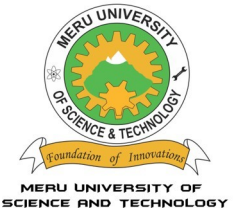




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Health-Related Quality of Life: differences between Human-Wildlife Interface and Non- Wildlife Zones of Meru County, Kenya

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ABSTRACT

KEYWORDS

EQ-5D-5L

HRQoL

Human-Wildlife Interface

Non-Human-Wildlife Zones

Background: Emerging Infectious Diseases (EIDs) originate from animals. This is due to increased contacts with animals and sub-optimal surveillance. Research, collaboration and surveillance through one health is necessary to prevent zoonoses. Comparison of Health-Related Quality of Life (HRQoL) between residents at the human-wildlife interface and inhabitants of non-wildlife zones can predict risk factors of these preventable diseases. This study compared the HRQoL of such areas in Meru County, Kenya. **Methods:** This was a comparative HRQoL cross-sectional study between household members living at the wildlife-human settle-

ment interface in Igembe Central and inhabitants of non-wildlife zone of Tigania West. The study included residents who had lived in the two study areas for five years and above. Sample frames were constructed from Meru County Government Community Health Strategy Registers and respondents systematically sampled. Ethical clearance Ref: MIRERC/002/2021 was obtained from the Meru University of Science and Technology Institutional Research Ethical Review Committee. Consent was sought and granted before administration of the questionnaires. Data were simultaneously collected using the European Quality of Life Five Dimension Five Level (EQ-5D-5L) tool and structured demographic questionnaires. Analysis was done using R script programming and summarized through descriptive statistics. Associations and hypotheses were tested through chi statistic and odds ratios respectively. Data was presented in form of tables and graphs. **Results:** Participants largely reported no problems in the dimensions of EQ-5D-5L. However, the HRQoL significantly differed between the two populations. Populations at the brink of Meru National Park in Igembe Central reported more problems in the worry (anxiety/depression) dimension of the EQ-5D-5L than their counterparts in Tigania West. **Conclusions:** The residents at the human-wildlife interface were more likely to report low HRQoL than their counterparts at the non-wildlife zone, $\chi^2 (1, N=525) = 35.5281, p < .001$. They also were more likely to get worried (OR 3.068, 95% CI: 2.109 to 4.463) $p < .00001$. Further studies are required to address the cause of anxiety/depression to improve population mental health around the Park.

Introduction

Emerging infectious diseases (EIDs) caused by novel viruses of animal origin such as Corona viruses (COVID- 19), Ebola and others have been on the increase.¹ This has partly been blamed on an-

thropogenic influence with regards to changes in land use, population growth, international travel and increased contacts with wild animal reservoirs from illegal hunting and game trophies ². About two thirds of the EIDs originate from animals.³

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EIDs are acquired when humans interact with infected wild or domestic animals. This could occur through change in land use, domestic animal care, meat consumption or encroachment into wildlife habitats and conservancies such as parks, virgin forested areas or zoos.⁴

In principle, national parks are completely protected natural resources with no access to individuals safe for tourism and research. Nevertheless, in African countries, protected areas must be preserved innovatively.⁵ In Kenya for instance, in spite of the provided safeguards, wild animals have been spotted outside the protected areas. Wildlife movement in and out of conservancies where predator carnivores killed and fed on livestock during certain periods of the year has been reported.⁶ Wild animals are also known to interact with people on private and community land destroying crops and causing human-wildlife conflicts.⁷ Illegal hunting and consumption of game meat has also been testified.⁸ Historically, societies have also built negative perceptions, beliefs, and experiences about predators such as carnivores and reptiles, and because of anger, fear, and disgust, they hunt and kill them.⁹

These factors constitute the risk of contracting zoonotic diseases by the communities and their livestock at the wildlife-human settlement interface zones. These activities also carry a risk of disease spread in both directions. There is a need therefore, to surveil the well-being of populations living next to native natural environments and wildlife conservation areas which may become foci for zoonotic disease spread. The future increase in destruction of animal habitats, closer interaction of humans and wildlife and evolving novel diseases resulting to microbes resistant to drugs, suggest sustained occurrence and increase in IEDs.²

Proactive public health surveillance for prevention and control of these diseases through “one health” platform is thus necessary. “One Health” strategy can address zoonotic disease priority areas regarding environment, humans and the wildlife. To that end, research collaboration, coordina-

tion, surveillance, preparedness and response would be necessary for prevention and control of zoonoses.¹⁰ Collection, analysis and interpretation of health-related data is important for the planning, implementation, and evaluation of public health practice. It is also part of early warning systems for identifying scenarios that could evolve into public health emergencies ¹¹.

