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Awareness of traditional knowledge and attitudes towards wildlife conservation among Maasai communities: The case of Enkusero Sampu Conservancy, Kajiado County in Kenya

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Abstract

Traditional wildlife conservation methods and attitude towards wildlife conservation are key for the success of wildlife conservation intervention. This study examined awareness of traditional wildlife conservation measures and socio-demographic factors associated with attitudes towards wildlife conservation among the Maasai communities living in Enkusero Sampu Conservancy (ESC) in Kajiado County, Kenya. Data were based on a cross-sectional household survey conducted from 02 February to 23 March 2018, among 278 heads of households. Analysis entails cross-tabulation with chi-square test and estimation of a multivariate logistic regression model. Awareness of traditional wildlife conservation methods and attitude towards wildlife conservation were significantly ($p < 0.05$) associated with gender and household size. Heads of household who were aware of traditional wildlife conservation methods were aged 50 or more years. While people from smaller household size (<6 persons) were more likely to have a positive attitude towards wildlife conservation. Those who experienced livestock predation or crop destruction by wild animals were less likely to have a positive attitude towards wildlife conservation. The findings underscore the need for conservation managers to factor in local people's traditional knowledge and attitudes to foster sustainable wildlife conservation in areas surrounding and within wildlife conservation areas.

KEYWORDS
attitude, awareness, conservation, enkusero sampu, Kenya, traditional knowledge, wildlife

Résumé

Les méthodes traditionnelles de conservation de la faune et l'attitude envers la celle-ci sont essentielles pour le succès des interventions de conservation de la faune. Cette étude a examiné la connaissance des mesures traditionnelles de conservation de la faune et les facteurs sociodémographiques associés aux attitudes à l'égard de celle-ci au sein des communautés Massaï vivant dans la zone du projet Enkusero Sampu Conservancy (ESC), dans le comté de Kajiado, au Kenya. Les données étaient basées sur une étude transversale menée auprès des ménages du 02 février au 23 mars 2018 parmi de 278 chefs de ménage. L'analyse implique un croisement entre le test du chi carré et l'estimation d'un modèle de régression logistique multivariée. La

connaissance des méthodes traditionnelles de conservation de la faune et l'attitude envers la conservation de la faune étaient en grande partie (*p* < 0.05) associées au sexe et à la taille du ménage. Les chefs de famille qui connaissaient les méthodes traditionnelles de conservation de la faune étaient âgés de 50 ans ou plus, tandis que les personnes faisant partie d'un ménage de plus petite taille (<6 personnes) étaient plus susceptibles de faire preuve d'une attitude positive à l'égard de la conservation de la faune. Les personne ayant subi les conséquences de la prédation du bétail ou de la destruction des cultures par les animaux sauvages étaient moins susceptibles d'avoir une attitude positive à l'égard de la conservation de la faune. Les résultats soulignent la nécessité pour les gestionnaires de la conservation de prendre en compte les connaissances et les attitudes traditionnelles des populations locales pour favoriser la conservation durable de la faune dans les zones environnantes et au sein des zones de conservation de la faune.
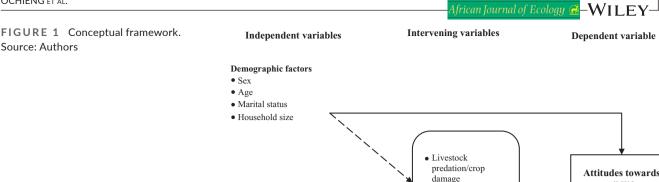
1 | INTRODUCTION

Traditional Knowledge, defined as the knowledge, innovations and practices of the indigenous and local communities, is among the key aspects for sustainable wildlife conservation (Convention on Biological Diversity, 2005; Harmon, 2004; Kideghesho, 2008, 2009). It forms an essential part of major global conservation initiatives. For example, Article 8(j) of the Convention on Biological Diversity (CBD) and the Aichi Biodiversity Target 18 recognises the role of indigenous knowledge and local community involvement in wildlife conservation (Convention on Biological Diversity, 2005). Traditional knowledge is important for effective utilisation of wildlife resources and sustainable wildlife conservation in settlement areas surrounding, and within Protected Areas (PAs) (Harmon, 2004; Kideghesho, 2008, 2009). For example, cultural practices for example initiation ceremonies, circumcision and child birth rites in some societies living within wildlife inhabited areas have exhibited values, beliefs and norms that preserve biodiversity and ecosystems (Dickman et al., 2015; Metcalfe et al., 2010; Roué et al., 2016). In the traditional African societies, there are some areas considered as sacred sites such as the Kayas of coastal Kenya (Mgumia & Oba, 2003), sacred grooves of Oshogbo, and Yoruba of Ara Nigeria and Malshegu groove of Ghana (Colding & Folke, 2001; Dudley et al., 2009), which are continuously monitored for any human activities that can pose threats to the survival of wild plants and animals in their ranges (Kideghesho, 2009).

