

Assessment of ethno-veterinary practices in small ruminants in Akinyele local government area, Ibadan, Oyo state, Nigeria

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ABSTRACT

The application of traditional medicine to veterinary medicine has been termed ethno-veterinary medicine. Interview survey was conducted using a structured questionnaire to generate data on ethno-veterinary medicinal (EVM) practices used for treating pests and diseases of small ruminants in Akinyele Local Government Area, Oyo State, Nigeria. Information from one hundred and nine respondents was obtained through a multi-stage sampling technique. The data were analysed using simple descriptive statistics to generate frequencies and percentages. Demographic characteristics of the respondents showed that 62.39% were males and majority of them fell within 41 – 50 year, married (48.62%), Christians (68.81%), practiced extensive system of rearing (83.49%) with all of them into goat farming (100%) and 30.28% also having sheep in addition to goats. Secondary level education (38.53%) was the most attended by respondents. Majority sourced their EVM from family and relatives (76.15%), whereas greatest causes of loss, constraint and ill-health were diseases (46.79%), feed resources (35.78%) and PPR (35.78%) respectively. Most of them agreed that EVM has medicinal value (91.74%), cheaper than orthodox drugs (93.58%), has side effects (52.29%) and also easier to administer (77.06%). Eighteen (18) plant products that include fruit, leaf, root and bark were used to treat various diseases such as mange, cough, mastitis, diarrhoea, PPR, anthrax and snake bite. It is therefore recommended that these findings be used as baseline information by identifying the effective herbal remedies for livestock health which can be utilized by veterinarians and pharmacologists for the development of new therapies as well as isolation of bioactive compounds.

Keywords: Animal diseases, ethno-veterinary practices, small ruminants, socio-economic

INTRODUCTION

Animal protein is regarded as a first class protein in the diets of humans because it supplies all the essential amino acids needed for the body to perform its biological functions. Livestock does not only supply protein to the body, it serves to be a repository of wealth, earning foreign exchange and enhancing the economy of a country. Unfortunately, there are setbacks occasioned by diseases that could lead to low productivity or even ultimately death. Conventional chemotherapeutic agents are either too expensive or outrightly unavailable to manage disease(s). Poor animal health is an important factor limiting animal productivity in most developing countries including Nigeria, there has been a decline in funding for veterinary services and animal-

health care in general. For these reasons, most of the animals kept by herdsman and other village producers are not accessed easily by veterinary personnel (Mishra, 2013). The indigenous knowledge existed among various traditional practitioners, elderly people, bone setters, hunters, including herdsman who are knowledgeable about medicinal plants' utilization which they use to meet the needs and expectations of populace (Abdulhamid *et al.*, 2017)., there arises the exigency to resort to ethnoveterinary medicine (EVM) to challenge the disease in the animal. Moreover, pastoralists depend on EVM because of their sedentary nature, which keep them far away from Veterinarians (Rahmatullah *et al.*, 2010).

Medicinal plants have been used for chemotherapeutic purpose across the globe since ages due to their efficacy and availability as well as cultural beliefs (Rafique *et al.*, 2021). According to Brouwer *et al.* (2005), approximately 25% of all pharmaceutical products worldwide originated from traditional medicinal knowledge and there is widespread interest in developing new types of medicinal agents with greater potency and reduced side effects. EVM is a system that is based on people's beliefs, indigenous knowledge, skills, methods and practices used for curing diseases and maintaining health of animals which are transmitted from generation to generation through oral communication without any formal documentation (Mathias-Mundy & McCorkle, 1989; Tabuti *et al.*, 2003; Birhanu & Abera, 2015). In other studies (Nok *et al.*, 1993; Nok & Williams, 1996), the active principles as well as the mechanisms of action of some plant extracts that are used in ethno-veterinary medicine have been established, thus suggesting the potential of traditional drugs in primary animal-health care. There are reports of farmers using traditional remedies because they are more readily available and cheaper Chah *et al.* (2009), Kubkomawa *et al.* (2013), Tariq *et al.* (2014) and Hart & Bussmann, (2018) and additionally, EVM is partly effective and practicable in animal diseases treatment (Kaikabo *et al.*, 2004).

