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Knowledge, Attitude and Practice of Surveillance for Human Anthrax Among Veterinary and Health Professionals in Western Province of Zambia

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Abstract

Background: *The need to strengthen surveillance systems to control and prevent anthrax disease outbreaks is essential, as 60% of emerging, re-emerging human diseases originate from pathogens that originally circulated in non-human animal species. The study aimed to determine the knowledge, Attitude and practice of surveillance for anthrax prevention among health and veterinary professionals.*

Methods: *We conducted Cross-sectional study among Health and veterinary professionals. A Semi-structured questionnaire was used to assess the Knowledge, Attitude and Practices of surveillance of the 203 study participants aged 18 years and above within selected districts of the study area. The participants were randomly sampled within selected districts of the study area and the districts and facilities were purposively sampled.*

Data was collected using questioners administered through face-to-face interviews. Data was analysed using descriptive statistics for socio-demographic characteristics, logistic regression, odd ratio test and chi-square test was used for bivariate analyses. Data was entered into Microsoft Excel 2016, and then exported to and IBM SPSS Statistics 26 for further analysis.

Results: *The study found that 90% of the participants had knowledge of disease surveillance, only 23% could mention all the components. 84% of the respondents reported willingness to participate in a routine sentinel surveillance system. 91% of Health professionals and 83% of veterinary professionals were knowledgeable about surveillance.*

The variables statistically significantly associated with knowledge were; district (OR 0.141, 95% CI 0.049 0.404 p = 0.001), service unit (OR 0.341, 95% CI 0.179 0.650 p = 0.001), Qualification (OR 1.068, 95% CI 0.27 4.228, p 0.012) and Type of Profession (OR 12.631, 95% CI 0.898 In Zambia, strengthening surveillance systems is important because Anthrax is endemic in Zambia's Luangwa Valley and Zambezi floodplain.177.641, p 0.056) as a marginal predictor. All 20 facilities were able to diagnose anthrax based on clinical symptoms, only 10% of facilities had the capacity for laboratory confirmation of anthrax diagnosis; 55% of facilities treated anthrax cases on-site, and 45% referred cases.

Conclusion: *The study shows better knowledge, attitudes, and practices adhered to WHO standards. However, the study reveals gaps in the comprehensive understanding of disease surveillance components despite professionals' willingness to participate in surveillance. District location, service unit, qualification, and profession type significantly influence knowledge. Strengthening surveillance systems, especially in anthrax-endemic areas like Zambia, remains crucial for timely diagnosis and management.*

Keywords: Anthrax Surveillance, Zoonotic Diseases, Western Province Zambia, Knowledge- Attitude-Practice.

Introduction

Anthrax is a zoonotic disease caused by the spore-forming bacteria Bacillus anthracis. Anthrax spores resist extreme environmental pressures and can persist in the soil. Humans acquire anthrax by ingesting infected meat or handling infected animal carcasses and products [1].

People can develop three forms of anthrax infection dependent on the inoculation route: cutaneous, gastrointestinal, and pulmonary anthrax. Cutaneous anthrax accounts for 95% of human cases globally; it occurs when spores enter the body through a wound or opening in the skin and has a 20% mortality rate if left untreated. Gastrointestinal anthrax infection occurs when

persons ingest contaminated food and has a 25% to 60% mortality rate. Pulmonary anthrax infection occurs when an individual inhales spores from the environment and has a mortality rate of greater than 80% if left untreated and a 45% fatality rate even after treatment [2].

Zambia experienced two outbreaks in 2016 affecting over 80 persons and 20 animals in Chama district in Muchinga province, while dozens of people and animals were affected in the Western province covering the four districts of Shangombo 26, Nalolo 9, Limulunga 1 and Kalabo 31[3].

In both outbreaks, human anthrax infection was associated with those contracted from hippos, buffalos and cattle, especially in the Western province It is anticipated that anthrax cases will continue increasing in these endemic areas than expected. Most anthrax cases occurred seasonally in Zambia between the months of July and December [4, 5].