The existence of taboos within societies is effective in influencing behaviours of local communities towards wildlife resource utilisation due to the fear that misfortune can happen if one breaks the taboo (Kideghesho, 2008). For instance, in some parts of Africa, the killing of animals like the hamerkop (*Scopus umbrette*) and the African barred owlet (*Glaucidium capense)* is perceived to cause a misfortune (Muiruri & Maundu, 2010). In a study conducted in northern benin, the sighting of nocturnal species during the day is a misfortune; hence, all of the species that portrays nocturnal behaviour are not hunted during the day. The species include: striped polecat (*ictonyx striatus*), honey

badger (*Mellivora capensis*), African pouched rat (*Cricetomys emini*) and Gambian pouched rat (*cricetomys gambiancus*) (Djagoun et al., 2009). In Tanzania, the Samabaa tribe believe that consuming Bohr reedbuck (*Redunca redunca*) and bushbuck(*Tragelaphus scriptus*) may cause skin diseases (Kideghesho, 2008), similarly, in Cameroon the Bakweri clan indicated that it is a taboo to kill the African elephant nor use it body parts for whatever reasons (Abugiche et al., 2017), hence a reduction in the persecution of these species.

In the traditional Maasai culture, the elephant was highly respected and valued through a saying that goes '*cows grow trees, elephants, grow grass*'. This fostered traditional peaceful coexistence with wild animals on Maasai land (Western, 2001). It was also believed that when a Maasai herder finds an elephant placenta in the grazing fields, it was a sign of fortune of owning a lot of livestock in future if the herder constructs a temporary boma and spends a night there with his livestock (Chadwick, 1992; Kangwana, 1993; Kioko, 2004; Sitati, 2003). Additionally, among the Maasai different parts of some plant species are extracted as medicinal derivatives to treat various human and livestock ailments (Ole-Miaron, 2003). During the traditional cultural practices such as blessings rites of passage and during circumcision ceremonies, the medicinal plant is brewed in a soup and consumed (Burford et al., 2001). Kajiado County which is predominantly a Maasai area is ranked among the leading tourist destination in Kenya, due to its magnificent landscapes and habitats (Kioko & Okello, 2010; Okello & Kiringe, 2004). Irrespective of this, harmful of traditional practices (HTPs) such as the killing of a male lion during the Maasai cultural traditional practice 'Maasai Moranism' ushering young men into adult groupings are common. Incidences of retaliatory killings of livestock predators, mainly lions, leopards and hyaenas have been on the rise in this area (Muriuki et al., 2017; Ogutu et al., 2014; Okello et al., 2014).

Despite evidence on the use of traditional knowledge on wildlife conservation, cultural transformations from communal to the modern practices such as; individual land ownership as well as the emergence of the commercial market of bushmeat trade are major threats to wildlife species and their habitats which lead to attitude change among local

FIGURE 1 Conceptual framework. Source: Authors

communities (Mbane et al., 2019; McSweeney, 2005). Attitude towards wildlife conservation, which refers to an individual opinion and feelings may be favourable or unfavourable towards wildlife conservation. It is among the critical parameters for sustainable coexistence between wildlife and human population (Romanach et al., 2007; Sekhar, 2003). Unfavourable attitudes towards wildlife is a major drawback on conservation efforts leading to retaliatory killings of wild animals which kill livestock or damage crops (Bagchi & Mishra, 2006; Williams et al., 2002).

Traditional knowledge and attitude towards wildlife conservation are often linked to the direct benefits derived from the PA such as biomass resources, park gate fee and revenue from wildlife tourism (Ntuli et al., 2019; Ogutu et al., 2014). Evidence also shows that knowledge of conservation priorities, the experience of a wild animal attack, and systems of land ownership are directly or indirectly associated with local people's attitudes and wildlife conservation practices (Infield & Namara, 2001; Nsonsi et al., 2017; Woodroffe et al., 2005). Various socio-demographic and economic factors including age, gender, level of education, household size and occupation are associated with local people's attitudes towards wildlife conservation and conservation practices (Bragagnolo et al., 2016; Hariohay et al., 2018; Jew & Bonnington, 2011; Sundström et al., 2020). However, the role of awareness of traditional knowledge and its association with attitudes towards wildlife conservation and actual conservation practices has been less studied. This study assessed awareness of traditional wildlife conservation measures and socio-demographic factors associated with attitudes towards wildlife conservation among the Maasai communities living in Enkusero Sampu Conservancy (ESC) in Kajiado County, Kenya.

