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Utilization Factors Associated with Brucellosis Surveillance Data Management among Animal Health Workers in Nairobi County, Kenya

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Abstract

Background: Brucellosis is a re-emerging neglected zoonotic infection but data on prevalence is scanty and surveillance system underdeveloped in Nairobi. Quality reliable data information essential prevention of and control of the disease. According to World Health Organization Data Management, dissemination and use usually inadequate. This study objective was to determine the level of Brucellosis Surveillance data management. Competencies, Data sources, use and data available surveillance tools for Brucellosis among animal health workers Nairobi County Kenya.

Method: An instituted based cross section was undertaken from October 10th to November 7th 2019 among animal health workers deployed in Nairobi County. A sample of 101 participants was used. Self-administered questionnaire was used for data collection. Data was entered into MS Excel and analyzed using SPSS versus 20 packages relevant population variables were described using Descriptive Statistics: while Bivariate logistic regression was carried to demonstrate the effects of independent variables on the dependent variable.

Results: Data utilization was very low. Only a fifth of the study population (24%) used the data they collected in their daily work. The level of supervision was found to be very low.

Conclusion: Data Management knowledge competencies were found to be low especially for data analysis and data interpretation: Training on data management was not extremely low. Availability of reporting formats, computers were important in data management resource; supervision is necessary to improved surveillance data management. Knowledge, practice and data utilization among animal health workers in Nairobi.

Keywords: Zoonosis; Data management; Animal health workers; Data utilization

Introduction

Sound Public Health decisions depend on available, reliable and timely data. The role of Public Health Surveillance is to systematically and continually collect, analyze dissemination and use of such data for sound health action. Individual health workers and community members require this information for clinical management of cases and assessment of effectiveness of public services. This information is also useful for senior health managers and policy makers in formulation of effective strategies of programs. Brucellosis has been considered eliminated in many countries but remained a problem of pastoral communities where raw dairy and meat products are consumed. The problem has re-emerged in non-endemic areas including urban settings. The government of Kenya gazetted Brucellosis as a notifiable since 2011 and lives others developing countries have been strengthening surveillance system for zoonosis. Animal health workers are the first line contacts with animals and the community responsible for Animal and Public Health services delivery. They play a vital role that focuses on animal disease surveillance and prevention. Nairobi has Brucellosis an important notifiable zoonosis, 100 animal health workers are deployed to over animal health and public health services field. They are expected to collect process and report to. In Africa, data remains scanty and it use weak particularly at field level (Counties and sub counties). Data Management Competencies such as data collection analysis, interpretation and dissemination are important factors. Appropriately trained workers with analytical, statistical and technological skills are crucial in improving data management practice.

Though no study has been conducted on Brucellosis. Surveillance data management. A study conducted in Ethiopia showed lack of knowledge in surveillance system, poor competencies in data management especially data analysis contribute to poor data management practice and scanty information [1]. Although data management knowledge and practice is critical in use of information by health workers in their routine work decisions; no previous Brucellosis Surveillance Data Management knowledge and associated factors in Nairobi [2]. This study will therefore have an important input to government program managers for designing surveillance systems and preventive programs. In addition to that, evaluation of such programs will be useful in fine tuning. Public health interventions and information from this study will serve as a baseline for further studies.

Methods

Institutional cross-sectional study was conducted from September 6 to October 13 2019 among animal health workers who were deployed in Nairobi County. The study area is the County of Nairobi Kenya. The county covers 969 square kilometers. Ranging from Peri-urban to urban zones and is constituted of 17 sub-counties. There are 101 workers (animal health workers deployed in the county. All 101 workers participated in the study. (By considering the known prevalence of Brucellosis in the neighboring county. Sample size of 81 calculations was obtained using a chrome formula. However, all 101 workers were recruited by considering knowledge on prevalence of 50% since no previous study had been conducted, anywhere, non-response rate. Structural questionnaire was administered to collect data since the study was only conducted in Nairobi. No standard questionnaire was available. The questionnaire used was developed using the animal health workers profile; the questions were grouped into data source, knowledge and utilization.

Operational definition

Good knowledge: animal health workers who indicate they understand surveillance system and tools available for Brucellosis surveillance.