Previous efforts to control anthrax outbreaks in endemic regions include mass vaccination of livestock, quarantine of infected animals, burning or burying of animal carcasses, and sensitisation of the community. Despite these measures, the close proximity of people and animals and food insecurity in the region continue to drive anthrax transmission [6, 7]. While most people know the threat of anthrax, entrenched behaviours and cultural practices are challenging to change. Continued outbreaks in the Western province highlight the importance of increasing community sensitisation and health education campaigns in the area [4].

In spite of many interventions, there were numerous gaps in the integrated surveillance system, mainly related to the high patient-to-health personnel ratio, inappropriate technical support, poor transportation and communication modes in facilities, poor enforcement of the Public Health guidelines and other regulations, disincentives, and lack of training for critical front-line health professionals [8].

In Zambia, there is limited literature that focuses on surveillance of anthrax, and as such, this study aimed at determining the knowledge level, attitude and practice of epidemic surveillance for anthrax disease prevention among health and veterinary professionals in the endemic areas of Shangombo, Nalolo and Senanga districts in western Zambia.

Methods

A cross sectional study was conducted in western province in Nalolo, Senanga and Shangombo districts of Zambia; The selected districts have a total of 45 Health facilities with Senanga having 19 facilities while Shangombo 15 and Nalolo has 11. The study population comprised of all consenting health and veterinary professionals who have worked and lived in Senanga, Nalolo and Shangombo districts for more than a year. all health and vet professionals who were not found at the facility during the interview, volunteer health care workers and those on leave were excluded from the study.

Sampling Technique and Sample Size Determination

A multi-stage sampling technique was used to select study participants. In the first stage, 3 districts were purposively sampled on basis of anthrax incidence and prevalence cases. In the second stage, 23 out of 45 health facilities in the selected districts were selected purposively conditioned by a high Outpatient Department (OPD) and In-Patient Department (IPD) attendance volume. Using this criterion, we selected 10 facilities from Senanga, 7 from Shangombo and 6 from Nalolo. Facility staff were selected by simple random sampling.

Survey Sample

Practitioners included health care workers and vet workers from the province, the three districts and 23 health facilities involved in either animal or human disease diagnosis, surveillance or notification. Examples of professionals considered included Integrated Disease Surveillance and Response (IDSR) specialists, Monitoring and Evaluation (M&E) Officers and Disease Surveillance Officers, veterinary medical officers, veterinary professionals and extension officers, Health Information Officers, Environmental Health Technologists, Medical Officers, Nurses in-charge, Biomedical Scientists (Facility level), Clinical Officers, Registry Officers, Pharmacy Technologists, Other Lab Technologists, Data Associates, Data Clerks, /Nurses, and Community Health Assistants as they are the people who directly interact with patients in health facilities and animals at the veterinary.

Sample Size Calculation

The sample size was calculated using the single population proportion formula (9) that is $\mathbf{n} = \frac{Z^2Pq}{d^2}$. The sample size was calculated by considering the assumptions of 50%, q = 50% (q=1-p), z=standard normal deviate at 95% confidence interval (Z=1.96) and d = 5% margin of error (d=0.05). Where: n = Required sample size, Z = Confidence level at 95% (standard value 1.96).

$$\mathbf{n} = \frac{Z^2Pq}{d^2} \qquad \mathbf{n} = \frac{1.96^2 * 0.50 * 0.50}{0.05^2} \qquad \mathbf{n} = \frac{0.9604}{0.0025} = 384.16 \quad \text{Therefore, } \mathbf{n = 384} \text{ Persons}$$

n = adjusted Sample size, where n_o is calculated sample size 384, N= the population of sample 501.

$$n = \frac{n_o}{1+\frac{(n_o-1)}{N}} \qquad n = \frac{384}{1+\frac{(384-1)}{501}} \qquad n = \frac{384}{1.7645} = 217.63 \qquad n = 218$$

Therefore, the minimum sample size required for the study is 217.63, and the study sample size = 218. Therefore, anticipating a response rate of 95%, the minimum sample size required for the study is = 218/0.95=230. the study adjusted sample size = 230.