1.1 | Conceptual framework

The study draws on the Theory of Planned Behavior (TPB) (Fishbein & Ajzen, 1975). According to TPB, attitude and norms influence behavioural intentions which are in turn directly linked to the actual

conservation practices in this case towards wildlife (Browne-Nuñez & Jonker, 2008). Conservation behaviour by individuals is grounded on the attitude in favour or disfavour to wildlife conservation, for example where human wildlife conflicts occur as a result of destruction to human property. Factors such as the experience of livestock predation or crop destruction by wild animals and exposure to wildlife conservation education may affect the relationship between background factors and attitudes towards wildlife conservation. The study hypothesises that individuals who are aware of traditional wildlife conservation methods are more likely to have a positive attitude towards wildlife conservation. Figure 1 presents the conceptual framework for the study. Further, awareness of traditional wildlife conservation methods such as the use of social norms, sacred sites, totems and taboos are linked to the local community attitude towards wildlife conservation.

Background factors such as demographic factors (gender, age, marital status and household size) where older generation with greater respect for taboos, and norms are likely to practice wildlife conservation relative to younger members of society. While socio-economic factors (level of education, the main source of livelihood, household cooking fuel used, and duration of stay in the study area) may directly or indirectly influence attitudes towards wildlife conservation. For instance, shorter stay especially for the immigrant community could translate to low understanding of norms and thus exhibit negative attitudes towards wildlife conservation. Thus, conceptually a combination of traditional knowledge, attitude and socio-demographic factors influence wildlife conservation.

2 | METHODS

2.1 | Study area

The study was conducted in six villages within the Enkusero Sampu Conservancy (ESC) in Kajiado West Constituency, Kajiado County in Kenya. The area is located at the right eastern border of South Rift

Association of Land Owners (SORALO) area, and on the southwestern side of Nairobi National Park between latitude 01°30'0–12°5'0S and longitude 36°40'0E (Figure 2). ESC covers an area of 4046 Ha and forms part of the greater SORALO ecosystem which is composed of 13 community conservancies and covers a total area of 124,084 Ha. The SORALO ecosystem covers a critical area connected to the Mara Ecosystem, through the Loita plains towards the Amboseli Ecosystem. Both ESC and SORALO are form of community-based natural resources management (CBNRM), in which local communities have donated their land for wildlife conservation outside PAs with the unit of governance being households. ESC plays a major ecological role in preserving cross-border linkages for pastoralists and wild animals' movements between Kenya to Tanzania (King et al., 2015). ESC is in an indigenous community setting, hosting the Maasai, who have withstood time to preserve their cultural heritage that dates back to centuries ago. It is jointly managed with Empaash Conservancy in collaboration with Kenya Wildlife Service to provide expertise and equipment for wildlife protection. The area comprises of a desert, savannah and woodland ecosystems with Sandstone Mountains that provides beautiful scenery, with the wildlife within the conservancy being the major tourist attractions in Kenya. The conservancy provides a habitat for the migrating and visiting elephants annually and supports a variety of wildlife throughout the year.

2.2 | Study design and sampling

The study used a cross-sectional study design, a type of observational study where the outcome is measured in a given population and a given geographical area at one point in time (Setia, 2016). The sampling frame was based on 2018 records of households in ESC. At the time of the survey, ESC had a total of 998 households with a population of about 10,000 persons. The sampling frame consisted of all households that were within the ESC, while the sampling unit comprised of male and female heads of the households in the area. We identified the exact boundary of the ESC based on the administrative units (sub-locations) in the Kajiado West Sub-county using ground-truthing in a transect walk and motorbike rides. A total of 278 households were randomly sampled. The sample size was based on a formula by (Bernard, 2002); $n = z^2 * (P) * (Q) / (e)^2$, where: n, is the sample size; Z = the number of standard error corresponding to 95% confidence interval, which is 1.96. This yielded a sample size of 385. However, due to a relatively small and sparse population, we applied the finite population correction procedure based on Cochran's formula to yield a sample size of 278 (Cochran, 1977). The study was conducted in all the six villages located in ESC. Sampled households were proportionately distributed based on the total number of households in each village, Table 1. Households included in the survey were systematically randomly sampled from the six villages where every third household along the right or left side of the transect was included in the study. In each sampled household, heads of households were identified and interviewed. In case the head of the household was unavailable, we interviewed responsible adults from the household who were knowledgeable about the affairs of the household.

2.3 | Data collection

Data collection took place from 02 February to 23 March 2018. Only household heads aged 18 years and above were eligible for inclusion.
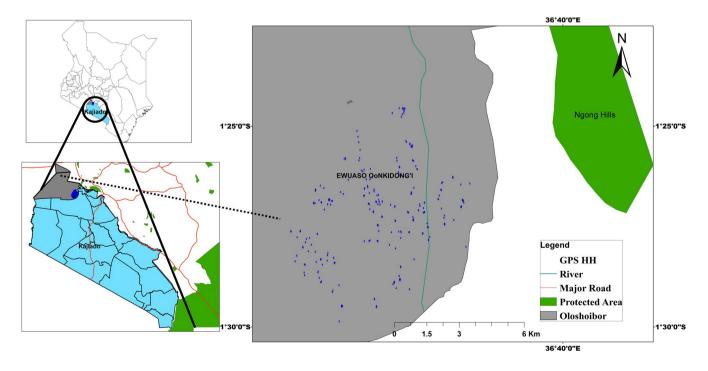