Poor knowledge: Animal health workers who are not aware of existence of surveillance, or tools available.

Good practice: Animal health workers who use data management tools frequently.

Data management knowledge

Refers to specific know how or skills of the processes of collection entry, analysis, interpretation and where to report results. Refers to ability to collect, enter, analyze and disseminate data using technological skills.

Data management practice

Refers to routinely carrying out of data gathering and management activities and data updating, data storage, compiling of minutes, compiling of reports. Audit reports-send reports. Data was cleaned and entered into SPSS Version 20 for analysis; Percentage frequencies and summary statistics were mainly used to describe study population characteristics in relation to relevant variables.

Bivariate logistic regression

The effect of independent variable Bivalent logistic regression was computed. The strength of association was indicated by odd ration and 95% C.I. Computation while statistical significance considered a P-Value of less than 0.5.

Background of the study

Brucellosis is the most common zoonosis globally. Though endemic in developing countries it is neglected in sub-Saharan Africa where it causes considerable suffering of human patients and heavy productivity loses in animals [3]. Estimates of the prevalence in animals and relevant data for building effective control strategies is lacking in most countries including Kenya [1]. The data gap has been attributed to poor data management practice among animal health workers. In this region, surveillance and control programs are rarely implemented.

The global burden of brucellosis Infections is on the increase due re-emergence in developed countries and neglect by health systems in developing countries [4]. This is complicated by rapid global urbanization trends. Urbanization offers more choices and opportunities such as employment, better housing and education among others benefits.

Sub-Saharan Africa is the most rapidly urbanizing region in the world. It is estimated that by 2030, 70% of the world population will be residing in the cities [5]. However, assured urban advantage in developing countries; raise many challenges including infections and zoonotic diseases which cannot effectively be tackled due to poor access to health services including disease surveillance and control programs) [5]. This is because of mismatch between rapid urban growth and government's inability to provide basic services including health for both human and animals.

To meet their food and livelihood needs urban people share housing with animals and practice agriculture in congested and contaminated environment. Human populations are therefore exposed to Brucella pathogens shed from tissues and milk of infected animal continuously and thereby raising the incidences of infections (Merck veterinary manual) [6]. The situation is made worse by inadequate public awareness and failure of surveillance systems and control programs [7].

Therefore, disease burden remains undetermined or under-estimated due to scanty and unreliable data. The lack of reliable and appropriate quality data has led to neglect and low disease prioritization among developing countries including Kenya [8]. The unavailability of sound quality data in Nairobi County, Kenya and developing world is associated with poor performance of surveillance systems, underreporting of cases and poor data management by field health workers. A systematic review of studies and publications in Kenya over the last century revealed huge gaps in disease metrics and data due to poor data management practices among professionals [9]. The practice of good data management among health workers is a key pillar in providing reliable quality data essential for decision making regarding brucellosis control both at local service delivery and at policy-planning levels.

Despite its high burden in low-income countries, brucellosis is classified as a neglected zoonosis and does not attract attention of health systems [4]. Therefore, disease prevention and control strategies are almost non- existent due to weak disease surveillance systems and scanty data necessary for planning interventions since the disease is grossly underreported [10]. The first case of brucellosis was recognized in Kenya in 1916 but a systematic literature review study of 36 publications indicated that data on brucellosis disease burden estimates, prevalence, reporting frequencies and potential risk factors is not available, an indication that data management practice and data utilization is wanting [9].

According to Menashe-Oren A, et al. [4] Nairobi which has over 100 slum settlements has 10% excess mortality and disease burden. The surge in disease burden is associated with zoonotic infections including brucellosis. The rise in Brucellosis infections is attributed to the increased trade and consumption of raw milk and milk products in urban settings and inadequate public health action arising from insufficient and unreliable health data.

A country Surveillance system for the disease exist since 2011 when it was gazette among notifiable diseases and field staff trained on data management and reporting This is a regional commitment in line with Greater Horn of Africa (GHOF) Standard Methods and Procedures (SMPs) for control of Brucellosis. Since then, no evaluation of staff performance has been done in urban settings. Effective prevention and control strategies require understanding the epidemiology of the

disease including its prevalence, incidence and other relevant data. However, this information is missing since field health personnel lack data management knowledge and the capacity to use surveillance data [11].