Although similar works have been done in other areas of Nigeria including Oyo state but Akinyele Local Government Area, Ibadan, Oyo State, Nigeria has paucity of information on the theme despite its abundant small ruminant population. Therefore, this study was conducted to evaluate the EVM practices among small ruminants' farmers in this study area.

METHODOLOGY

THE STUDY AREA

The study was conducted at Akinyele Local Government Area (LGA), Oyo State, Nigeria. It is one of the eleven LGAs that make up Ibadan metropolis and comprises both urban and rural parts with Moniya as the Headquarters. It has an area of 518 km² and a population of 105, 594 males and 106, 217 females (NPC, 2006). The LGA was created in 1976 and shares boundaries with Afijo to the North, Lagelu to the East, Ido to the West and Ibadan-North LGAs to the South. It occupies a land area of 464,892 km² with a population density of 516 persons per square kilometre. Its geographic coordinates are 7°23' 47" N and longitude 3°55' 0" E (Efenakpo *et al.*, 2016). The LGA is subdivided into 12 Wards, namely Ikereku, Olanla/Oboda/Labode, Arulogun/Eniosa/Aroro, Olode/Amosun/Onidundu, Akinyele/Isabiye/Irepodun, Ojo-emo/Moniya, Iwokoto/Talonta/Idi-oro, Ojoo/Ajibode/Laniba and Ajibade/Alabata/Elekuru. Others include Ijaye/Ojedeji, Olorisa-oko/Okegbemi/Mele, and Iroko. The LGA houses

the major Central Abattoir of Ibadan Metropolis and has large population of small ruminants.

ETHICAL STATEMENT

Code of ethics of International Society of Ethnobiology (2008) was followed during data collection. The respondents were initially briefed about the purpose of this research work and verbal consents were obtained from all of them. Most of the respondents were illiterate and obtaining written consent from them was impossible.

SOURCE OF DATA AND SAMPLING PROCEDURE AND SIZE

The methods used for ethno-veterinary practice data collection were semi-structured interviews and field observation (Bouyahya *et al.*, 2017). Questionnaires as standardized data collection protocols (Martin, 2004; Ocvirk *et al.*, 2013) were used to elicit information on ethno-veterinary management of small ruminants from the farmers at the study area between February and March, 2017. Open ended questions and field observation were used to identify the medicinal plants used, information on pests and diseases of small ruminants, medicinal value of each medicinal plants and its method of administration through key informants' interviews and focus group discussion (FGDs). The LGA was purposively selected because of the abundance of subsistent small ruminant farmers. Multi-stage sampling technique was used for the study. Households that cut across the 12 Wards rearing small ruminants were enumerated and ten farmers randomly selected from each of them for administration of questionnaires and conduct of field survey. Therefore, a total of 120 small ruminant (sheep and goats) farmers were selected. More often, they were accompanied to the field for identification of plant species used in the EVM. To bring an element of accuracy, the information obtained from one locality was cross-checked with that of others. Specimens of medicinal plants collected from each locality were provided with a collection voucher number for future reference. The plant specimens were processed at the Herbarium of Federal College of Animal Health and Production Technology, Ibadan, Oyo State, Nigeria and then identified with the help of available literature (Abbasi *et al.*, 2013; Akobundu *et al.*, 2016; Aziz *et al.*, 2018).

DATA ANALYSIS

The data collected were presented using descriptive (such as frequency counts, percentages and means) and inferential statistics.