FIGURE 2 Map showing location of Enkusero Sampu Conservancy and household survey points. Key: GPS HH- Geographical Position System and Households. Source: Authors

TABLE 1 Proportionate distribution of the interviewed households by village

Village Name	Number of households	Proportion	Sampled household heads
Eluai	120	0.1202	34
Enkorienito	100	0.1002	29
Enkusero Sampu	189	0.1894	52
Ilng'arooj	290	0.2906	81
Olkudate	140	0.1403	38
Oloshoibor	159	0.1593	44
Total	998	1.0000	278

Source: Authors.

Face-to-face structured interviews with eligible participants were carried out using mobile app K-MACHO an electronic-based data capture platform that lasted on average 45 min. The questionnaire captured information on socio-demographic characteristics (age, education level, marital status and household size); awareness of traditional wildlife conservation strategies; attitudes and practices towards wildlife focusing on selected terrestrial mammals common in the study area such as hyaena, leopard, and lions. Interviews were conducted by 10 research assistants (5 male and 5 female) who had completed secondary education or were in colleges and were recruited from the local community with the help of local administration (sub-chief). The research assistants underwent a three-day training that covered objectives of the study, study design and ethics as well as a pre-test of the questionnaire. The questionnaire was pre-tested in a village near the study area which was not part of the sampled villages but had similar characteristics.

2.4 | Ethical considerations

Approval was obtained from the National Council for Science and Technology (NACOSTI), with Permit Number: NACOSTI/P/18/25211/21556. Informed consent was obtained from prospective respondents who were informed of the purpose of the research and an informed consent statement read to them in the Maa or Swahili language. Respondents were assured that participation in the survey was voluntary and they were free to stop the interview at any stage if they felt so. To ensure anonymity, the respondent's identification information such as names and mobile numbers were not linked to the questionnaire; instead, each questionnaire was assigned a unique identification number.

2.5 | Data analysis

The analysis involved descriptive statistics, chi-square tests and estimation of a multivariate binary logistic regression model to assess the association between independent variables and attitudes towards wildlife conservation. Binary logistic regression was preferred

since the dependent variable, attitude towards wildlife conservation, was dichotomous. The logistic model is presented in terms of the log of odds or logits, which is a transformation of the general logistic distribution. The study aimed to examine exogenous factors that may influence attitudes towards wildlife conservation. Odds ratios greater than 1 indicates a more likely chance of having a positive attitude towards wildlife conservation while those lower than 1 indicates less likelihood (Sperandei, 2014). Results are presented as adjusted odds ratios (AORs) at 95% confidence intervals (CI). Reported p-values were based on a two-sided test of the coefficients. All estimates accounted for the clustering at the village level. The analysis was conducted using Stata® version 15 (StataCorp LLC).

2.6 | Description of variables

2.6.1 | Dependent variable

Attitude towards wildlife conservation

Two components of attitude towards wildlife conservation were measured: (a) affection (how do people feel towards wild animals), and (b) behavioural intention (willingness to support wildlife conservation initiatives). Respondents were asked whether they agreed or disagreed with the following statements on protection of wild animals (lions and leopards), benefits and support for conservation activities and whether allowing them to trap/hunt a predator that kills their livestock could be a good thing (Table 2). The response categories were *1 = strongly agree, 2 = Agree 3 = neither agree nor disagree, 4 = disagree* and *5 = strongly disagree*. Statements on attitudes were scored to generate an index of attitude towards conservation. Strong agreement or agreement with a positive attitudinal statement was scored 1 whereas strong disagreement or disagreement was scored −1. Indifferent responses (neither agree/disagree) were scored zero. The potential scoring ranged from −5 to +5. The measure was found to be reliable (Cronbach's alpha=0.74). A binary outcome variable—attitude towards wildlife conservation was created from the scores to represent those with a positive attitude (that is, respondents with scores above zero), and negative attitude (respondents with zero or negative scores). A similar analytical approach has been used to study attitudes towards wildlife conservation (Infield & Namara, 2001).