Surveillance is referred to ongoing orderly gathering, analysis, clarification, and timely sharing of health-related information that can assist health professionals to plan, implement and evaluate health related programs and intervention. Surveillance is an essential function of veterinary and human health system. The function of Public Health Surveillance is to assist in detecting disease, occurrence of health events and designing health related intervention. It is also important in assessing the extent of injuries disease spread and distribution of illness. Surveillance plays an important role in planning, implementing and evaluating public health prevention and control programs. In simulating research, it helps to trace natural history of disease and generation of hypothesis [12].

In recent global pandemics, emerging and re-emerging health problems and diseases such as Rift Valley Fever, Hemorrhagic viral Fevers, Ebola, Respiratory Viruses among others underscore the importance of efficient surveillance and response systems throughout world. The ever-increasing threats of bioterrorism to the health security and economic stability globally have also revitalized the role of public health surveillance among international communities. The role of surveillance systems in national and international health security is important in providing early warning systems for disease outbreaks as well as acting as a basis for planning required responses.

Concerning the World Organization for Animal Health (OIE) Animal disease management guidelines, Member countries are required to report on notifiable diseases in transparently and in good time to facilitate global disease management. The status of animal health of each country concerning animal illnesses must include zoonosis ("A new OIE guide to better surveillance and detection of health risks related to animals," 2011). The OIE produces a list of notifiable aquatic and terrestrial Zoo noses that must be reported by each member country. The list includes a wide range of the zoonotic diseases like Rift Valley Fever, rabies „anthrax and brucellosis ("A new OIE guide to better surveillance and detection of health risks related to animals,") Countries have to achieve disease free status for brucellosis when the infection rate for cattle does not go beyond 0.2% of cattle flocks [13].

Good surveillance, availability of accurate and reliable data is critical to formulation, implementation and evaluation of effective public health actions. The capacity to generate these data depends on the level of knowledge practice and regular use of data among health personnel at all stages of a health system. Studies conducted to evaluate monitoring and surveillance data quality in vaccine preventable disease programs across Africa have revealed major data gaps [14,15]. Kenya has been implementing field-based brucellosis syndrome surveillance since 2011 when the disease was gazette as Notifiable.

Pemba SK, et al. [16] reported that 1.1% of raw milk in Dagoretti tested positive for *Brucella abortus,* Nairobi County Official records indicate that 3696 persons were treated for brucellosis Nairobi Public Health facilities, in 2014, while only 5 animal cases were recorded in the County Veterinary Department. Animal handlers [17] base animal cases on mandatory abortion notification. The number of animal brucellosis cases is extremely small as compared to those of humans captured at various Health facilities. Farmers and animal keepers are required to report every abortion case for investigation by animal health workers thus animal case reports will depend on goodwill of individual farmers. Cases are missed, usually misdiagnosed, under-reported or not reported at all [18]. The animal health workers are first point of contact with animals and animal handlers. They are directly responsible for animal related disease surveillance data management including brucellosis. Animal health workers like other health professionals require appropriate data management skills and organizational support in order to generate, analyze, disseminate and make use of data for public health action [19].

However, studies to assess levels of data management knowledge practice and data use among animal health workers and associated factors have not been undertaken in Kenya or Nairobi. The aim of this study is to assess level of data management knowledge, practice and factors that are associated with brucellosis surveillance data management knowledge practice and data use among animal health workers in urban settings of Nairobi County. The study findings will be used to improve performance of surveillance system and provide quality data essential for effective public health action.

Introduction

This section will present the analysis of the study data.

Study response

All the 101 questionnaires administered to the respondents were completed giving a response rate of 100%. According to Mangiestu AS, et al. [1], any response above 70% is excellent for statistical analysis and reporting.

Association between social demographic characteristics of data management practice: The statistical analysis in this section were informative, descriptive and was on demographic of animal health workers that included gender, age, marital status, level of education, years of service and department. As shown as in table 1 below. In terms of station of work 20% were stationed at the facility, 8% were at laboratory service, 46% were at ward level, 5% were stationed at the county headquarters while 21% were stationed at the Sub-counties. The animal health workers interviewed consisted of 52% Male consisted of and 48% females. In terms of age distribution, majority of the animal health workers were above 50 years (55%), those who were between 40 and 49 years were 37. Those who were between 30 and 39 years were 6%. The least group consisted of those who were between 20 and 29 years and they constituted 2% of the total respondents.