RESULTS

SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

One hundred and nine (109) out of one hundred and twenty (120) questionnaires distributed were recovered. Table I shows the socio-economic characteristics of the respondents. The results showed that most of the respondents were within the age range of 41 – 50 (40.37%), followed by 31 – 40 (22.02%), 21 – 30 (18.35%) and whereas the least was 10 – 20 (3.67%) years. Males (62.39%) were the greater respondents. Married people (48.62%) assumed the greatest proportion, followed closely by the singles (43.20%) and the least been the widowed (3.67%) people. Christians (68.81%) also constituted the greater portion as opposed to Islam (31.19%). In terms of household size, 1 – 5 (53.21%) was the most populous followed by 6 – 10 (42.20%), 11 – 15 (3.67%) and the least was >15 (0.92%) people. The respondents practiced extensive system (83.49%) and semi-intensive (16.51%) whereas no one practiced intensive system of raising animals. Every respondent reared goat while 34 of them practiced mixed farming of sheep and goat. Most of them had flock size of 1 – 10 (51.38%) followed by 11 – 20 (43.12%), 21 – 30 (3.67%), 31 – 40 (1.83%) and none had above 40 animals. Majority of the people had been in the small ruminant rearing for the past 6 – 10 (62.39%) years. Most of the farmers had secondary education (38.53%), followed by tertiary (31.19%) and primary (16.51%) whereas the holders of non-formal education (13.76%) were the least. Majority had their primary occupation as farming (37.61%) followed by trading (22.02%) and artisan and civil service (20.18%). Thirty three percent ((33%) of the respondents had a monthly earning of more than N40,000:00.

SOURCES OF INFORMATION ON ETHNOVETERINARY KNOWLEDGE USED IN TREATING SMALL RUMINANTS

Table II shows the sources of information on ethno-veterinary knowledge used in treating small ruminants in the study area. The results showed that most respondents (76.15%) got their information from family and relatives. Similarly, 67.89 % got theirs from friends. Extension agents contributed 15.60 % of the information whereas books, radio, television and trial/error contributed 11.01, 10.09, 7.34 and 4.59 % respectively.

Table I: Socio-economic characteristics of the respondents (n = ?)

Variable	Frequency	Percent age (%)	Freq %	
Age (years)			Flock size	
10-20	04	3.67	1-10	56 51.38
21-30	20	18.35	11-20	47 43.12
31-40	24	22.02	21-30	04 3.67
41-50	44	40.37	31-40	02 1.83
51-60	09	8.27	>40	0.00 0.00
>60	08	7.34	Length of time in the rearing (year)	
Sex			1-5	33 30.28
Male	68	62.39	6-10	68 62.39
Female	41	37.61	11-15	06 5.50
Marital status			>15	02 1.83
Single	47	43.20	Level of education	
Married	53	48.62	No formal education	15 13.76
Divorced	05	4.59	Primary education	18 16.51
Widowed	04	3.67	Secondary education	42 38.53
Religion			Tertiary education	34 31.19
Islam	34	31.19	Primary occupation	
Christianity	75	68.81	Artisan	22 20.18
Household size			Farming	41 37.61
1-5	58	53.21	Trading	24 22.02
6-10	46	42.20	Civil service	22 20.18
11-15	04	3.67	Income level (₦ monthly)	
>15	01	0.92	<20,000	20 18.35
Farming system			20,000-29,999	34 31.19
Extensive	91	83.49	30,000-39,999	19 17.43
Semi-intensive	18	16.51	>40,000	36 33.03
Intensive	0.00	0.00		
Type of livestock				
Goat	109	100		
Sheep	34	31.19		

VARIABLES THAT INFLUENCED ILL-HEALTH IN SMALL RUMINANTS

Table III shows the results of variables that influenced ill-health in small ruminants. The results showed that most of the losses encountered were due to diseases (46.79%)

Table II: Sources of information on ethnoveterinary knowledge used in treating small ruminants

Sources	Frequency	Percentage (%)	Rank
Family and relatives	83*	76.15	1 st
Friends	74*	67.89	2 nd
Extension agent	17	15.60	3 rd
Books	12*	11.01	4 th
Radio	11	10.09	5 th
Television	08	7.34	6 th
Trial and error	05	4.59	7 th

followed by accident (32.11%) and parasitism (21.10%). In rearing the animals, the highest constraint was attributed to feed resources (35.78%), followed by theft (32.11%), diseases/parasitism (16.51%) and the least was space for rearing (15.60%). Amongst diseases experienced, PPR (35.78%) was top-most followed by diarrhoea (29.36%), mange (12.84%), foot rot (11.93%) and bloat (10.09%). In terms of managing ill-health, traditional treatment (35.78%) was mostly used as compared to zero treatment (29.36%), orthodox medication (22.02%) and mixture of orthodox and traditional medications (12.84%).

