Assessment Of Factors Affecting Adoption Of Control Measures Against Rabies In Mwala Sub-County, Machakos County, Kenya

Naftaly Mwaniki Ithiga
Deputy Director Veterinary Services, Directorate of Veterinary Services, P.O. Private bag, Kangemi, 00625 Nairobi, Kenya

Dr Nyamai Juma
PhD, Senior, lecturer, School of public health, Mount Kenya University, P.O. Box 342-01000 Thika, Kenya

Dr Jesse Gitaka
PhD, Senior lecturer, School of clinical medicine, Mount Kenya University, P.O. Box 342-01000 Thika, Kenya

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ABSTRACT

Control of rabies in Kenya is of major importance. Machakos county has reported the highest number of rabies cases nationally. Adoption of rabies control measures by residents is determined by various factors including the proportion of households with dogs vaccinated against rabies among others. The study involved 397 residents of 6 wards in Mwala sub-county, Machakos County, Kenya where the sampling frame was the number of households in each ward with dogs eligible for vaccination. A structured questionnaire and an interview guide were used to collect both quantitative and qualitative data. Analysis was done using SPSS version 26.0 and Ms. Excel version 8. Descriptive statistics was used to demonstrate the prevalence of various characteristics by means of standard deviation, mean and median. Data was presented using bar graphs, pie charts and tables. 74.1% of the homesteads had dogs. Only 23.5% of these were vaccinated against rabies. Educational level and occupation status were greatly associated with vaccination of dogs (p=0.012 and p=0.025 respectively). The study concluded that vaccination of dogs against rabies plays a major role in the adoption of control measures against the disease.

Keywords: Rabies, adoption, control, awareness, vaccination, zoonoses, transmission, collaboration

1. INTRODUCTION

Rabies is a zoonotic viral disease, caused by the rabies virus and mainly transmitted by the domestic dog and other canines to humans via bites and scratches. It affects humans, livestock, canines and other wild animals (Wallace et al., 2017). It is one of the most important zoonotic diseases globally, resulting in 60.000 human fatalities annually. It occurs in all continents except Antarctica. Most of the cases occur in Asia and Africa, with most of the Asian cases occurring in India (Hagos et al., 2020).

One of the variables under study was to determine the proportion of households with dogs that had been vaccinated against rabies in Mwala Sub County, Machakos County, Kenya. This variable is directly affected by the ability of the residents to access health care facilities specifically vaccination of their dogs against rabies, hence affecting their ability to adopt control measures against rabies. The cost of post exposure treatment is at an average of US $ 40 in Asia and US $ 40 in Africa, where the average income is 1-2 US $ per capita according to WHO (2018).

Vaccination of dogs and public education is key to stopping human rabies (Hatamabadi et al., 2014). According to Monje et al. (2020a) mass and sustained vaccination of dogs for at least 3 consecutive years with a coverage of more than 70%of the dog population will eliminate rabies. The main indicator for this variable is the number of vaccinated dogs within those households owning dogs.

2. RESEARCH OBJECTIVE

To determine the proportion of households with dogs that had been vaccinated against rabies in Mwala Sub County, Machakos County, Kenya.

3. LITERATURE REVIEW

3.1 INTRODUCTION

Zoonotic diseases, rabies included, are of worldwide concern, especially in the tropics, and are of economic importance in developing countries. Spread is enhanced by global migratory trends, an increase in human interactions, international trade, new and emerging infections, and changes in biodiversity (WHO, 2018). Domestic and wild dogs contribute to 99 % of all human rabies cases with 40% of all the cases occurring in children under the age of fifteen years. An increase in the vaccination figures for both humans and animals is a positive indicator of the success of the control measures (WHO, 2018).

Nationally, rabies results in 2000 human fatalities annually. The disease is endemic in the country, including the study area. The zoonotic disease unit (ZDU) jointly comprising the Ministry of Health (MOH) and the Directorate of Veterinary Services (DVS) has come up with a strategic plan for the eradication of rabies in Kenya (Beyene et al., 2018). Kenya is among the countries where the impact of zoonotic disease, including rabies, is mostly felt, hence the importance of adoption of rabies control measures by the residents. Financial and organizational challenges are among the impediments to effective disease control in the country (Castillo-Neyra et al., 2017).