2.6.2 | Independent variables

(i) *Socio-demographic variables*: Respondents' age (in grouped years as 1= 'less than 30 years' 2 = '31–50 years' 3='51 or more years'), sex (coded as 1 = male and 2 = female), marital status (coded as 1=in union and 2 = not in union), household size (coded as 1= small <=6 persons and 2 = large 7 or more persons)

(ii) *Economic variables*: Educational level (coded 1 = no education, 2 = primary school education and 3 = secondary school education

TABLE 2 Statements on attitude towards wildlife conservation

Statements	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)	Mean	Cronbach's alpha
1. The presence of a lion in this area is a sign of human coexistence with wild animals[a]	18.0	5.4	39.2	11.9	25.5	3.2	0.74
2. Presence of hyaena is a sign of clean environment[a]	33.1	4.3	21.9	29.5	11.2	2.8	
3. Lions should be protected[a]	43.5	2.2	4.0	46.8	3.6	2.6	
4. Leopards should be protected[a]	38.1	3.2	5.4	49.6	3.6	2.7	
5. Hyaenas are unacceptable threat to livestock[b]	31.4	5.8	19.9	40.1	2.9	3.3	
6. Allowing us to trap /hunt a predator which kills our livestock could be a good thing[b]	26.6	21.8	12.0	36.4	3.3	2.8	
7. Enkusero Sampu conservancy is beneficial to our community[a]	40.3	11.2	8.3	37.8	2.5	2.6	
8. I am willing to support wildlife conservation programmes of Enkusero Sampu conservancy[a]	18.0	5.4	39.2	11.9	25.5	2.5	

Source: Authors.

[a]Positive attitudinal statement.

[b]Negative attitudinal statement.

and above), and main source of livelihood (coded as 1=livestock and 2 =others), duration of stay in the study area (coded as 1 = 10 or less years, 2 = 11–20 years and 3 = 21 or more years)

(iii) *Intervening variables*: Experience of loss of livestock to predators or crop destruction from wild animals (coded as 1= ever experienced and 2 = never experienced);

Traditional knowledge of wildlife conservation

Traditional knowledge of wildlife conservation was measured by asking respondents to indicate if they were aware of any traditional way of conserving and managing wildlife. Those who were affirmative were further asked an open-ended question to indicate which traditional wildlife conservation method they were aware of and were practising. These were later categorised into four (use of taboos, social norms, totemic [sacred species of plants and animals] or sacred sites). A binary outcome variable was generated such that awareness of at least any of the 4 traditional wildlife conservation methods coded one and zero otherwise.

3 | RESULTS

3.1 | Demographic and socioeconomic characteristics of respondents

The majority of participants were female, aged between 31–50 years, were married and lived in a larger household (comprising 7 persons or above). The majority of households heads had no formal education, depended on livestock keeping as the main source of livelihood and had lived in the study area for 20 or more years. Furthermore, the majority of households had experienced a loss of livestock to predators or crop destruction from wild animals (Table 3).

3.2 | Factors associated with awareness of traditional wildlife conservation methods and attitudes towards wildlife conservation

Overall, slightly more than half of the household heads (55%, *n* = 278) interviewed were aware of traditional wildlife conservation methods. Among those who were aware, the most cited traditional wildlife conservation method known by respondents was the use of taboos (88%) followed by social norms at (79.5%), totems or sacred species (63%) and sacred sites (59%) (Figure 3). Some of the taboos mentioned by respondents include avoiding cutting sacred trees for domestic use. For example, trees such as 'oreteti (*Ficus thonningii*)' and 'oloirien (*Olea africana*)' were considered as sacred trees which when one cuts, the spirit of death may come to the household. Respondents also indicated that it was a taboo to kill animals like the tortoise and ostrich. Their presence was believed to be a symbol of coming of rain and killing them would mean no rainfall which might result in prolonged periods of drought leading to the death of livestock and people.

Several demographic and socio-economic factors which included gender, the main source of livelihood, main cooking material, were strongly associated with awareness of traditional wildlife conservation methods (*p* < 0.01), additionally, household size had a significant relationship with the awareness of traditional wildlife conservation methods (*p* < 0.05). The proportion of respondents aware of traditional wildlife conservation methods was high among males (74%), those with primary and secondary level of education (62%) and those from larger households (60.6%). However, age, marital status, level of education, duration of stay in the study area and experience of livestock loss to predators or crop destruction did not show statistically significant association with awareness of traditional wildlife conservation methods (Table 4). Gender, age and household sizes (*p* < 0.01) and experience of livestock loss to predators or crop destruction (*p* < 0.05) were significantly associated with attitude towards wildlife conservation

TABLE 3 Background characteristics

	Frequency	Percent
Sex		
Female	200	71.9
Male	78	28.1
Age		
<30 years	64	23
31–50 years	117	42.1
>50 years	97	34.9
Marital status		
In Union	240	86.3
Not in union	38	13.7
Household size		
6 persons or less	146	52.5
7 and above	132	47.5
Level of Education		
No Education	172	61.9
Primary	50	18
Secondary and higher	56	20.1
The main source of livelihood		
Livestock keeping	216	77.7
Formal employment/Business/other	62	22.3
Duration stay in the study area		
10 year or less	66	23.7
11–20 years	70	25.2
21 or more years	142	51.1
Ever lost livestock to predators		
Yes	252	90.7
No	26	9.3
Ever experienced crop destruction		
Yes	202	74.8
No	68	25.2

Source: Authors.

