana (Blumenbach, 1797)	African elephant	Dangarssa (G, K)	Mammals	Dropping	---	Asthma	Inhaling the smoke of dry faces	0.07	VU

Note: A= Awinin language, Am= Amharic language; G= Gamo language, K= Konta language, CR= Critically endangered, EN= Endangered; LC= Least concern, NT= Near threatened, and VU= Vulnerable

Asthma, protection for evil eye, and broken bone were the most commonly reported diseases in the sampled areas. Where asthma and broken bone were treated by animal products derived from multiple species (Table 2). Although Abyssinian hare was reported to have one of the lowest UV (0.01), the species was used to treat ailments like skin burn, kidney infection, and heart failure. Moreover, the meat of porcupine and hare were involved in treating cough in horses and a source of body weight gain ingredient in emaciated cattle, respectively. However, the meat of buffalo and bushbuck was exclusively reported as a source of bush meat in the study communities.

Among the 20 medicinal animals involved in the TM, four species were listed on the IUCN Red List of threatened species (version 2021-3). The leopard (*Panthera pardus* Linnaeus, 1758) is vulnerable, the African buffalo (*Syncerus caffer* Sparrman, 1779) is near threatened, the African elephant (*Loxodonta africana* Blumenbach, 1797) is vulnerable, and the python (*Python sebae* Gmelin, 1789) is critically endangered (Table 2). The population of such species is declining due to poaching by the local communities for their body parts. For instance, the tusks of elephants and the skin of leopards are international resources traded in the illegal wildlife market (’t Sas-Rolfes et al. 2019; Gubbi et al. 2020), while buffalo and python are poached for bush meat and other cultural values within the community. The declining trend in such globally vulnerable and threatened wildlife populations demand urgent conservation interventions in terms of biodiversity conservation and ethnozoological point of view.

Meat, skin, and blood were the most frequently listed remedial animal products used by the local communities, with the pooled RFC of 0.48, 0.28, and 0.13, respectively (Table 3). The dominant use of meat, either roasted or prepared as soup, in our study, is in agreement with previous studies in Northern Ethiopia (Tsegazeabe 2012; Kendie et al. 2018; Mussarat et al. 2021). The use of soup prepared from the meat of warthog, bushbuck, and bush pig as a remedy for a broken bone in our study might be related to the higher protein and fat content of the meat, which promotes building up processes around damaged tissues. The remedy preparation and administration method vary based on the type of infection and complications developed. As reported by different authors (Souto et al. 2011; Tsegazeabe 2012; Dereje and Chane 2014; del Valle et al. 2015; Altaf et al. 2018; Manaye et al. 2021) the medicinal materials were used either raw or in cooked form, administered orally, smelled or topical as reported by the sampled respondents. Accordingly, the meat of different animals was used orally for various ailments, the elephant dung was dried, crushed, placed on a fire, and smelled for asthmatic conditions, while the fur of Abyssinian hare was placed topically on the surface of a burnt body part.

The general binary logistic regression model revealed that all four variables (i.e., age, education, gender, and region) were important to predicting respondents’ knowledge ($\chi 2$=32.95; *df*=8; P=0.0001). However, of the four variables used in the general model, only age ($\chi 2$=10.53; *df*=3; P=0.01) and region ($\chi 2$=5.11; *df*=1; P=0.02) have significantly influenced ethnozoological knowledge of respondents in the sampled areas (Table 4). For example, respondents’ knowledge in the Amhara region (RE 1) of TM is 1.4 times higher than that of respondents in SNNPR. Similarly, respondents’ knowledge of TM in those age groups less than 30 years (AGC 1) is 2.6 times lower than in old age classes.

The current finding showed that younger respondents have lesser knowledge regarding the use of wild animals towards TM compared with older age groups (Borah and Prasad 2017; Adhikari et al. 2020; Mussarat et al. 2021). Such knowledge variation related to age increment might be linked with accumulated life experiences and skills (Mussarat et al. 2021). Moreover, respondents from the Amhara region have better knowledge about the importance of wild animals in TM than respondents in the Southern region. Therefore, such knowledge variations could be related to the older age of respondents sampled in Amhara than Southern region and might also relate to the cultural affinity of the Amhara community towards wildlife.