KNOWLEDGE ON THE USE OF TRADITIONAL TREATMENT

Table IV shows the knowledge on the use of traditional medicine. The results showed that majority of the respondents agreed that traditional medicine had medicinal value (91.74%), can be used to treat animals (85.32%), cheaper than orthodox drugs (93.58%), has side effects (52.29%), more readily available (82.57%), easier to administer (77.06%) and animals perform better with it (57.80%). While a greater number of respondents disagreed that EVM was more effective than orthodox medicine (54.13%) in treating diseases of small ruminants, that animals can survive only on traditional medicine (56.88%) and vaccination and orthodox medicines are not necessary (65.14%).

TRADITIONAL TREATMENTS FOR DISEASES OF SMALL RUMINANTS

Table V shows traditional treatments for diseases of small ruminants in the study area. Mange, cough, mastitis, malnutrition, helminthosis, diarrhoea, footrot, bloat, flea and tick infestations, PPR (pestes des petit ruminants), anthrax and snake bite were the diseases for which they claimed to have traditional treatments. A skin disease such as mange can be treated with topical application of a mixture of palm oil, ground sunflower leaves, engine oil, kerosene and gammalin as well as ground bark of *Khaya senegalensis* and leaves of

Table III: Variables that influenced ill-health in small ruminants

Variable	Frequency	Percentage (%)
Cause of death		
Disease	51	46.79
Parasitism	23	21.10
Accident	35	32.11
Constraints of raising animals		
Disease/parasitism	18	16.51
Theft	35	32.11
Feed resources	39	35.78
Space for rearing	17	15.60
Most encountered ill-health		
PPR	39	35.78
Diarrhoea	32	29.36
Mange	14	12.84
Bloat	11	10.09
Foot rot	13	11.93
Management of disease		
Orthodox and traditional medications	14	12.84
Orthodox medication	24	22.02
Traditional medication	39	35.78
No treatment	32	29.36

Nicotiana tabacum. Cough could be cured by drenching the diseased small ruminant with a mixture of palm kernel oil, juice of lime citrus fruit and *Bridelia ferruginea* bark soaked in water for 24 hours. The remedy for mastitis was a drench of cooked *Spondias monbim* leaf, while malnutrition was cured by grinding and feeding a mixture of *Moringa oleifera* and *Leucaena leucocephala* leaves to the animals. Helminthosis was treated with drench of pawpaw leaf and unripe pawpaw fruit soaked in water or grinding and drenching of the animal with *Khaya senegalensis* bark while diarrhoea was treated with either a drench of ground *Phyllanthus amarus* leaves, or soaked onion (in water) or feeding the animal with cooked maize. Alternatively, helminthosis was also treatable by drenching squeezed out bitter leaf water. Footrot was taken care of by applying a mixture of Aloe vera and lime fruit (*Citrus aurantifolia*) on

Table IV: Knowledge on the use of traditional medicine

Questions	Agree	S. agree	Disagree	S. disagree
Trad. med. has medicinal value	75	25	6	3
Trad. med. can be used to treat animal	59	34	12	4
Trad. med. is more effective than orthodox drugs	35	15	46	13
Animals survive only on the use of trad. med.	38	9	39	23
Trad. med. are cheaper than orthodox drugs	61	41	4	3
Vaccination and orthodox med. are not necessary	31	7	41	30
Trad. med. has side effects	39	18	43	9
Trad. med. is more readily available	65	25	16	3
Trad. med. is easier to administer	57	27	18	7
Animals perform better with trad. med.	42	21	41	5

the affected foot whereas bloat was cured using palm oil drench. Flea and tick infestations were treated by rubbing palm oil and palm kernel oil respectively on the affected skin. Pestis des petit ruminants (PPR) received cure by topical application of ground mixture of *Adansonia digitata* and alligator pepper as well as grinding and drenching with *Phyllanthus amarus* leaf. Anthrax was managed with a drench of ground mixture of bitter leaf (*Vernonia amygdalina*) and lime (*Citrus aurantifolia*) fruit. Whereas, snake bite was treated with drench of ground *Anona senegalensis* bark and *Diospyrus mespitiiformis* root.