(p < 0.01). The proportion of respondents with favourable attitude towards wildlife conservation was high among males (68%), those aged 50 years and above (68%) and those from larger households (64%) (Table 4). However, education, the main source of livelihood and main cooking material were not statistically significantly associated with attitude towards wildlife conservation.

3.3 | Factors influencing attitudes towards wildlife conservation

A binary logistic regression analysis was conducted with positive/negative attitude towards wildlife conservation as a dependent variable and age, gender, marital status, education level, size of households, main source of livelihood, duration of stay in the study area and awareness of traditional wildlife conservation methods as the predictors. Analysis showed that age, household size, main source of livelihood, experience of livestock loss to predators or crop destruction and awareness of traditional wildlife conservation methods had a statistically significant association with attitudes towards wildlife conservation (Table 5). Respondents aged 50 years or above were 2.5 times (95% CI=0.907–6.832) more likely to indicate a positive attitude towards wildlife conservation compared to younger respondents. Respondents from smaller households (<6 persons) were 1.6 times more likely to have a positive attitude towards wildlife conservation (95% CI=0.910–2.880) compared to those from larger households (7 or more persons). Households that depended on livestock keeping as a source of livelihood were 0.5 less likely to have a positive attitude towards wildlife conservation compared to those who relied on other sources such as formal employment/business. Respondents who were aware of traditional wildlife conservation methods were 2.4 times (95% CI =0.355–4.308; p = 0.003) more likely to have a positive attitude towards wildlife conservation compared to those who were not aware. Lastly, respondents who had not experienced loss of livestock to predators or crop destruction to wild animals were 1.8 times (95% CI=0.736–4.603; p = 0.036) more likely to have a positive attitude towards wildlife conservation compared to those who had experienced the effect of wildlife predation and crop destruction.

3.4 | Attitude towards wildlife conservation and wildlife conservation practices

We further examined the association between attitudes towards wildlife conservation and wildlife conservation behaviour or practice in the study area. All respondents were asked to indicate what they do to problem animals that predate on their livestock or destroy their crops. The proportion of household heads with pro-conservation practices (control predators) was high among those who had positive attitudes towards wildlife conservation (77%) compared to those who had negative attitudes (59%). Similarly, the proportion of household heads with pro-conservation views was higher among household heads aware of traditional wildlife conservation methods (73%) compared to those not aware (64%) although this association was not statistically significant (Figure 4).

4 | DISCUSSION

Understanding local communities' traditional knowledge, attitudes and practices towards wildlife conservation are key to the success of wildlife conservation programmes and policies. This study examined awareness of traditional wildlife conservation measures (use of taboos, social norms, totemic [sacred species of plants and animals] or sacred sites) and attitudes towards wildlife conservation among the Maasai community in ESC. Results show that more than half of the surveyed respondents were aware of the traditional ways of wildlife conservation. At bivariate level, factors
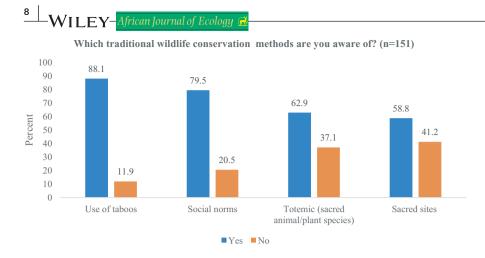
Which traditional wildlife conservation methods are you aware of? (n=151)

that were found to be significantly associated with awareness of traditional wildlife conservation methods and attitudes towards wildlife conservation include gender and household size. Lack of gender equality in the awareness of traditional conservation methods as well as attitudes towards wildlife conservation may be attributed to customs and gender roles (Sundström et al., 2020). In the Maasai culture, women tend to spend most of their time doing household chores and taking care of the family (Browne-Nunez, 2010). Women were also not allowed to attend the traditional praying ritual rites when sacrifices are offered to God, thus they may not be very conversant with the traditional knowledge regarding the ways of wildlife conservation. Traditional knowledge on the use and presence of natural resources has been associated with customs, traditions, beliefs and rituals (Kideghesho, 2008, 2009). Knowledge of traditional wildlife conservation methods such as the use of taboos and traditional norms has implications on local communities' ecological understanding, conservation practices and resource management (Roué et al., 2016).

Household size may not be directly associated with awareness of traditional wildlife conservation methods but the significant association may happen through other unobservable contextual factors. For instance, larger households tend to rely mainly on livestock keeping for livelihood, which in turn depends on pasture and medicinal herbs to cure livestock diseases. Studies show that larger households tend to interact more frequently with nature and know more about each plant and animal species as they use them in their day-to-day life (Deisser & Njuguna, 2016; Dickman et al., 2015; Kioko & Okello, 2010; Muiruri & Maundu, 2010). While small-sized households (<6 persons) depended on other sources of livelihood which include formal employment and trading had less interaction with nature. Household size was also negatively associated with attitude towards wildlife conservation. This may be attributed to the perceived long-term benefits derived from wildlife, for example, as a source of livelihood, future employment opportunity, and for their recreation (Anthony, 2007; Naughton-Treves & Weber, 2001; Nsonsi et al., 2017). Studies show that the Maasai community heavily rely on wildlife resources for socio-cultural rituals, traditions and taboos in the sustenance of their livelihood (Dickman et al., 2015). Communities or households that are reliant on wildlife resources as

the main source of livelihood may be averse to wildlife conservation and are likely to portray negative attitudes towards wildlife conservation activities if the wildlife conservation initiative restricts their access and utilisation of wildlife resources (Nsonsi et al., 2017).