In terms of age distribution of animal health, workers among degree holders' majority 12 out of 28 respondents representing 43 percent were above 50 years 13 (46%) respondents were between 40 and 49 years. Those between 30 and 39 years were 2 respondents. Only one respondent who had a degree was below 29 years. As shown in figure 1 below:

The respondents in the study consisted of singles (13%), married (71%), separated (15%) and divorced (1%).In terms of education level all the respondents majority of the respondents held either certificate or diploma qualification (72%) .Those who had reached university level of education constituted 28% of the respondents. Those who were in the range of 21-30 years constituted 43% and those who had worked for more than 30 years constituted 47. Those who had worked for less than 10 years constituted 5% of the sample while those who had worked between 11 years and 20 years constituted 6% of the respondents. The departments that the respondents belonged were Disease control (66%), extension services (5%), and public Health (10%), food Safety (10%), laboratory services (8%), clinical services (1%). Social demographic characteristics associated with brucellosis surveillance are summarized in table 1 below.

Table 1: Demographic characteristics associated with brucellosis surveillance data management practice.

	Details	Frequency	Percent	Significance (P-value)
Station	Facility	25	25	p<0.001
	Laboratory Service	11	11	p<0.001
	Ward	41	41	p<0.001
	County Headquarters	4	4	p<0.001
	S/County	21	21	p<0.001
Gender	Male	53	52	p<0.001
	Female	48	48	p<0.001
Age	20-29	2	2	p<0.001
	30-39	6	6	p<0.001
	40-49	37	37	p<0.001
	50 & above	56	55	p<0.001
Marital Status	Single	13	13	p<0.001
	Married	72	71	p<0.001
	Separated	15	15	p<0.001
	Divorced	1	1	p<0.001
Education Level	Primary	0	0	p<0.001
	Secondary	0	0	p<0.001
	Cert/dip	73	72	p<0.001
	University	28	28	p<0.001
Years of Service	10 and below	5	5	p<0.001
	11-20	6	6	p<0.001
	21-30	43	43	p<0.001
	Above 30	47	47	p<0.001
Department	Disease control	67	66	p<0.001
	Extension services	5	5	p<0.001
	public Health	10	10	p<0.001
	Food Safety	10	10	p<0.001
	Laboratory services	8	8	p<0.001
	Clinical services	1	1	p<0.001
	Others	0	0	p<0.001

Source: Research Findings (2019).

Data utilization

The study inquired about utilization of data a health worker collected in planning and implementing public health measures routine activities. According to the findings only 54% of the respondents reported to have used data, they had personally collected while 47 % of the respondents did not use data that they collected personally.

According to the findings about three quarter of the animal health, workers either rarely use (34%) or do not make use (42%) of data or feedback in their routine work. Only 16 % and 9% of the respondents often and seldom use data or feedback in their routine work respectively.

According to the findings majority of the activities or measures routinely planned and implemented by animal health workers involved data dissemination/information sharing (68%), collection of samples (68%) and vaccination of animals (65%). The study also found that animal health workers played a minimal role in planning and implementation of disease surveillance (18%), public education (32%), outbreak investigation (35%) and imposing quarantine/closure of premises (26%). When asked about what they needed to improve data utilization in their routine work, majority of the respondents cited training (98%), materials (92%), feedback (77%) and lab facilities (75%). Only 50% of the respondents considered technical supervision (50%) vital in their routine work.

According to the study, their technical supervisor visited very few animal health workers in the last three years. For instance, only 28% of the respondents were visited monthly. Out of 101 respondents 21 said they were visited quarterly and 15 were, visited annually. Those not visited at all constituted 27% of the respondents.