The HRQoL surveillance with regards to one health principles can support the fundamental functions of public health practice.¹² Assessing the HRQoL can establish leads to risk factors of preventable diseases.¹³ The same can reveal new understanding on linkages between HRQoL and risk factors ¹⁴. In addition, HRQoL surveillance can be useful in the identification of unmet population health needs such as trends, disparities, and determinants of health of unique populations such as those living next to risky environments.¹⁵ The HRQoL surveillance data can also be used by health managers and policymakers to develop and implement policy decisions and programs to promote health of affected populations.¹⁶ Besides, health programs have previously benefited from HRQoL surveillance data in public health interventions ¹⁷.

Viral zoonotic epidemics from wildlife have been on the increase ¹⁸. Surveillance efforts at the wildlife-human interface settlements need to be heightened to prevent zoonotic infections within livestock herds, wildlife and humans. The EQ-5D-5L instrument can primarily be used to assess the HRQoL of the residents¹⁹ to inform further investigations. The HRQoL measurement is in alignment with the seminal definition of health.²⁰ The WHO defines health as a state of complete physical, mental, and social well-being of a person and not merely the absence of disease or infirmity.²¹

The closest measurement of health as per the WHO's definition is the HRQoL. Health related quality of life goes beyond direct measures of population health, such as morbidity and mortality or life expectancy. It assesses the well-being and life satisfaction in relation to health.

Previously, various studies on HRQoL have been done in Kenya. They range from Economic evaluation of health states preferences²² impacts of treatment,²³ determinants of medical procedures,²⁴ duration of treatment,²⁵ gender differences in health-related quality of life,²⁶ environmental correlates of HRQoL²⁷ and correlates of health-related quality of life among adults receiving combined therapies.²⁸

In spite of the foregoing, no data is available on the novel use of EQ-5D-5L instrument to compare the HRQoL among residents of risky environments such human-wildlife interface and non-wildlife zones of Kenya to inform further action. Thus, we gathered and compared the HRQoL data in Igembe Central and Tigania West Sub-Counties at the human-wildlife interface and non-wildlife zones respectively, for further work in the prevention and control of zoonotic infections through one health concept.

The results from the study would inform the development of inter-sectoral policies by the County, wildlife managers and National govern-

ments in Kenya to empower communities in the prevention and control zoonotic diseases.

Methodology

This was a comparative HRQoL cross-sectional study between household members living at the wildlife-human settlement interface of Igembe Central near Meru National Park and those living in the non-wildlife zone of Tigania West. The two study areas; Igembe Central and Tigania West Sub Counties, have similar climatic conditions. The study included those who had lived in the two areas for a period of 5 years and above. Ethical clearance Ref: MIRERC/002/2021 was obtained from the Meru University of Science and Technology Institutional Research Ethical Review Committee. Written and signed consent of each interviewee was sought and given before administration of the questionnaires.

A sample frame of the household heads in each of the locations was constructed from the Community Strategy Register of the Ministry of Health Meru County. The calculated samples were distributed proportionately to the population size of

Characteristics	Category	Igembe central	Tigania West
Gender	Female	90 (32.8%)	86 (34.3%)
	Male	184 (67.2%)	165 (65.7%)
Marital status	Single	23 (8.4%)	24 (9.6%)
	Married	216 (78.8%)	175 (69.7%)
	Widowed	10 (3.6%)	35 (13.9%)
	Divorced	25 (9.1%)	17 (6.8%)
Religion	Catholic	40 (14.6%)	155 (61.8%)
	Protestant	229 (83.6%)	69 (27.5%)
	Others	5 (1.8%)	27 (10.8%)
Education	No formal education	18 (6.6%)	44 (17.5%)
	Primary	199 (72.6%)	154 (61.4%)
	Secondary	46 (16.8%)	47 (18.7%)
	Post-secondary	11 (4%)	6 (2.4%)
Occupation	Peasant	252 (92%)	222 (88.4%)
	Civil servant	3 (1.1%)	12 (4.8%)
	Entrepreneur	16 (5.8%)	9 (3.6%)
	Casual	3 (1.1%)	8 (3.2%)