The study targets the residents of the Mwala sub-county. As with the rest of the county, rabies is endemic in this area with the rabies control activities being carried out by the Machakos County government through the county departments of veterinary services, public health, and other partner agencies including the central government. A study by Kenyan researchers indicated that communities in Machakos County, including Mwala sub-county, are at great risk of rabies based on active surveillance for the disease in the area. Hence the role of inter-sectoral collaboration is crucial in the control the disease in the county (Mutua et al., 2019).

A critical review of the various studies done on the adoption of control measures against rabies and the factors affecting them has identified the following research gaps which this study seeks to address. Globally, continentally, regionally, and in the Kenyan context, there are few studies and little information on canine statistics especially the population of dogs which this study will seek to establish. This awareness is crucial in the reduction of rabies cases in the world.

A review of literature related to the topic under study was done by the researcher, with priority being given to the most recent review articles. They gave a broader, historical perspective of the topic and identification of the

research gaps. The review also focused on the important variables and new ideas associated with the study. The researcher reviewed three important theoretical models that were linked to the study.

3.2 THE TRIAD MODEL OF DISEASE CAUSATION

The model is grounded on a triad or triangle that involves an outside agent, a host, and the environment within which the agent and host interact. When these three factors converge, the host (which can refer to both humans and animals) becomes susceptible to developing a disease. Additionally, the vector, an organism responsible for transmitting infections by transporting pathogens from one host to another without causing illness, may also play a role in the infection process.

3.3 HEALTH BELIEF MODEL

Decision-making about adopting a certain health behavior is influenced by four basic factors, namely the perceived severity to the disease once it occurs, perceived susceptibility of the individual or community to the disease, perceived benefits of the preventive behavior, and perceived obstacles to the adoption of that behavior. The Health Belief Model is a psychological framework developed by social psychologists at the United States Public Health Service during the 1950s and remains one of the most renowned and extensively employed theories in health behavioral investigation (Janz & Becker, 1984).

3.4 TRANS-THEORETICAL MODEL (STAGES OF CHANGE)

The TTM functions on the postulation that persons do not transform behaviors rapidly and conclusively, rather, change in behavior, especially habitual behavior, occurs progressively through a cyclical process. The TTM is not a theory but a model. Different social theories and concepts can be practical to various phases of the model where they may be most operative (Prochaska & Diclemente, 1986).

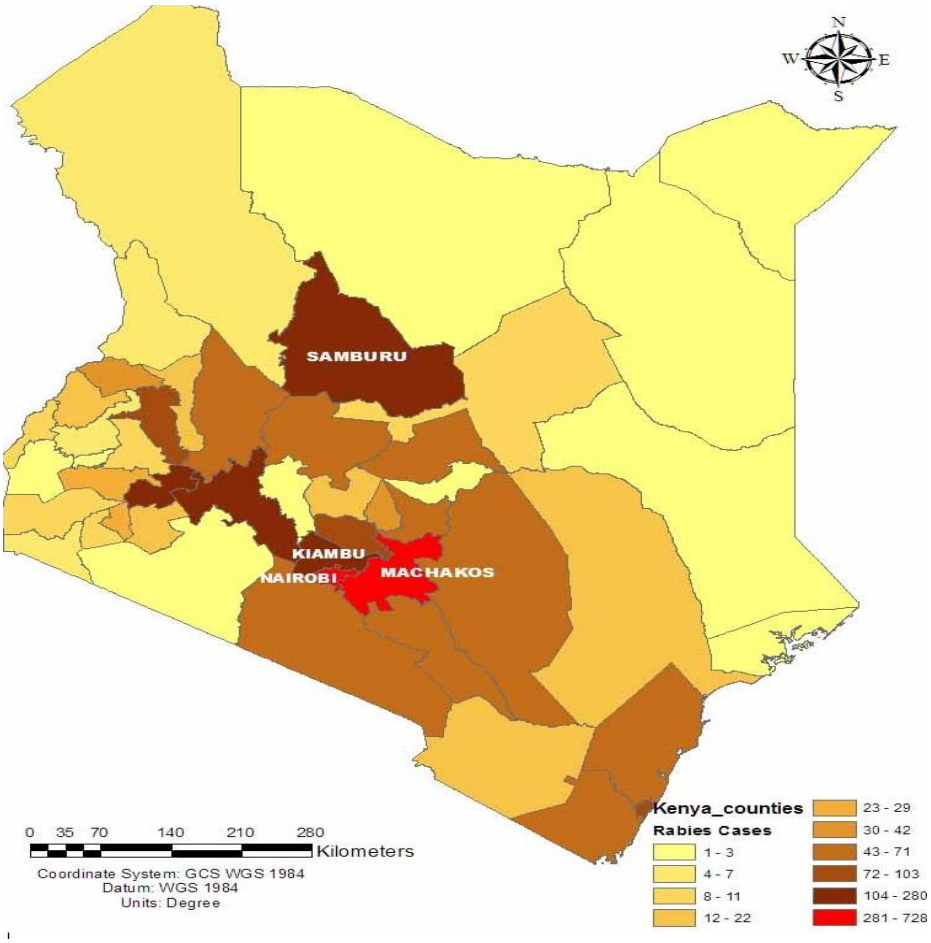
The TTM posits that individuals move through six stages of the change process. Termination was not part of the original model and is less often used in the definition of phases of change for health-related actions. For each stage of change, different mediation tactics are most operative at stirring the person to the next stage of change and afterward through the model to the upkeep of the ideal phase of behavior (Prochaska & Diclemente, 1986)