Multivariate analysis shows that socio-demographic variables such as age, household size and main source of livelihood had a statistically significant effect on attitude towards wildlife conservation in the study community. Older respondents were more likely to have positive attitudes towards wildlife conservation than their younger counterparts. As expected, older respondents had interacted with wildlife for a longer period than younger respondents. The strong effect of age on wildlife conservation attitudes may also be attributed to the fact that older respondents may have been involved in many traditional practices that involved the use of wildlife than younger respondents (Browne-Nunez, 2010; Tessema et al., 2010). As a result, older respondents tend to appreciate instrumental cultural and social value associated with wildlife resources like for medicinal use, taboos and as sacred sites.

The main source of livelihood influenced local people's attitudes towards wildlife conservation; households that relied on livestock keeping or agriculture as the main source of livelihood were less likely to report positive attitude towards wildlife conservation. The negative association may be attributed to past experience of livestock loss due to predation depriving them their main source of livelihood. Separately, experience of livestock predation or crop destruction by wild animals had a significant negative effect on attitudes towards wildlife conservation. The results are similar to findings of (Hariohay et al., 2018) who noted that depredation and crop damage negatively influenced attitudes of local people towards wildlife conservation in the Rungwa Game Reserve in Central Tanzania. Predation has been shown to promote negative attitudes of local communities towards wildlife conservation due to its negative impact on the wealth status of pastoral communities (Manoa & Mwaura, 2016).

An important finding from our study is the positive association between awareness of traditional conservation methods and attitudes towards wildlife conservation. Respondents who were aware of traditional ways of wildlife conservation were more likely to have favourable support towards wildlife conservation, than those who were not aware. The results are consistent with findings of (Infield

TABLE 4 Respondents awareness of traditional wildlife conservation methods or favourable attitude towards wildlife conservation by background characteristics

	Total (N)	Proportion aware of traditional wildlife conservation methods		Proportion with a favourable attitude towards wildlife conservation	
		%	p-value	%	p-value
Sex					
Female	200	46.0		49.0	
Male	78	74.4	0.001	68.0	0.004
Age					
<30 years	64	45.3		42.2	
31–50 years	117	58.1	0.252	49.6	0.002
>50 years	97	54.6		68.0	
Household size					
<=6 persons	146	47.9		45.9	
>=7persons	132	60.6	0.023	63.6	0.009
Level of Education					
No Education	172	48.8		56.4	
Primary	50	62.0	0.092	50.0	0.664
Secondary and higher	56	62.5		51.8	
Main source of livelihood					
Livestock	216	46.3		56.5	
Others	62	80.7	0.001	46.8	0.180
Main cooking material					
Firewood	251	51.0		56.2	
Others	27	81.5	0.003	58.8	0.156
Duration stay in the study area					
10 year or less	66	48.5		43.9	
11–20 years	70	50.0	0.303	57.1	0.152
21 or more years	142	58.5		57.8	
Ever lost livestock to predators or experienced crop destruction					
Yes	252	54.8		34.6	
No	26	46.2	0.402	56.4	0.034

Source: Authors.

TABLE 5 Logistic regression model on factors associated with having positive attitudes towards wildlife conservation

	Exp (B) [95% CI]	SE
Sex		
Male	1.000	
Female	1.680 [0.053–3.308]	0.346
Age		
<30 years[®]	1.000	
31–50 years	0.983 [0.441–2.193]	0.409
>50 years	2.490 [0.907–6.832][**]	0.515
Marital status		
Married	1.000	
Not married	1.322 [0.564–3.097]	0.435
Household size (1 = 7 people or above)		
7 persons or less	1.000	
6 persons or more	1.618 [0.910–2.880][*]	0.294
Level of Education		
No Education[®]	1.000	
Primary	0.951 [0.452–2.004]	0.380
Secondary and higher	1.224 [0.555–2.701]	0.404
Main source of livelihood		
Other sources[a]	1.000	
Livestock keeping/ agriculture	0.539 [0.705–3.447][*]	0.358
Duration stay in the study area		
10 year or less[®]	1.000	
11–20 years	1.559 [0.406–2.115]	0.405
21 or more years	0.926 [0.267–1.087]	0.421
Ever lost livestock to predators or experienced crop destruction		
Yes	1.000	
No	1.840 [1.736–4.603][**]	0.468
Awareness of traditional wildlife conservation methods		
Not aware	1.000	
Aware	2.416 [1.355–4.308][**]	0.295

[a]Other sources include small-scale businesses and formal employment.; *Source*: Authors. [®]Reference category; Starred values correspond to the following cut-off levels for statistical significance:
*p =0.10,
**p =0.05,
***p =0.01 or better.