Data Collection

The Semi-Structured questionnaire was used to interview the human health and veterinary professionals. Before data collection, three research assistants were oriented on the purpose of the study, methods of data collection and how to fill the questionnaires [3]. This was done by the researcher to ensure quality field operation all assistants are fluent in Lozi and English and interpreted the questionnaire in Silozi (the local language spoken

in the study area) for participants who were not comfortable with the English language. The questionnaires were administered by the researcher and the research assistants to the participants.

Outcome Variable

Knowledge of Surveillance

To determine the binary outcome variable, data on questionnaire was coded 0 and 1 for "No" and "Yes" in MS excel to establish whether the participant had knowledge of anthrax surveillance "Yes" or "No". A practitioner was classified as having Knowledge if they could define disease surveillance two of the three components of surveillance as well as if they are aware of anthrax disease, aware of the 3 types of anthrax, name at least one way it can be transmitted into humans and animals and identify the symptoms in humans and animals , while "No" meant being unable to name at least less than two of the mentioned components and failure to define anthrax.

The questions about anthrax and 3 components from which the outcome variable was generated are: Aware about disease surveillance, Surveillance components Systematic collection, Analysis, Dissemination to allow action and Definition of anthrax, main types of anthrax, transmission in humans, transmission in Animals, signs and symptoms animals with anthrax, signs and symptoms in people with anthrax.

Attitude and Practices Assessing Variables

willingness to participate in a routine sentinel surveillance system on a continuous basis, willingness to participate in a pilot sentinel surveillance system for Notifiable diseases, best reporting practices in surveillance, what diseases to be recorded in the system, perception about reporting system in general, preferred government agency to report to, reporting method that you would like to use the most? (Paper or electronic) and how frequent is data reported.

Assessing Surveillance Practices Variables

How often is community mobilisation on surveillance conducted, how often do supervisors visit, do you conduct emergency response simulation activities? Have you done community risk mapping activities, Capabilities of laboratories, Availability of protective clothing, vaccines, anthrax surveillance training.

Data Analysis

Descriptive statistics such as frequencies and proportions were used to summarize the variables. The logistic regression model was used for knowledge of surveillance variables in the process. A p-value of less than 0.05 at the bivariate and multivariable logistic regression analysis was considered statistically significant and odd ratio at 95% Confidence Intervals were used in the study. Data collected from Semi-Structured questionnaire was edited, cleaned, and entered into an MS excel sheet and exported to a Statistical Package for Social Science (SPSS) version 26 for further analysis.

Ethical Consideration

Ethical approval (REF. No. 2008-2021) was obtained from the University of Zambia Biomedical Research Ethics Committee (UNZABREC) Permission to conduct the study was obtained from the National Health Research Authority (NHR) as well as the Ministry of Health through the Provincial Health Director and District Health Directors from the districts. Participation in this study was based on voluntary, informed consent. Participants were informed that they could withdraw from the study at any time and that it did not have an effect on the services they got from the health facilities and departments.

Results

Table 1 shows the profile of the 203 participants, which included 94% health care workers and 12 6% veterinarians. A majority of the respondents were males 66%. The majority 82% held a college graduate Degree/Diploma. The share of postgraduate practitioners was the lowest 2%. The mean duration of practice was 34 years (SD 8.3). A total of 36% practitioners had 10 or more years of experience, 35% between 5 and 9 years, and 29% less than 10 years. The majority of respondents 49% were from Senanga district.

Table 1: Background characteristics of respondents

Variable	Respondents (n)	Percentage (%)
Age		
20-29	75	37
30-39	77	38
40-49	38	19
50+	13	6
Age: Mean (Std. dev.)	34 Years	(SD 8.3)
Sex		
Male	134	66
Female	69	34
District		
Senanga	100	49
Nalolo	40	20
Shangombo	63	31
Service Unit		
Administration	18	9
Surveillance	34	17

Laboratory	16	8
Medical	96	47
Pharmacy	10	5
Support Staff	17	8
Veterinary	12	6
Type of Profession		
Health	191	94
Veterinary	12	6
Qualification		
High School Certificate	32	16
College Graduate Diploma/Degree	166	82
Postgraduate	5	2
Years of experience		
<5	58	29
5-9	71	35
10+	74	36