DISCUSSION

The results in Table I show that a greater proportion of the rural people practicing EVM were within the age range of 41-50 years which agrees with the findings of Nnadi *et al.* (2012) and Ojo *et al.* (2014) that got 36-50 years. It infers that the study area was dominated by farmers who were still in their active ages and can thus engage actively in agricultural production. It was observed that old age population groups possessed more ethnobotanical knowledge because of their higher association with typical agro-pastoral lifestyle as compared to the younger generation (Heinrich *et al.*, 2009).

Greater number of males in the demographic characteristics supports the observation that in most African societies, males are the head of the household (Chimonyo *et al.*, 1999). Also, in the Northern Nigeria, males were reported to be the ones

involved mostly in the activities of farming, hunting and marketing (Mudansiru *et al.*, 2016; Ebbo *et al.*, 2019). This however, was contradicted by Osho & Fasina (2013) & Ojo *et al.* (2014) in Ekiti State, that more women were involved in ethnoveterinary practice than men. That the majority of the respondents were married justifies the fact that 41 – 50 year old people dominated the practice and it is in consonance with the findings of Omotara & Olutegbe (2015) in Obokun Local Government Area of Osun State. That Christianity was in greater proportion is a function of location and religious belief of the people. Similarly, Ojo *et al.* (2014) got dominance of Christianity at Ekiti State where they surveyed ethno-veterinary practice in ruminants.

The dominance of extensive system of management in the study area agrees with findings of Safilios (1983) that the most common system throughout the developing countries involves the extensive system. The practice of subsistence farming by the respondents is similar to the finding of Adedeji *et al.* (2013) in Ona-Ara Local Government of Oyo State that was characterized by small flock size dominated by goats possibly because of preference of goat meat to mutton in the Southern Nigeria. In the same vein, Omotara & Olutegbe (2015) got more goat farmers in Ekiti State. The length of time into rearing showed that they are experienced in animal husbandry. Because of the urban status of the study area, many that practiced EVM were educated unlike informal education that dominates similar settings particularly in typical rural areas (Ojo *et al.*, 2014; Omotara & Olutegbe, 2015). The primary occupation was mostly farming. This agrees with the finding of Ebbo *et al.* (2019) within Sokoto Metropolis, Nigeria. Most of them made N20,000 – N29,999 monthly suggesting that the business is profitable.

The results on sources of information align with several authors (Menale & Muoio, 2014; Birhanu & Abera, 2015) who have documented the passage of ethnoveterinary knowledge orally among family with preference to old age group as secret and protection of their cultural heritage. This finding is in support of Fullas (2010) and Omotara & Olutegbe (2015) who observed that similar to traditional knowledge, ethno-veterinary medicinal plant knowledge is not documented. It is simply transferred verbally from generation to generation and thus risks the danger of extinction. This mode of knowledge transfer may lead to interrupted knowledge transmission; intergenerational knowledge erosion and its effects are discrepancies between knowledge and actual use of medicinal plants (Srithi *et al.*, 2009; Buwa-komoreng *et al.*, 2019).

Table V: Traditional treatments for diseases of small ruminants

Disease	Treatment	Local name	Application method
Mange	Palm oil	Epo pupa	Apply on the skin
	Sun flower leaf	Sepelupa	Apply on the skin
	Engine oil	Epo brake	Apply on the skin
	Kerosene	Baafin	Apply on the skin
	Gammalin	Gamale	Apply on the skin
	<i>Khaya senegalensis</i> bark	Oganwo	Grind and apply on the skin
	<i>Nicotiana tabacum</i> leaf	Taba	Grind and apply on the skin
Cough	<i>Curcuma longa</i> L (turmeric)		Grind and apply on the skin
	Palm kernel oil + lime citrus	Adin eyan	Drench the animal
	<i>Bridelia ferruginea</i> bark soaked in water	Ira	Drench the animal
Mastitis	<i>Spondias monbim</i> leaf	Iyeye	Drench the animal
	<i>Curcuma longa</i> L (turmeric)		Drench the animal
Malnutrition	<i>Moringa oleifera</i> + <i>Leucaena leucocephala</i>	Leucena	Grind the leaves and feed the animals
Helminthosis	Pawpaw leaf	Ewe ibepe	Soak in water and drench
	Unripe pawpaw fruit	Ibepe dudu	Soak in water and drench
	<i>Khaya senegalensis</i> bark	Oganwo	Grind and drench the animal
Diarrhoea	<i>Phyllanthus amarus</i> leaf	Eyin olobe	Grind and drench the animal
	Onion	Alubosa	Soak in water and drench
	Cooked maize	Agbado sise	Feed the animal
	Bitter leaf	Ewuro	Squeeze in water and drench
Foot rot	Aloevera + Lime (<i>Citrus aurantifolia</i>)	Aloe	Grind and apply on the foot
Bloat	Palm oil	Epo pupa	Drench the animal
Flea	Palm oil	Epo pupa	Rub on the body
Tick	Palm kernel oil	Adi-agbon	Rub on the body
PPR (kata)	<i>Adansonia digitata</i> & Alligator pepper	Lulu & ose	Grind and rob on the lesions
	<i>Phyllanthus amarus</i> leaf	Eyin olobe	Grind and drench
Anthrax	Bitter leaf + Lime	Ewuro lime	Grind them and drench the animal daily
Snake bite	<i>Anona senegalensis</i> bark	No name	Grind, boil and drench
	<i>Diospyrus mespitiiformis</i> root	No name	Grind and drench

