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Original Research Article

Association between visceral leishmaniasis awareness and diagnostic and management capacity among healthcare workers in public health facilities in Isiolo County, Kenya

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ABSTRACT

Background: Visceral leishmaniasis (VL) remains a major neglected tropical disease in Kenya, particularly in arid and semi-arid regions such as Isiolo County. Delayed diagnosis, low clinical suspicion, and inadequate awareness among healthcare workers contribute to poor disease outcomes despite the availability of effective treatment. This study assessed the association between healthcare workers' awareness of VL and their capacity to diagnose the disease in public health facilities in Isiolo County, Kenya.

Methods: Descriptive cross-sectional mixed-methods study was conducted among 243 healthcare workers recruited through a census approach from Sub-County and county health facilities in Isiolo County. Data were collected using structured questionnaires and key informant interviews. Descriptive statistics, Pearson's chi-square test, and binary logistic regression were used, with statistical significance set at $p \leq 0.05$.

Results: Moderate VL awareness was observed, with 73.3% demonstrating adequate awareness (mean score 6.03±1.678). More than half correctly identified cause (54.3%), vector (62.6%), transmission (61.7%), symptoms (59.3%), spleen involvement (67.1%), diagnosis and treatment (60.1%), and prevention (63.4%), although only 48.1% identified endemic regions. Diagnostic capacity was low, with only 37.9% of facilities demonstrating adequate capacity, while 71.2% reported poor management capacity. There was no significant association between awareness and diagnostic capacity ($p>0.05$), except organ awareness and management capacity ($\chi^2=8.294$, $p=0.040$), though regression showed reduced odds (OR=0.092).

Conclusions: Healthcare workers demonstrated moderate VL awareness, but diagnostic capacity and preparedness remained inadequate. Awareness of VL did not significantly influence diagnostic capacity, highlighting the need to strengthen training, diagnostic resources, and health system preparedness.

Keywords: Visceral leishmaniasis, Awareness and awareness, Neglected tropical diseases, Diagnostic capacity, Healthcare providers, Public health facilities

INTRODUCTION

Visceral leishmaniasis (VL), commonly known as kala-azar, is a neglected tropical disease that remains a significant public health challenge in East Africa, particularly in Kenya's arid and semi-arid regions.[1] The disease is endemic in several counties, including Isiolo, where recurrent outbreaks continue to be reported despite ongoing control efforts.[2] Recent studies in Merti Sub-County have highlighted the persistent burden of VL and

its association with socio-cultural factors that influence health-seeking behavior and disease management.[3] Furthermore, evidence suggests that inadequate community awareness and delayed healthcare utilization contribute to late diagnosis and poor treatment outcomes in endemic settings.[1] The continued occurrence of VL outbreaks in Isiolo County underscores the need for strengthened surveillance systems, improved healthcare delivery, and enhanced disease awareness among both communities and healthcare providers[2]. Given the fatal nature of untreated VL, early recognition and prompt diagnosis remain critical components of disease control and prevention strategies.

Accurate diagnosis is fundamental to effective management of VL and reduction of disease-related morbidity and mortality. However, diagnostic services in many endemic regions continue to face challenges associated with limited infrastructure, inadequate laboratory capacity, and shortages of trained personnel.[4] Strengthening diagnostic capacity through decentralization of services has been shown to improve access to diagnosis and treatment in Kenyan endemic counties.[5] Recent reviews of VL diagnostic techniques in East Africa have further emphasized the importance of healthcare worker competence in the utilization and interpretation of available diagnostic tools.[6] Advances in diagnostic technologies have improved case detection; however, successful implementation depends largely on the awareness and skills of frontline healthcare workers responsible for identifying suspected cases and initiating appropriate investigations.[7] Consequently, enhancing diagnostic capacity among healthcare workers remains a key strategy for improving VL case detection and management in endemic settings.

Healthcare workers play a central role in the early detection, diagnosis, treatment, and reporting of VL cases. Adequate awareness of disease transmission, clinical manifestations, risk factors, and diagnostic procedures is essential for timely identification and management of patients.[4] Studies conducted in Isiolo County have identified gaps in awareness and understanding of VL among affected populations, highlighting the need for continuous education and capacity-building initiatives.[8]

Similarly, multidisciplinary approaches emphasizing awareness enhancement and health system strengthening have been recommended as sustainable strategies for controlling recurrent VL outbreaks in endemic areas.[2] Despite these efforts, evidence regarding the relationship between healthcare workers' awareness of VL and their diagnostic capacity remains limited, particularly within public health facilities in Isiolo County.

Therefore, this study aimed to assess the association between VL awareness and diagnostic capacity among healthcare workers in public health facilities in Isiolo County, Kenya.