Diagnostic and Treatment Surveillance Practices Capacities of Facilities

Table 2 presents the surveillance capacities among facilities in Western Province. About 55% of the facilities had electricity, and 85% of facilities had a backup. All facilities had a phone (landline or cell phone) and internet. About 80% of facilities had general practitioners and specialists available. Regarding laboratory Capability practices, only 50% of facilities had a laboratory. 90% of the total facilities did not provide x-ray diagnostic while only 10% conducted x-ray diagnostic. About 90% of facilities offered RDT, and 80% of facilities did not have IPD capabilities. While 85% of facilities always maintained patient registers, only 48% of facilities had a data clerk.

All facilities (100%) reported having the capacity for anthrax diagnosis based on clinical symptoms, and all reported being able to provide treatment for anthrax. However, only 2 (10%) reported having the capacity for laboratory confirmation of anthrax diagnosis. In terms of referral or treatment of anthrax cases, 55% of facilities reported treating anthrax cases on site.

Table 2: Surveillance capacities of facilities in Western province

Response	Frequency n (%)
ZESCO Electricity	
Yes	11 (55)
No	9 (45)
b) Electricity Backup	
Yes	17 (85)
No	3 (15)
Photocopier	
Yes	17 (85)
No	3 (15)
Phone (landline or cell phone)	
Yes	20 (100)
Computer	
Yes	16 (80)
No	4 (20)
Internet	
Yes	20 (100)
Maintain patient registers	
yes, always	17 (85)
no	3 (15)
Data Clerk	

No	12 (52)
Yes	11 (48)
laboratory	
Yes	10 (50)
No	10 (50)
X-ray	
Yes	2 (10)
No	18 (90)
RDT	
Yes	17 (85)
No	3 (15)
IPD	
Yes	4 (20)
No	16 (80)
Anthrax Diagnosis	
Yes	20 (100)
Anthrax clinical symptoms	
Yes	20 (100)
Anthrax Treatment referral or treat	
Treat	11 (55)
Referral	9 (45)
Anthrax Laboratory confirmation	
Yes	2 (10)
No	18 (90)

OPD: Outpatient department, IPD: Inpatient Department, RDT: Rapid Diagnostic Tests

Knowledge of Surveillance of the Respondents in Relation to Demographic Characteristics

The data on Table 3 reveals a significant association between age and knowledge levels (p= 0.011), with the 20-29 age group displaying the highest proportion of respondents with knowledge. Similarly, district location is a significant factor (p = 0.001), as respondents from Senanga exhibited a notably higher proportion of knowledge compared to Nalolo and Shangombo.

The service unit also demonstrated a significant relationship with knowledge (p = 0.002), with medical and surveillance units having higher proportions of knowledgeable respondents. Qualification was also associated with knowledge levels (p= 0.038), with graduates exhibiting a higher proportion of people with high knowledge levels compared to those with certificates

Table 3: Knowledge of surveillance of the respondents in relation to Demographic characteristics

Characteristic	Knowledge on Surveillance		Total	P-Value
	Yes	No		
Age				
20-29	72 (35%)	3 (1%)	75 (37%)	0.011
30-39	70 (34%)	7 (3%)	77 (38%)	
40-49	29 (14%)	9 (4%)	38 (19%)	
50+	12 (6%)	1 (0.5%)	13 (6%)	
Sex				
Male	121 (60%)	13 (6%)	134 (66%)	0.551
Female	62 (31%)	7 (3%)	69 (34%)	
District				
Senanga	98 (48%)	2 (1%)	100 (49%)	0.001
Nalolo	40 (20%)	0 (0%)	40 (20%)	
Shangombo	45 (22%)	18 (9%)	63 (31%)	