When asked whom they share their surveillance data 63 out of 101 respondents shared their data with farmers, Sixty four percent (64%) shared their data with veterinary public health office. Sixty nine (69%) shared their data with County veterinary centers while 59% percent of the respondents shared their data with animal clinicians (59%). The respondents scarcely shared their data with human public health office (44%), national surveillance center (14%) and ZDU (11%). Cited in the data sharing included: Livestock/meat traders, KEBS, OIE, and AUIBUR, universities, research institution, FAO, community barazas and colleagues. Data utilization is summarized in table 2 below.

Association between data utilization and data management practice

In the table Chi-Square Tests result, SPSS also tells us 27 cells have expected count less than 5 and the minimum expected count is 0.01. This means the sample size requirement for the chi-square test of independence is satisfied. The probability of the chi-square test statistic (chi-square=307.184) was p<0.001, less than or equal to the alpha level of significance of 0.05. The analysis shows that there is a significant relationship between data utilization and data management practice of animal health workers (Figure 2). Association between Data Utilization and Data Management Practice is summarized in table 3 below.

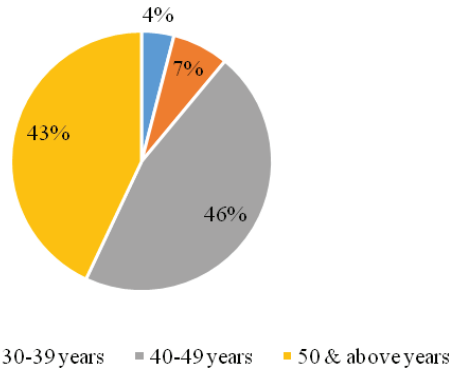

Figure 1: Age distribution of degree holders.