Table 1: Sociodemographic characteristics in Igembe Central and Tigania West Sub-Counties

Dimension	Domain	Igembe Central	Tigania West
Mobility	No problem	240 (87.6%)	186 (74.1%)
	Slight problem	15 (5.5%)	35 (13.9%)
	Moderate problem	17 (6.2%)	20 (8%)
	Severe problem	2 (0.7%)	7 (2.8%)
	Unable to walk	0 (0.0%)	3 (1.2%)
Self-care	No problem	265 (96.7%)	207 (82.5%)
	Slight problem	5 (1.8%)	28 (11.2%)
	Moderate problem	3 (1.1%)	10 (4%)
	Severe problem	0 (0.0%)	3 (1.2%)
	Unable to wash	1 (0.4%)	3 (1.2%)
Usual activities	No problem	240 (87.6%)	170 (67.7%)
	Slight problem	16 (5.8%)	46 (18.3%)
	Moderate problem	14 (5.1%)	20 (8%)
	Severe problem	2 (0.7%)	11 (4.4%)
	Unable to do	2 (0.7%)	4 (1.6%)
Pain/discomfort	No pain	141 (51.5%)	135 (53.8%)
	Slight pain	90 (32.8%)	85 (33.9%)
	Moderate pain	34 (12.4%)	18 (7.2%)
	Severe pain	8 (2.9%)	9 (3.6%)
	Extreme pain	1 (0.4%)	4 (1.6%)
Worry (anxiety/dipression)	Not anxious	63 (23%)	120 (47.8%)
	Slight anxious	57 (20.8%)	98 (39%)
	Moderate anxious	103 (37.6%)	21 (8.4%)
	Severely anxious	38 (13.9%)	8 (3.2%)
	Extremely anxious	13 (4.7%)	4 (1.6%)

Table 2: Health Related Quality of Life in Igembe Central and Tigania West Sub-Counties

each village in the chosen locations and the respondents were identified through systematic sampling.

Two sets of data for comparison were simultaneously generated using EQ-5D-5L and structured questionnaires for HRQoL and demographic information data correspondingly, in the month of April 2021..

Analysis was done using R script programming and summarized through descriptive statistics and presented in form of tables and graphs. Hypothesis and associations between variables were tested using odds ratios and Chi square statistic at 95% confidence level respectively.

Results

Table 1 summarizes the sociodemographic characteristics in Igembe Central and Tigania West Sub-Counties. Most of the respondents in both study areas were males of primary level education and married. The main occupation of the respondents was peasant farming.

Table 2 summarizes the health-related Quality of Life in Igembe Central and Tigania West Sub-Counties.

Residents in both study areas majorly reported no problem in the five domains. Most of the respondents in Igembe Central were moderately