Service Unit				
Administration	18 (9%)	0 (0%)	18 (9%)	0.002
Surveillance	34 (17%)	0 (0%)	34 (17%)	
Laboratory	16 (8%)	0 (0%)	16 (8%)	
Medical	85 (42%)	11 (5%)	96 (47%)	
Pharmacy	9 (4%)	1 (0.5%)	10 (5%)	
Support Staff	11 (5%)	6 (3%)	17 (8%)	
Veterinary	10 (5%)	2 (1%)	12 (6%)	
Type of Profession				
Health	173 (85%)	18 (9%)	191 (94%)	0.335
Veterinary	10 (5%)	2 (1%)	12 (6%)	
Qualification				
Certificate	25 (12%)	7 (3%)	32 (16%)	0.038
Graduate Diploma/Degree	153 (75%)	13 (6%)	166 (82%)	
Postgraduate	5 (2%)	0 (0%)	5 (2%)	
Years of experience				
<5	55 (27%)	3 (1%)	58 (29%)	0.238
5-9	61 (30%)	10 (5%)	71 (35%)	
10+	67 (33%)	7 (3%)	74 (36%)	

SD, standard deviation *p < 0.05

Preferences and Attitudes Towards Anthrax Surveillance Reporting.

Table 4 shows that about 77% preferred paper-based reporting, while 17% preferred digital reporting and 6% indicated a preference for both reporting methods. The other preferred diseases to be recorded were 47% of the participants indicated they preferred Covid-19 to be recorded in the system, followed by Rickettsiosis with 22%. 20% chose to record only zoonotic anthrax, and 3% chose Ebola. Additionally, respondents 8% did not provide any response to the question.

37% indicated that the surveillance system is convenient, while 20% found it inconvenient. 36% indicated that they were not familiar with the system, and 8% were neutral.

On government agency to repot to 64% indicated that their preferred government agency for reporting anthrax surveillance is the DHO, followed by CIDRZ with 8%, and ZNPHI with 3%. Only 4% chose MOH as their preferred agency for reporting. The PHO and CDC were the least preferred options with 11% and 3% responses, respectively. Additionally, 8% were neutral and did not indicate a preferred agency.

Table 4 displays 27% indicated that they prefer to use the internet as their reporting method, 15% preferred to use a telephone cell phone. A majority of the respondents 58% did not prefer a reporting method.

Table 4: Preferences and attitudes towards anthrax surveillance reporting. in shangombo, nalolo and senanga districts.

	Response	Frequency
What do you think is the best way of reporting in surveillance	Digital	34 (17)
	Paper Based	157 (77)
	Both	12 (6)
What other diseases do you want to be recorded in the system	Covid 19	96 (47)
	Ebola	6 (3)
	Rickettsiosis	45 (22)
	Zoonotic anthrax s only	40 (20)
	No response	16 (8)
How do you feel about the system in general	Convenient	75 (37)
	Inconvenient	40 (20)
	Not familiar with the system	72 (36)
	Neutral	16 (8)
Which is your preferred government agency you would like to report to	DHO	130 (64)

	PHO	22 (11)
	MOH	8 (4)
	CIDRZ	16 (8)
	ZNPHI	6 (3)
	CDC	5 (2)
	Neutral	16 (8)
If you can choose, what is the reporting method that you would like to use the most?	Telephone Cell phone	30 (15)
	Internet	55 (27)
	No preference	118 (58)

DHO: District Health Office, **PHO**: Provincial Health Office, **MOH**: Ministry of Health, **CIDRZ**: Centre for Infectious Disease Research in Zambia, **ZNPHI**: The Zambia National Public Health Institute, **CDC:** Centres for Disease Control and Prevention

Table 5 indicates that out of the 203 participants, 84% were willing to participate in the surveillance system on a continuous basis, while 8% participants were not willing and another 8% were neutral. The willingness of participants towards participating in a pilot sentinel surveillance system for notifiable anthrax. 77% were willing to participate, 15% were not willing, and 8% were neutral.

Table 5: Surveillance Attitude participate in a routine sentinel surveillance system.