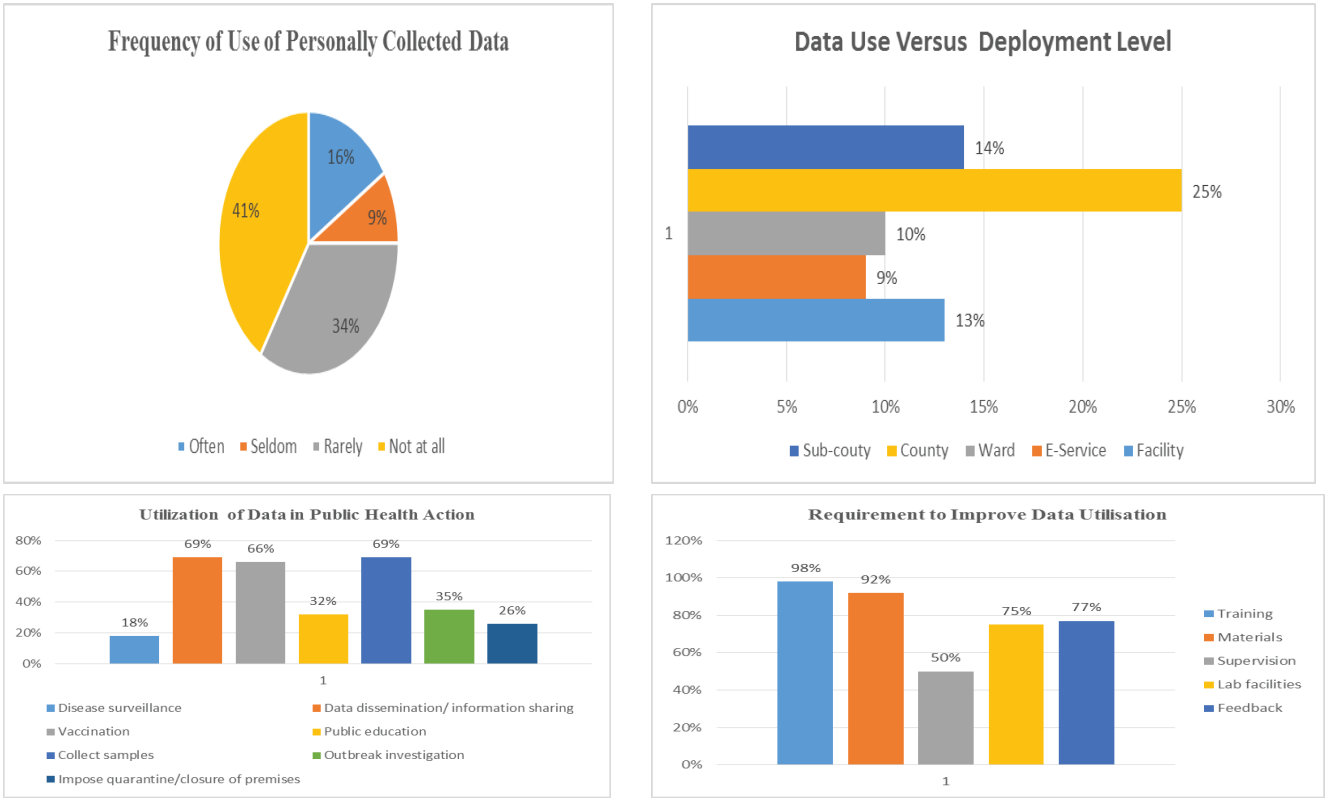

Figure 2: Significant relationship between data utilization and data management practice of animal health workers.

Bivariate regression analysis

Association between graduate level staff and whether they were trained on data management: Bivariate regression was carried out to check whether there exists any statistically significant association between respondents at graduate level staff and training on data management. The association was found to be statistically significant. The result is summarized in the table 4 below.

Association between staff above 50 years of age and whether they were trained on data management: Bivariate regression was carried out to check whether there exists any statistically significant association between respondents at graduate level staff and training on data management. The association was found to be statistically significant. The result is summarized in the table 5 below.

Association between availability of tools, frequency of use of data or feedback and frequency of visit with data management: Bivariate regression was carried out to check whether there exists any statistically significant association between respondent's availability of tools, frequency of use of data or feedback and frequency of visit. The association was found to be statistically significant. The result is summarized in the table 6 below.

Discussion

Background characteristics of respondents

The study established that male and female were nearly equally distributed in the animal health department. In addition, most workers were above 50 years of age and very few were below 39 years. Most of the animal health workers were married and very few were single, divorced or separated. In terms of level of education majority were diploma or certificate holders. Very few were degree holders. In terms of duration of service majority of the respondents were had worked for more than 20 years. The study revealed that the bulk of the workers belonged to the disease control department with very few representations of other departments. The analysis shows that there is a significant relationship between social demographic factors of the respondents and data management practice of animal health workers.

Data utilization

The study established that in order to assist them improve data utilization in their routine work what most animal health needed was training, materials, feedback and lab facilities. Supervision was the least needed. The study established that very few information from surveillance is shared with human public health office, national surveillance center and ZDU. The study revealed that nearly three quarters of animal health workers rarely use or do not make use of data or feedback in their routine work.

The study established that animal health workers were involved in planning data collection, data dissemination and vaccination but played a minimal role in surveillance, public education, outbreak investigation and imposing quarantine. The analysis shows that there is a significant relationship between data utilization and data management practice of animal health workers.

Conclusion

The study concludes that the only a very few members were trained on data management 3 years before the study was done (12%). This low level of knowledge on data management among animal health workers

Table 2: Data utilization.

	Variables	Frequency	Percent
Use of personally collected data	Yes	54	53
	No	47	47
Frequency in Use of Data or Feedback	Often	16	16
	Seldom	9	9
	Rarely	34	34
	Not at all	42	42
Public Health Measures/ Activities Routinely Planned and Implemented.	Disease surveillance	18	18
	Data dissemination/ information sharing	69	68
	Vaccination	66	65
	Public education	32	32
	Collect samples	69	68
	Outbreak investigation	35	35
	Impose quarantine/ closure of premises	26	26
What's needed to improve data utilization in routine work	Training	99	98
	Materials	93	92
	Supervision	51	50
	Lab facilities	76	75
	Feedback	78	77
Frequency of visits by technical supervisor	Monthly	28	28
	Quarterly	21	21
	Annually	15	15
	Not at all	27	27
Sharing of Surveillance Data	Farmers	63	63
	Laboratories	39	39
	Animal clinicians'	60	59
	Human Public health office	44	44
	Veterinary public health office	65	64
	County veterinary centers	70	69
	National surveillance centers	14	14
	ZDU	11	11

Table 3: Association between Data Utilization and Data Management Practice.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	307.184[a]	20	.000
Likelihood Ratio	34.897	20	.021
N of Valid Cases	102		

a: 27 cells (90.0%) have expected count less than 5. The minimum expected count is .01.