& Namara, 2001) who reported that access to cultural benefits is efficient in gaining local people's support to conservation. Similarly, (Kideghesho, 2008; Kideghesho et al., 2007) found that taboos and social norms compel individuals to use wildlife resources with caution; it automatically leads to support to conservation as a result of fear of being punished or befallen by a bad omen.

Local communities' attitudes towards wildlife conservation influenced conservation behaviour, with a positive attitude likely to lead to pro-conservation behaviour and negative attitude leading to anti-conservation behaviour. Negative attitudes towards wildlife conservation may lead to anti-conservation practices and increased

human-wildlife conflicts (Rao et al., 2002). Inversely, human-wildlife-conflict may also lead to negative attitudes (Ntuli et al., 2019). Support for wildlife conservation diminishes in areas where residents incur losses due to frequent property destruction without compensation (Infield & Namara, 2001; Romanach et al., 2007). This may lead to a lack of support to protect wildlife on community lands (Gadd, 2005). Among the interviewed respondents it was evident that action on livestock predators was coupled with retaliatory killings of predators, and calling upon the government to take away wild animals from community land. This is similar to the findings of
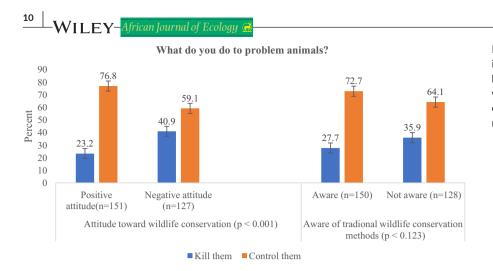
What do you do to problem animals?

FIGURE 4 Proportion of respondents indicating that livestock predators should be killed or controlled by attitude towards wildlife conservation and knowledge of traditional wildlife conservation methods

(Muriuki et al., 2017; Okello et al., 2014) who reported that due to the economic losses incurred as a result of predation, the Maasai community of Kajiado county has resorted into killing predators mostly affected being the lions.

4.1 | Limitations

The study had various limitations. First, the study was based on one conservancy, thus may not be sufficiently diverse to provide reliable insights into demographic or cultural differences in attitudes towards conservation. Second, the study was based on cross-sectional data; it was therefore not possible to establish causality between independent and outcome variables that were endogenous. For instance, knowledge of traditional wildlife conservation methods may influence attitudes and vice versa. There could also be a possibility of behaviour fostering attitude, that is, some participants may have benefitted from past conservation initiatives prompting them to give a positive response. In terms of measurement, the paper is based on quantitative scales that measure attitude towards wildlife conservation. However, a quantitative scale may not explain all or most of the variations in such attitude-related attributes. Despite these limitations, the findings show the association between awareness of traditional wildlife conservation methods and attitudes towards wildlife conservation in the study area.

5 | CONCLUSION

Awareness of traditional wildlife conservation measures results in a favourable attitude towards wildlife conservation which in turn leads to support of wildlife conservation interventions. However, this may be influenced by some aspects of the socio-demographic factors such as gender, education, household size and the main source of livelihood. The study revealed that awareness of traditional wildlife conservation methods had a positive influence on attitude towards wildlife conservation in the study area. Therefore, understanding

local communities' traditional wildlife conservation methods and attitudes towards wildlife conservation are necessary for the success of conservation policies and programmes. The inclusion of best practice traditional knowledge towards wildlife conservation (use of sacred sites, taboos and totemic species) should be integrated in the long-term wildlife conservation agenda in Kenya, East Africa region and Africa at large.

Experience of livestock predation and crop destruction resulted in negative attitudes towards wildlife conservation. Hence, sustainable mechanisms should be put in place to ensure communities who incur losses of property to wild animals are effectively compensated. To achieve sustainable wildlife conservation agenda, in areas where human-wildlife conflict is common due to livestock predation and crop damage, there is a need to integrate local people's traditional knowledge and attitudes towards wildlife conservation in participatory management of wildlife resources.

CONFLICT OF INTEREST

All the authors declared no conflict of interest.

AUTHOR CONTRIBUTIONS

CO contributed to the conceptualisation of the study, data collection, analysis and writing of the initial draft. TT and PS were academic supervisors to the corresponding author and were very instrumental in providing professional guidance and interpretation of results. GO conducted statistical data analysis. CO, TT, PS and GO reviewed and approved the manuscript.

DATA AVAILABILITY STATEMENT

The data available from the corresponding author upon request.

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