Indicator	Response	Frequency
Are you willing to participate in a routine sentinel surveillance system on a continuous basis	Willing	171 (84)
	Not Willing	16 (8)
	Neutral	17 (8)
Are you willing to participate in a pilot sentinel surveillance system for Notifiable Diseases?	Willing	156 (77)
	Not Willing	31 (15)
	Neutral	16 (8)

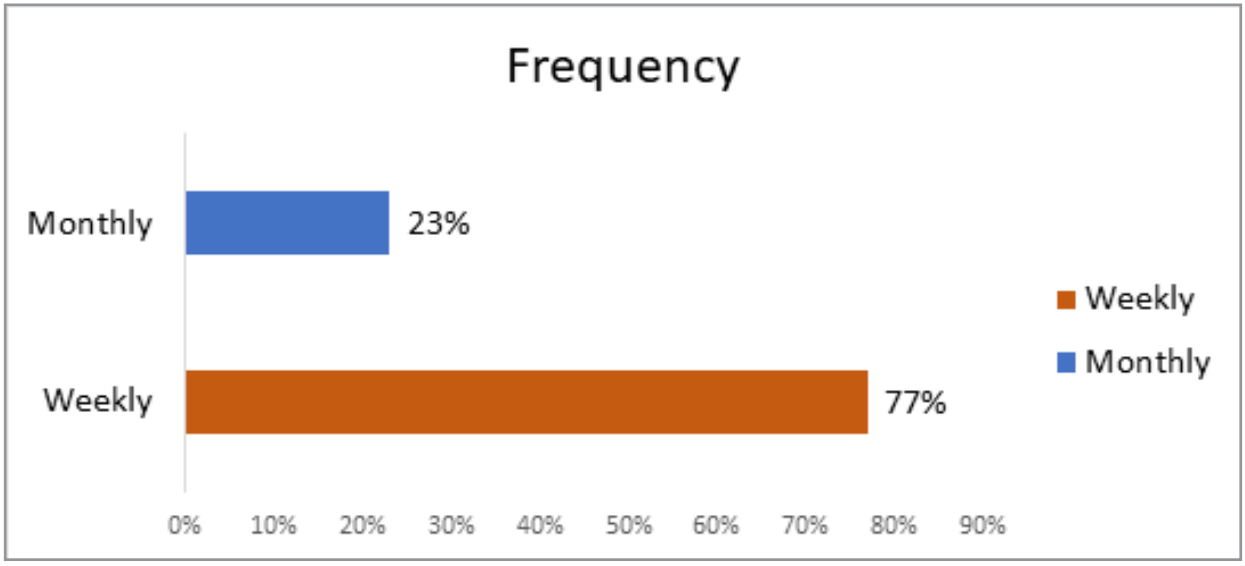

Figure 1: shows that over 77% reported data on a weekly basis, while 23% reported on a monthly basis.

Predictors of Knowledge of Anthrax Surveillance Among Veterinary and Health Professionals

In this study, Knowledge of anthrax surveillance is associated with several socio-economic and demographic factors. However, to assess the contribution of all these factors to the overall variance, multifactorial logistic regression analysis was used to control for confounding. Table 6 shows the final multifactorial regression. After adjusting for the effect of other factors, Health and Veterinary professions with Postgraduate qualifications had higher odds knowledge than with Graduate Diploma/Degree and Certificate qualifications P-Value = 0.004 (OR = 1.22; 95% CI: 0.15, 9.61). Additionally, being in the Nalolo district locality was associated with slightly higher odds of knowledge of anthrax surveillance P-value= 0.001 (OR = 1.08; 95% CI: 0.30, 3.89)

compared to Senanga, but Senanga district's association was not statistically significant.

Professionals working in Surveillance, Laboratory, and medical service units showed significantly higher odds of having knowledge towards anthrax surveillance compared to those in Administration (the reference category). Health professionals were thirty-two times more likely to be knowledgeable in anthrax surveillance with significantly higher odds compared to veterinary professionals P-Value= 0.011 (OR=32.05; 95% 4.256, 85.53).

Table 6: Adjusted multifactorial Logistic regression analysis of predictors of Knowledge towards anthrax surveillance.