Regarding the FGDs, all focus group discussants in each region confirmed wild animals were an important input for TM in their respective localities. For instance, discussants in the Awi zone Amhara region underlined the loss of “stingless bee” (*Trigona* spp.) resulted in the loss of a special kind of honey, locally termed as *“Tazima mar,”* that was harvested from the species. This honey was reported to have an essential medicinal value in the community. Therefore, residents suffered a lot due to the local extinction of the species and its product. They have also stressed the role of birds as important biological pest control agents. The discussants remembered the locust outbreak that occurred during the crop harvesting seasons of 2020 and indicated that birds were the only source to combat the outbreak. The group discussants elaborated that the unidentified bird species arrived simultaneously with the arrival of the swarm of locusts and preyed on them so that the crop damage and loss by the locust had significantly decreased. A senior discussant described the situation as follows “we have nothing to harvest in that season unless the birds preyed up on the locusts, and we believe the arrival of the birds was a miracle from God to safeguard our crops and our lives.” Moreover, discussants in SNNPR confirmed that buffalo and grater kudu remained an important source of bush meat besides the role in the TM. Remarkably, all group discussants agreed on relatively higher incidences of human-wildlife conflict in their respective localities. Hence, almost all the discussants concluded that the important wildlife species are threatened mainly due to poaching, deforestation, habitat destruction, and loss.

Table 3. Relative Frequency of Citation (RFC) of animal body parts used for traditional medication in the studied areas

Animal part or product used	No. of citation in Amhara Region	No. of citation in SNNPR	RFC in Amhara (%)	RFC in SNNPR (%)	Total RFC (%)
Meat	24	20	0.26	0.22	0.48
Skin	16	10	0.17	0.11	0.28
Blood	12	-	0.13	-	0.13
Bile	7	-	0.08	-	0.08
Feather	-	2	-	0.02	0.02

Table 4. SAS output of the predictor variables used in the binary logistic regression model

Variables used	Variable level	Degree of freedom	Estimate	Chi square value	P-value
AGC, ED, GE, RE	---	8	---	32.95	0.0001**
ED	1	1	0.4237	0.2147	0.6431
ED	2	1	0.1370	0.0278	0.8675
ED	3	1	1.0761	1.4342	0.2311
GE	0	1	0.2251	0.1381	0.7102
AGC	1	1	-2.6375	6.9839	0.0082**
AGC	2	1	-1.4674	2.3743	0.1233
AGC	3	1	0.4981	0.1455	0.7029
RE	1	1	1.4065	5.1124	0.0238**

Note: AGC=age category; ED=education; GE=gender; RE=region of respondent. ED 1= respondent with no formal education, ED 2= primary education, ED 3= secondary education, GE 0= female respondents, AGC 1= age group $\leq$ 30, AGC 2= age group $\leq$ 40, AGC 3= age group $\leq$ 50, RE 1= Amhara region. Values with double stars** refer to variables having statistical significance

In conclusion, this study confirmed local communities' unique knowledge and experience regarding animal-based TM. In all the sampled areas, zootherapeutic practices remained a vital component of communal health care systems. In comparison, a relatively higher number of zootherapeutic animals were reported in Amhara compared with the Southern region. Among the reported species, hyena, porcupine, and bushbuck were the important medicinal animals in the study areas with higher use values. The wild animals, besides their role in the TM, are important sources of bush meat and have cultural and spiritual values. Although the wildlife population is an important asset to the community in terms of TM and socio-economic values, the population is decreasing over time. All these call for community conservation education campaigns to achieve sustainable wildlife utilization practices in the study areas. Since the study revealed the unexplored communal knowledge regarding animal-based TM, an intensive study involving knowledgeable traditional healers as key informants is recommended. Moreover, to maintain the intact indigenous community knowledge, emphasis should be given to older age groups in designing similar studies in the future.

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