3.5 SUMMARY OF LITERATURE REVIEW

The health belief model was chosen to be the one best suited for this study and was mainly used. This is because it identifies well with the general and specific objectives used in the study, hence useful in answering the research questions. Adoption of certain health behaviors which, according to this theory, is influenced by perceived severity and susceptibility to the disease, perceived benefits of adopting the health behavior and perceived obstacles to the adoption, can be realized by addressing these factors through creating awareness among the residents. The severity of rabies disease and susceptibility of the population to the same will be

emphasized during the awareness creation. The benefits of adopting certain behaviors like routine vaccinations against rabies will also be highlighted.

Figure 1: Map of Kenya showing rabies cases by counties.



Source: Kenya national bureau of statistics (2019)

4. RESEARCH METHOD AND MATERIALS

4.1 RESEARCH DESIGN

The design of the research used in this study is a cross-sectional descriptive one. The study involved designing a suitable data collection instrument, in this case a structured questionnaire, collecting the data from the identified target population, processing, analyzing the data, and reporting the results (Kothari, 2014).

4.2 STUDY APPROACH

The research entailed the gathering of both quantitative and qualitative data from residents and key stakeholders regarding assessment of factors affecting adoption of rabies control measures in Mwala Sub-County, which is the general objective. A mixed-method approach was employed.

4.3 STUDY LOCATION

The research was conducted in Mwala Sub County, Machakos County, Kenya. The GPS coordinates for the county are; latitude: - 1.51667 and longitude; 37.26667 at an elevation of 1,138 meters above sea level. It has an area of 6043 square kilometers. Mwala Sub County is made up of six wards namely Mbiuni, Makutano, Masii, Muthethani, Wamuyu, and Kibauni. The population as per the 2019 census is 181,896 with an area of 1018 square kilometers. The total number of households is 45,840 (KNBS, 2019a).

4.4 TARGET POPULATION

The population targeted by this research comprised of the adult residents of Mwala Sub-County in Machakos County in Kenya.

4.5 SAMPLING PROCEDURE

To select participants in the six wards of Mwala Sub-County in Machakos County, Kenya, a cluster random sampling technique was utilized. Additionally, a purposive sample was employed to select key informers among the residents. Sampling and distribution of questionnaires in the six wards making up Mwala sub county was done proportionately among the 45,840 households.

Respondents were literate and over 18 years of age from whom prior consent was sought. Both genders were selected using random simple sampling to participate in the study according to the calculated distributions. Purposive sampling was employed to select the key informants.

4.6 DETERMINATION OF SAMPLE SIZE

The sample size was determined using Yamane's formula (1986) which states;

n= N/1+N (e2) where;

n=sample size of the sample,

N= size of the population,

e=precision level (95% confidence level)

N=181896/1+181896 (0.05*0.05) = 400

The sampling technique was mixed multistage, using both cluster and simple random sampling. To account for non-respondents and spoilt questionnaires, 10% of the anticipated sample size was added.

4.7 SAMPLE SIZE DISTRIBUTION

The distribution of households with dogs eligible for a vaccination against rabies is assumed to be homogenous (GOK, 2019b), hence the 400 questionnaires were administered to the 45,840 household heads using random simple sampling.