Ojo *et al.* (2014) reported massive death of goats due to different diseases. Animal diseases in general and infectious ones in particular are the major constraints to crop and livestock production in the humid and sub humid parts of the African continent (Palling & Dwinger, 1993). Moreki *et al.* (2010) reported order of importance the major causes of losses in sheep and goats to include diseases, predation and a combination of diseases, parasites and predation. Feed cost is acknowledged to be the greatest constraint of raising small ruminants in the study area. This is in consonance with the report of Offor *et al.* (2018) who noted that cost of feeding small ruminants was the greatest constraint. Poor nutrition has always been considered as the most critical factor in livestock production, but in recent times, diseases cause more economic losses (FAO, 2016). The most encountered ill-health was pestes des petit ruminant (PPR) which is in agreement with the findings of Oboegbulem and Chah (1997) who reported that although PPR occurs throughout the year more cases were seen during the rainy season or

during the first half of the year. The use of traditional medicine was the most popular among the respondents. Similar to the current study, Adeniran *et al.* (2020) reported that 46% of respondents indicated that they used herbal remedies exclusively to manage animal health conditions, 40% used both EVM and orthodox drugs while only 14% relied on orthodox veterinary preparations alone. The use of medicinal plants exclusively in the treatment of diseases of animals has been documented by Gras *et al.* (2018).

The respondents agreed that EVM has medicinal values, cheaper, more readily available, easier to administer and that animals perform better with it over orthodox medicines. These observations are at par

with earlier reports of Marwat (2008) and Hart & Bussmann (2018), converging that herbs are often used because of their frequent availability, ease of collection and applications. Other studies in some States in Northern Nigeria reported that only 15.31% of respondents went for orthodox medicine (De Smet, 1998; Neils *et al.*, 2008). This result is also in agreement with reports of Raul *et al.* (1990), Sori *et al.* (2004) and Sakaba *et al.* (2019) that most farmers and pastoralists rely on traditional knowledge and the use of available plants for the treatment of ruminant diseases. It is also in line with Alawa *et al.* (2002) and Fajimi & Taiwo (2005) who reported the existence and efficacy of ethnoveterinary practices using available plants in Nigeria. Meanwhile, greater number agreed that orthodox medicine is more effective in treating animal diseases. According to Sori *et al.* (2004), most pastoralists frequently use herbal preparations to treat their animals, whereas the remaining preferred the complementary use of both herbal preparations and modern drugs. It was observed that the method of

administering ethno-veterinary plant remedies varied greatly among the different ethnic communities (Bhatti *et al.*, 2017). More so, the fear of orthodox drugs or its scarcity (Mesfin *et al.*, 2009) may grow beyond the reach of Nomads and hence, resort to medicinal plants for livestock health need.