Variable	Sig. P-Value	OR (95% CI)
Age		
20-29		1
30-39	0.056	0.43 (0.12, 1.50)
40-49	0.749	0.43 (0.098, 1.91)
50+	0.069	1.17 (0.14, 14.57)
Years Of Experience		
<5		1
5-9	0.324	2.00 (0.55, 7.28)
10+	0.077	0.94 (0.27, 3.29)
Qualification		
Certificate		1
Graduate Diploma/Degree	0.041	0.58 (0.073, 4.55)
Postgraduate	0.004	1.22 (0.15, 9.61)
District		
Senanga		1
Nalolo	0.001	1.08 (0.30, 3.89)
Shangombo	0.731	2.01 (0.56, 7.15)
Service Unit		
Administration		1
Surveillance	0.002	19.82 (4.06, 96.78)
Laboratory	0.035	19.39 (2.63, 142.93)
Medical	0.098	47.79 (3.08, 56.09)
Pharmacy	0.217	4.76 (0.40, 56.57)
Support Staff	0.481	3.51 (0.11, 114.80)
Veterinary	0.661	0.54 (0.03, 8.77)
Type of Profession		
Veterinary	0.988	1
Health	0.011	32.05 (4.256, 85.53)

Discussion

The current study applied a broad concept in terms of knowledge, attitude, and practices of anthrax surveillance among veterinary and health professionals in senanga, Nalolo and Shangombo District of Western province Zambia. The study provides an opportunity for future research, as well as efforts focused on prevention, control, and surveillance of human and animal anthrax within the study area and throughout Zambia.

In this study, the social-demographic characteristics of participants revealed that 66% were males and 34% females. Even though the Zambia Demographic survey shows that the proportion of males and females are almost similar, there were a significantly higher number of males than female respondents in this study [10].

Most respondents fall in age between 30-39 years of age (38%); this result was in line with the actual country's demographics data, which infers about (31%) of the total population categorized between 30-39 years of the working-age group [11].

Regarding employment/occupation, most respondents were Health care workers (94%); this is similar to the fact that there is a disparity between health workers and veterinary workers. The labour force engaged in the agriculture, forest and fisheries sector was about 11% of their respective population of formal sector employment as compared to 76% of Human health social work activities [11].

The majority of respondents had some College Graduate Diploma/Degree (82%), this is in line with a study conducted in Ethi-

opia which shows that (100%) of the professional's health and veterinary population had Diploma and above [12]. It might be due to most participants involved in this survey were professionals in formal employment.

The district with the most professionals interviewed was senanga district (49%). Similarly, according to the Population of the country, senanga has a bigger population than the nalolo and shangombo [13]. It indicates that heath and veterinary workers are employed based on the population of the area.

Knowledge

The study findings show that current knowledge of human and animal anthrax surveillance varies among different categories of Health and professionals and socio-demographic factors. In this study, the overall knowledge level of professionals who knew the (definition of disease surveillance, name two of the three components of surveillance, aware of the 3 types of anthrax, name at least one way it can be transmitted into humans and animals and identify the symptoms in humans and animals of the anthrax) was 90%.

Hence, compared to other similar studies conducted on the Southern Ethiopia 91%, the result found to be very similar but slightly higher than the studies conducted in Zambia 88%, Zimbabwe 72%, Kenya 78% [12-16]. These variations might be due to in the current study area; both human and animal health professionals had more experience of anthrax surveillance and had better access to information of the disease.

Generally, this study revealed that Human health professionals (90.6%) better understand Surveillance than Veterinary professionals (83.3%) this could be due to Health professionals having a public health department as well as having better education in case-based surveillance than veterinary professionals. In comparison with other similar studies conducted in Kenya to assess KAP of anthrax respondents revealed that the proportion of them (81.6%) had knowledge on the prevention and (88%) transmission less when compared to this study. This is due to a larger sample size of community health workers in the study as compared to ours [16].

Attitude and Practices

However, medical and veterinary professionals have a good to moderate attitude towards the harshness of the disease around their locality, (84%) are willing to participate in a routine sentinel surveillance system on a continuous basis and (77%) were willing to participate in a pilot sentinel surveillance system for Notifiable Diseases.