4.8 DATA COLLECTION INSTRUMENTS

A structured questionnaire was used as the primary data-gathering instrument. An interview guide was used for focus group discussions and key informants. These instruments collected both quantitative and qualitative data

respectively. The study also used secondary data collected from other sources e.g., records from government departments and other agencies, journals, and publications from libraries.

5. DATA ANALYSIS

5.1 DATA ANALYSIS TOOLS

Both quantitative and qualitative data was collected using a structured questionnaire and an interview guide. The collection, analysis and presentation was done as described below.

5.2 QUANTITATIVE DATA.

Quantitative data was collected using a structured questionnaire for all the variables. This was entered, coded, cleaned, and analyzed using Ms. excel version 8 and SPSS version 26.0. The presentation of data was done using pie charts, tables, and bar graphs.

5.3 QUALITATIVE DATA

Qualitative data for some variables was collected partially by means of the structured questionnaire. This was in the case of understanding the role of intersectoral collaboration and rabies prevention. The interview guide was used for all variables.

6. RESEARCH FINDINGS

6.1 SOCIO-DEMOGRAPHIC FEATURES

Table 1 reveals the socio-demographic and economic features of participants in the survey; 67.9% of total respondents were male, while 32.2% were females. A large proportion of study participants, 72.8%, were married. Regarding the level of education, the majority 41.1% had completed high school, 23.9% had a tertiary level of education, 20.4% had completed primary school education. 97.2% of study participants were Christians, and that only 19.6% were not employed.

Table 1: Socio-demographic features

	Occurrence	Percent
Gender		
Male	269	67.8
Female	128	32.2
Total	397	100.0
Monthly Income (Ksh)	Mean 21,118 Median 15,000	
Marital status		
Single	108	27.2
Married	289	72.8
Total	397	100.0
Education level		
Primary Complete	81	20.4
Primary Partial	43	10.8

Secondary Complete	163	41.1
Secondary Partial	15	3.8
Tertiary/College	95	23.9
Total	397	100.0
Religion of the residents		
Christian	386	97.2
Muslim	11	2.8
Total	397	100.0
Residents' occupation		
Employed	319	80.4
Not employed	78	19.6
Total	397	100.0

Source: primary data

6.2 DOG OWNERSHIP

Table 2 shows the proportion of households with dogs and those without dogs; only 25.9% did not have dogs in their homesteads, while majority of study 74.1% participants had dogs.

Table 2: dog ownership

Own Dog in Homestead	Frequency	Percent
No	103	25.9
Yes	294	74.1
Total	397	100.0

Source: primary data

6.3 NUMBER OF DOGS AMONG THOSE WITH DOGS (N=294)

Table 3 presents descriptive statistics of the number of dogs owned by respondents who owned dogs in their homesteads. The median number of dogs was 2 while the dogs per homestead was 3+3.3.

Table 3: Number of dogs per homestead

	N	Minimum	Maximum	Mean	Std. Deviation	Median
Dog numbers	289	1	51	3	3.3	2

Source: primary data

6.4 PROPORTION OF DOG VACCINATED IN HOMESTEADS WITH DOGS

Table 4 shows that, from the number of dogs per homesteads (N=289), as shown in table 4.3, 76.5%(N=221) of dogs were not vaccinated, while only 23.5% were vaccinated.

Table 4: Proportion of vaccinated dogs

Vaccinated Dogs	Occurrence	Percent
Yes	68	23.5
No	221	76.5
Total	289	100.0

Source: primary data

6.5 PROPORTION OF DOGS VACCINATED IN HOMESTEADS WITH DOGS PER WARD.

Table 5 shows the proportion of wards with vaccinated dogs. Kibauni (46.9%), Mwala (43.4%), Mbiuni (35%) and Muthetheni wards (31.3%) respectively had the highest proportion of households with vaccinated dogs. Masii (2.4%) and Wamunyu (8%) wards had the least proportion of households with vaccinated dogs.

Table 5: Proportion of Dogs vaccinated in homesteads with dogs per ward.