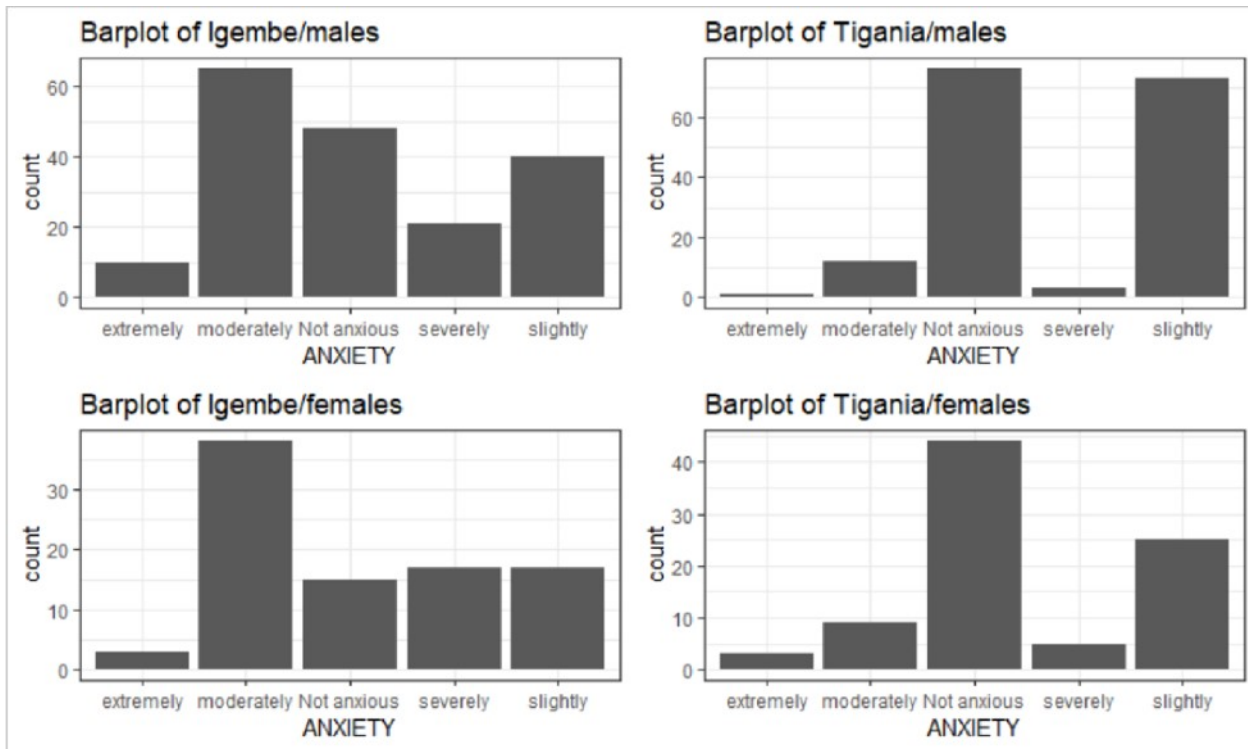


Figure 1: Respondents by HRQoL domain of Worry (anxiety/depression) in Igembe Central and Tigania West

anxious. The respondents of Tigania West were less anxious.

Overall respondents reporting problems and no problems in both Igembe Central and Tigania West Sub-counties are summarized in Table 3. Reported problems in the domains were higher in Igembe Central than in Tigania west.

Discussion

We compare the health status of persons at the human-wildlife interface and inhabitants of a non-wildlife zone for the first time with regard to the HRQoL in Kenya. The HRQoL data among the two populations were collected using EQ-5D-5L questionnaire, 29 estimated and compared. Socio-demographic information of the respondents was also collected using a structured questionnaires and analyzed.

A total of 274 and 251 persons in Igembe Central and Tigania West sub counties respectively, were interviewed (Table: 3). Majority were married and more males answered to questionnaires than females in the two areas. This could probably be informed by the two study areas’ cultural norms which require males to respond to strangers if present in the homestead. Females thus did not respond to questionnaires when males were present. However, redundancy from COVID-19 lockdown measures resulted to many people including but not limited to men being at home during the time of the study.³⁰ The number of widowed respondents was higher in Tigania West than in Igembe Central. This could probably have been because residents of Tigania West were relatively older compared to Igembe Central. The mean age of respondents in Tigania West was 50.99 with a

Study area	Had some problem	Had no problem	Total
Igembe Central	211	63	274
Tigania West	131	120	251

Table 3: Overall respondents reporting problems and no problems in both Igembe Central and Tigania West sub-counties.

standard deviation of 16.25, compared to 43.84 years with a standard deviation of 12.11 in Igembe Central.

The residents of Igembe Central at the human-wildlife interface were largely more likely to report low HRQoL than their counterparts at the non-wildlife zone of Tigania West, χ^2 (1, N=525) =35.5281, $p < .001$ (Table: 3). The respondents of the non-wildlife zone who had a mean age of 50.99 years compared to their counterparts at the human-wildlife interface with a mean age of 43.84, enjoyed better HRQoL.

Comparatively, the residents of Igembe Central who also had closer proximity to wildlife scored worse in the domain of worry (anxiety/depression) of the EQ-5D-5L questionnaire than the residents of Tigania West at the non-wildlife zone (OR3.068, 95% CI: 2.109 to 4.463) $p < .00001$. The lower HRQoL in this domain was associated with nearness and exposure to wildlife. In this study therefore, individuals with worry (anxiety/depression) were 3 times more likely to have been exposed to living conditions at the human-wildlife interface than at the non-wildlife zones.