On the contrary, the study shows that only (17%) are willing to use the Digital method and (58%) of respondents are not interested in using the internet or mobile phone to collect and report data. A study conducted in Zambia highlight the delayed process of having to send all the paper-based data to the District Health Information Officer to enter in the DHIS II when it is already at the facility this has contributed to the moderate attitude in surveillance as compared to knowledge. This is not in line with the Guidelines set by western African countries in response to recent public health crises, new digital approaches to disease surveillance have emerged to accelerate the transfer of epidemiological data and increase countries' preparedness for future outbreaks [17, 18]

Knowledge, Attitude and Practices

In the current study, about 36% of respondents said that they were not familiar with the surveillance system, this is almost similar with a study conducted in Kenya (19) where Nearly a half (50%) of respondents either disagreed or strongly disagreed that the methods for NTDs surveillance data collection were simple.

This can be attributed to the fact that most personnel at the facility are not conversant with surveillance the cadres are mostly nurses and clinicians with little or no knowledge lack of data clerks also contributes on lack of surveillance practices. In this study (52%) of the facilities do not have data clerks, this is supported by study conducted in Malawi which entails that Health facilities often have inadequate personnel to handle the collection of accurate HMIS data [20].

Clinical staff, such as nurses and medical assistants, are burdened with the responsibility of data collection due to the lack of statistical clerks. This puts pressure on them as they are already overworked with their primary duties of attending to patients.

Only (20%) preferred recording and reporting anthrax , in spite of this (85%) have stated that they always maintain up to date patient registers and (77%) report weekly. This is supported by even though only 77% report 100% need to report weekly as a guideline for IDSR reporting [21, 8].

Only (80%) have computers, a study in India demonstrated concern on lack of computers it stated that the availability of a computers at the facility was a predictor of the respondents' willingness to participate in surveillance activities which is a predictor of attitude [22]. Only (55%) of Facilities are able to treat anthrax the rest referrer, only (10%) of the facilities are able to perform anthrax Laboratory confirmation, only (55%) had ZESCO electricity. When facilities do not have electricity and are also unable to treat Anthrax, they tend to abandon surveillance as well.

Conclusion

The study found that while the majority of health and veterinary professionals in Shangombo, Nalolo, and Senanga districts in western Zambia had knowledge of disease surveillance, there were still gaps in their practices and reporting [23-25].

Factors such as age, district, service unit, and qualification influenced knowledge, while only two variables were found to influence attitude towards participation in a routine sentinel surveillance system. Despite limited knowledge, the majority of respondents agreed on the importance of disease surveillance for improving human health in the district, with a focus on zoonotic diseases and Covid-19 [26-30].

Study Limitation

The study was conducted in an area with frequent outbreaks of anthrax. The results, therefore, may not be generalised to areas with low or no anthrax outbreaks. Anthrax has reached an endemic stage in the study area, and the last severe outbreak happened four years ago; therefore, this might have introduced reporting recall bias [30-35].

The questionnaire targeted health and veterinary professionals who have been residents of the study area for more than a year

to provide information on Knowledge, attitudes, and Practices. The health professionals' views will not necessarily represent all health and vet professionals; therefore, the results may not accurately represent the views of others. Additionally, it's important to note that the sample size was 230, but only 203 were interviewed [36-40].

This raises concerns about the sample's representativeness and the findings' generalisability. Overall, while the study provides valuable insights into the knowledge, attitudes, and practices of health and veterinary professionals in the study area, its limitations must be considered when interpreting the results [41-45].

Declarations

Author Contributions

RN, and WN conception and design of the study. WN data analysis and drafting the article. WN interpretation of data. WN, RN, TH, and MM revising the article for critical intellectual content. WN, RN, TH, and MM approval of the final version [46-56].

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Conflict of Interest and Funding

The author(s) declare that they have no conflict of interests.

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Ethics Declarations

Ethics Approval and Consent to Participate

This study was approved by the Research Ethics and Science (ERES) Converge committee (Reference number: 2008-2021) in Zambia. Consent from participants was obtained as the study used Primary data and hence had direct contact with study participants. Permission to use the Ministry of Health data was sought from Western Provincial Health Office, and District Health Offices for Nalolo, Senanga and Shangombo Districts. Approval to conduct the research was obtained from the National Health Research Authority (NHRA).

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