Most of the respondents in the study area agreed that local herbs have medicinal value, can be used to treat animals. However some of the plants mentioned in this study contain chemicals that may explain their ethnoveterinary use. For instance, some of the plants influence the immune system or are effective against internal and external parasites (Abdu & Faya, 2000). Plant parts used for drug preparation include barks, leaves, stems, juices, flowers, bulbs and seeds (Viegi *et al.*, 2003; Jabber *et al.*, 2006; Dilshad *et al.*, 2008). Some ethnoveterinary practices have been reported in Nigeria (Alawa *et al.*, 2002; Alhaji & Babalobi, 2015; Pakhtunkhwa *et al.*, 2019). Alawa *et al.* (2002) and Fajimi & Taiwo (2005) reported the existence and efficacy of ethnoveterinary practices using available plants in Nigeria. Several studies carried out in Africa, Asia, Europe, Latin America and North America show that plants are routinely used as remedy for animal diseases (Lans *et al.*, 2007). Different combinations of plant and other organic materials have been used at the study area to treat skin infections/parasitosis including palm oil, palm kernel oil, engine oil, *Khaya senegalensis* bark, *Nicotiana tabacum* leaf etc. Several authors have corroborated the efficacy of these traditional treatments. In small ruminants, *Veronia conferia* (leaves), palm oil and engine oil are used against fleas, ticks and mange, respectively in Nigeria (Worku, 2018). Rhizome of turmeric was reported to be used for the treatment of mastitis, inflammation, constipation, foot and mouth disease and ectoparasitic infection (Kumar *et al.*, 1993; Rautray *et al.*, 2015). Turmeric paste is used for prevention and treating different skin diseases including fungal infections (Mishra, 2011; Rautray *et al.*, 2015).

The present result agrees with the findings of Kolawole *et al.* (2007) that palm oil is used to treat scabies (mange). It also corroborates Ojo *et al.* (2014) whose respondents used *Khaya senegalensis* and *Nicotiana tabacum* to treat mange in ruminants in Ekiti State, Nigeria. The use of *Aloe spp* and *Nicotiana tabacum* leaves against diseases and parasites aligns with the reports of Moreki *et al.* (2010). A paste of *Nicotiana tabacum* leaves is used to treat skin diseases, swelling and scorpion sting (Moreki *et al.*, 2010; Tsouh *et al.*, 2015). Omotara and Olutegbe (2015) also reported the rubbing of the body of the animal with palm kernel oil and salt for lice treatment. The use of *Bridelia ferruginea* stem bark for the treating of cough aligns with the report of Adeola *et al.* (2012). The treatment of mastitis using *Curcuma longa* L (turmeric) has been validated by Rautray *et al.* (2015). The use of *Khaya senegalensis* for the

treatment of helminthosis in this survey was corroborated by Bizimana (1994) that gave a number of plants that have anthelmintic properties including *Khaya senegalensis* (bark), leaves and stems of *Securinegar virosa*. The use of bitter leaf plants in treating diarrhoea agrees with that of Chah *et al.* (2009) and the study of Mafimisebi *et al.* (2012) whereas Chauhan & Sharma (2018) validated the antidiarrhoeal efficacy of *Phyllanthus amarus* too. The use of bitter leaf and lime orange drench in this study is in agreement with the study of Omotara & Olutegbe (2015) in Obokun Local government Area of Osun State. Sakaba *et al.* (2019) supported the use of *Anona senegalensis* bark and *Diospyrus mespitiformis* root for the treatment of snake bite.

CONCLUSION

Larger proportion of the respondents was males in their productive age. Family, relatives and friends were the major sources of endogenous knowledge in treating diseases of small ruminants. The people used 18 medicinal plants to cure 13 prevalent small ruminant disease conditions. Some important plants like *Khaya senegalensis*, *Nicotiana tabacum*, *Curcuma longa* L, Palm tree, *Moringa oleifera*, Pawpaw, *Phyllanthus amarus*, *Vernonia amygdalina*, *Anona senegalensis*, *Diospyrus mespitiformis* etc were used. These plants were cost effective and easily available for treatment of diseases compared to orthodox medicine. PPR was the most encountered disease and feed resources were recorded as the greatest constraint that militated against successful rearing of small ruminants while diseases accounted for most deaths. The current study has contributed to the preservation of indigenous plant-based knowledge from extinction. Phytochemical and pharmacological investigations could be carried out to isolate the active compound(s). Moreover, toxicological investigations are required for safe and secure use of the plants and their products.

CONFLICT OF INTEREST

There was no conflict of interest.

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