is an impediment to brucellosis surveillance. This is because the same workers are required to collect, process, analyze, interpret, disseminate and utilize data yet they were not regularly trained. Therefore, the level of data management competencies is major factor influencing data utilization. This agrees with the study carried out by Gichuki JW, et al. [20] who was studying health care practice of smoking cessation intervention with their level of knowledge. As compared to our findings he found that only 11% of the health workers were trained on smoking cessation intervention. In his conclusion, Gichuki JW, et al. [20] found out that there was a significant relationship between having received training on smoking cessation intervention with the health care providers level of knowledge and confidence in provision of smoking cessation interventions.

The study established that the frequency of visitation by the technical supervisor was generally low despite its importance. This disconnect affects the efficiency of tackling zoonotic disease. This agrees with the findings by Shagake SS, et al. [21] who found out that those Health Extension Workers (HEW) who were supervised every three months were 4 times [(AOR=4.204, 95% CI: (1.372-12.885)] more likely to have good knowledge compared to those who were not supervised. Other supervision frequencies such as every month, every six months and every one year were not significantly associated. That means those HEWs who were supervised once in every month, 6 months and every year had no significant difference in their data management knowledge compared with no supervision at all.

In conclusions, animal health workers rarely use data or feedback in their routine work that they were involved in collecting. From our finding, only 16% often use the data that they personally collected. Animal health workers stationed at County level used were the greatest users of data they personally collected (25%). This was followed by Sub-County (14%), facility (13%), ward (10%) and service (9%). This percentages show that senior management who are concentrated at the county level are the main users of the data collected as compared to the lower-level staffs who are located outside the county headquarters. This low use might affect the motivation for collecting accurate information. This finding relates to a study done by Kuyo RO, et al. [22], who reported that utilization of data within the District Health Information System 2 (DHIS2) system was affected by the hierarchical arrangement, which hindered access to the system in favor of senior officers in the organization. The study by Kuyo RO, et al. [22] also found that utilization of data and DHIS2 varied with levels top sub-county and county level managers who used the data more than the lower-level staff. The study established that in order to assist them improve data utilization in their routine work what most animal health needed was training, materials, feedback and lab facilities and to some extent Supervision This agrees with a study by Kuyo RO, et al. [22] who found out that the main challenges inhibiting the use of information in the DHIS2 for evidenced based decision-making included lack of management support, poor skills among the users, lack of adequate computers, unreliable internet connectivity, lack of power backup and resistance to change.

Recommendation

To improve data utilization in public health action the national government and County government should provide training, materials and lab facilities to animal health workers. In addition, they should be regularly supervised and given timely feedback.

Areas for further study

Further researches are needed using tools having greater observational components to ascertain timeliness and accuracy of brucellosis surveillance data.

Table 4: Association between graduate level staff and training on data management.

Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.247	0.047		5.246	0.000
Been Trained on Data Management	0.253	0.137	0.183	1.849	0.067

a: Dependent Variable: University.

Table 5: Association between staff above 50 years of age and training on data management Coefficients.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.562	0.053		10.584	0.000
Been Trained on Data Management	0.022	0.154	0.014	0.140	0.889

a: Dependent Variable: at 50 amp above.

Table 6: Association between availability of tools, frequency of use of data or feedback and frequency of visit with Data Management.

	Significance	95% Confidence Interval	
		Lower Bond	Upper Bond
Availability of tools			
Pen and paper	0.662	-0.814	0.520
Computer	0.162	-0.460	0.274
Mobile phone	0.415	-0.160	0.385
Register	0.277	-0.198	0.057
Protective clothing	0.754	-0.180	0.248
Reporting format	0.958	-0.132	0.125
Thermometer/ Stethoscope	0.458	-0.263	0.120
Frequency of use of data or feedback			
Often	0.450	-0.263	0.117
Seldom	0.663	-0.280	0.179
Rarely	0.351	-0.068	0.189
Not at all	0.396	-0.204	0.081
Frequency of visit			
Monthly	0.707	-0.133	0.196
Quarterly	0.175	-0.051	0.279
Annually	0.049	0.001	0.357

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