The respondents in the two areas were mainly peasant farmers (Table:1). All of them reported at least some problems in all dimensions of the HRQoL. Nonetheless, more problems were reported in the domain of worry (anxiety/depression) than in all other domains in the two areas (Table: 2). The findings of this study are consistent with a study done in China³¹ who compared the HRQoL of Farmers and Workers.

However, in the dimension of being anxious/depression, 77% (n=274) of respondents in Igembe Central at the human-wildlife interface reported some problems compared to 53% (n=251) in Tigania West (Table: 2). In the dimension of being moderately anxious, residents of Igembe Central reported 37% (n=274) occurrences compared to 8.4% (n=251) in Tigania West. Anxiety among the populations was therefore higher in Igembe Central than in Tigania West. This disagrees with studies done in other areas which reported anxiety/depression at 20.5% in population studies.¹⁴ Hu-

man-wildlife conflicts were commonly stated among the residents of Igembe Central in other studies. The reported psychological problems therefore, may have resulted from stress related to crop raiding by wild animals, attacks on humans and livestock depredation by carnivores. Notwithstanding, residents were not worried of contracting zoonotic diseases from wildlife interactions. In fact, from other studies in the same area, the inhabitants of Igembe Central had scanty knowledge on zoonoses compared to those of Tigania West, who lived almost 100 KM away from wildlife.

The second highest aspect where problems were reported is the pain/discomfort dimension (Table: 2). Close to half 48.5% and 46.2% had some problems ranging from slight pain to extreme pain in Igembe Central Sub County and Tigania West Sub-Counties, respectively. These findings disagree with others that reported lower proportions on pain/discomfort at 33.8% in a population study in Brazil.¹⁴ A third of the respondents reported slight pain in the two study areas at 32.8% (n=274) and 33.9% (n=251) in Igembe Central and Tigania West correspondingly. Respondents of Igembe Central reported moderate pain at 12.4% (n=274), compared to 7.2% (n=274) in Tigania West. Males and females in both areas had anxiety (Figure :1).

Older populations are expected to experience more pain due to degenerative aging complications than younger populations. In spite of this, 12.4% (n=274) younger populations of Igembe Central reported moderate pain compared to 7.2% (n=274) in Tigania West (Table 2). This finding is inconsistent with others that found older populations to experience more pain than younger ones.¹⁵

Further investigation is required to establish the cause of this anomaly. Nevertheless, fewer people recorded severe pain in both areas at 2.9% (n=274) and 3.6% (n=251) in Igembe Central and Tigania West Respectively. Results in the two areas indicated very small proportions of persons ex-

periencing extreme pain in both places at 0.4% in Igembe Central and 1.6% in Tigania West.

Overall, the residents of the human-wildlife interface and non-wildlife zones widely reported no health problems in all the dimensions except Anxiety/Depression. However, the HRQoL significantly differed between the two populations. Respondents of Igembe Central at the brink of Meru National Park reported more problems in the worry (anxiety/depression) dimension of the EQ-5D-5L than their counterparts in Tigania West. Further studies are required to address the cause of anxiety/depression to improve mental health of the population at the human-wildlife interface zone of Meru National Park.

Conclusions

There was a significant difference in HRQoL between the two communities. The residents of Igembe Central at the human-wildlife interface were more likely to report low HRQoL than their counterparts at the non-wildlife zone of Tigania West, $\chi^2 (1, N=525) = 35.5281, p < .001$. Similarly, residents of Igembe Central were more likely to get worried compared to the residents of Tigania (OR 3.068, 95% CI: 2.109 to 4.463) $p < .00001$.

Further studies to establish and address the phenomenon and improve people's mental health around the park is necessary.

Authors' contributions

GM conceived the study, collected the data and wrote the manuscript. IM performed the analysis. CK reviewed the manuscript and referencing. AN revised the manuscript for publication.

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Competing interests: None declared.

Ethical approval:

Ethical clearance was obtained from Meru University of Science and Technology Institutional Ethical Review Committee (MIRERC)

Data availability

The dataset for this study is available on request

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