Ward	Dog Vaccination	Occurrence	Percent
Masii	Yes	2	2.4
	No	80	97.6
	Total	82	100.0
Mwala	Yes	23	43.4
	No	30	56.6
	Total	53	100.0
Mbiuni	Yes	14	35.0
	No	26	65.0
	Total	40	100.0
Wamunyu	Yes	4	8.0
	No	46	92.0
	Total	50	100.0
Kibauni	Yes	15	46.9
	No	17	53.1
	Total	32	100.0
Muthetheni	Yes	10	31.3
	No	22	68.8
	Total	32	100.0

Source: primary data

6.6 PREVALENCE OF DOG BITES IN THE PAST THREE MONTHS AT THE HOME LEVEL

Table 6 shows the prevalence of dog bites in the past three months before the study. 80% of study participants reported that within the past three months a member of their household had been bitten by a dog. Less than two-fifth of study participants reported no dog bite incidence.

Table 6: Prevalence of Dog bites

Dog Bite Incidence the past three Months	Frequency	Percent
Yes	318	80.1
No	74	18.6
Total	392	98.7

Source: primary data

6.7 REGRESSION ANALYSIS

Table 7 displays regression analysis of the predictors of the ability to vaccinate dogs. regarding the educational level, respondents with incomplete secondary level of education were 2.724 times (p=0.02) more likely to vaccinate their dogs, while college educated individuals were 3.7 times (p=0.018) more likely to adopt rabies

control activities as equated to those with incomplete level of primary school learning. The level of income was statistically associated with the adoption of rabies control activities.

Table 7: Regression analysis

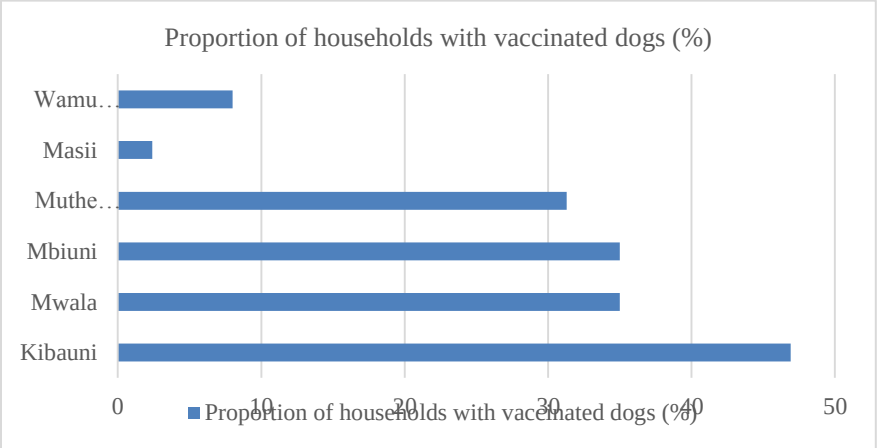
Variables in the Equation	Sig.	Exp(B)	95% C.I.for EXP(B)	
			Lower	Upper
Primary Incomplete	Ref			
Primary complete	0.148	2.450	0.728	8.248
Secondary Incomplete	0.020	2.724	1.172	6.333
Secondary Complete	0.362	2.849	0.300	27.079
College/University	0.018	3.701	1.249	10.965
Unemployed	Ref			
Employed	0.450	0.596	0.155	2.287
Income Level	0.024	1.000	1.000	1.000
Constant	0.423	1.815		

Source: primary data

6.8 SUMMARY OF FINDINGS

Dog ownership is high. About 75 percent of households owned at least two dogs. Regrettably, less than 25% of these dogs owned were vaccinated. Masii and Wamunyu wards had the least households with the vaccinated dogs.

Figure 2: Proportion of households with vaccinated dogs



Source: primary data

7. CONCLUSION

The current study has established that three-quarters of households' own dogs with an average of three dogs per household. This compares well with the findings by WHO (2018) that 80% of dogs are owned and hence available for parenteral vaccine vaccination. The proportion of dogs vaccinated in the study area is low. This compares closely with epidemiological survey where it was established that the annual vaccination coverage

was at 24% in Machakos. The present study statistics illustrates a need to conduct mass dog vaccination to reduce the risk of human rabies within the study area.

Elsewhere in Kenya, a cross-sectional survey by Mutua et al. (2019) in Kakamega county Kenya established that about 55% of households owning dogs had vaccinated their dogs. .In Uganda, ,Mazeri et al (2018) survey established that more than half of dog owners in their survey had their dogs vaccinated. These figures are well below the WHO recommendation of 70% coverage.

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