METHODS

The study was conducted from 3rd January, 2026 to 28th April, 2026 across all public health facilities in Isiolo County, Kenya, which comprises 56 operational facilities distributed across three sub-counties: Isiolo, Garbatulla, and Merti. The county covers approximately 25,350 km² and is classified as an arid and semi-arid region with an estimated population of 283,139.[8] A descriptive-analytical cross-sectional research design was employed to assess health system preparedness for VL outbreaks. Data were collected using both quantitative and qualitative approaches. The study population included all healthcare workers in public facilities, including medical officers, clinical officers, nurses, laboratory personnel, pharmacists, public health officers, nutritionists, and community health and extension officers. A census approach was used, resulting in a sample of 243 participants who met the inclusion criteria of consenting participation and at least six months of service in Isiolo County health facilities.

The study variables included health system preparedness for VL as the dependent variable, focusing on diagnostic and case management capacity. Independent variables included awareness of VL among healthcare workers, covering awareness of causative agents, transmission, vectors, symptoms, diagnosis, treatment, and prevention. Diagnostic capacity was assessed using five binary indicators: availability of diagnostic kits, staff training in testing and interpretation, availability of diagnostic algorithms, and timely suspicion and testing of suspected cases. Each indicator was scored 1 for "Yes" and 0 for "No," producing a composite score ranging from 0 to 5, later categorized into inadequate (0-3) and adequate (4-5). Management capacity was assessed using five indicators, including staff training, emergency response plans, review frequency, staff familiarity, and availability of essential medicines and guidelines. A composite score ranging from 0-8 was generated and categorized into inadequate (0-4) and adequate (5-8) preparedness levels.

Awareness of VL was assessed using a structured questionnaire with 10 awareness-based items covering epidemiology, transmission, clinical presentation, diagnosis, treatment, and prevention. Each correct response was awarded one point, producing a total score ranging from 0 to 10. Scores were categorized into low (0-3), moderate (4-7), and high (8-10) awareness levels. Quantitative data were analyzed using descriptive statistics such as frequencies and percentages, while associations between awareness levels and diagnostic capacity were examined using Pearson's Chi-square test. Variables showing significant associations were further analyzed using binary logistic regression to determine odds ratios at a significance level of $\alpha \leq 0.05$. This allowed for the assessment of the strength of relationships between awareness and diagnostic preparedness among healthcare workers.

Qualitative data were collected from Key Informants, including facility in-charges and representatives from relevant government and private health institutions, using a key informant guide. The qualitative responses were analyzed thematically and presented verbatim to preserve participants' original expressions and contextual meaning. This approach complemented quantitative findings by providing in-depth insights into operational challenges and contextual factors influencing preparedness. The integration of qualitative and quantitative data enhanced triangulation, enabling a comprehensive understanding of health system readiness for VL in Isiolo County and supporting interpretation of statistical findings within real-world service delivery contexts.

RESULTS

Table 1 provides the profile of the study participants whereby, slightly above average; 129 (53.1%) were drawn from sub-county and county level health facilities in the study context (Isiolo County). Of the study participants recruited, most of them; 70 (28.8%) were nurses, whereby a high proportion of the participants; 97 (39.9%) were aged between 29-39 years with their mean age being 36.62 (±10.29 SD). In terms of years of experience, slightly above average; 132 (54.3%) reported to have worked for 5-10 years whereby the mean years of experience was 7.35 (±4.27 SD).

Table 2 presents findings on awareness level on VL among the respondents. It was apparent that 132 (54.3%) recognized parasites as the cause, while 152 (62.6%) identified the sandfly as the main vector and 150 (61.7%) understood transmission occurs via bites from infected female sandflies. Regarding symptoms, 144 (59.3%) reported persistent fever, and 163 (67.1%) correctly identified the spleen as the primary affected organ. In diagnostic and treatment awareness, 146 (60.1%) were aware of the rK39 test and an equal proportion identified Amphotericin B as treatment. Additionally, 156 (64.2%) recognized immunocompromised individuals as high-risk groups, and 154 (63.4%) cited insecticide-treated nets as preventive measures, though only 117 (48.1%) correctly identified geographic susceptibility. Overall, 178 (73.3%) demonstrated moderate awareness, with a mean score of 6.03 (±1.678).

Qualitative findings from key informants complemented the quantitative results on awareness of VL among healthcare workers, highlighting variability in awareness across key domains. Informants noted that while many healthcare workers correctly understood that VL is caused by parasites and transmitted by sandflies, a proportion still confuse it with other common febrile illnesses in the region (KI_6, 2025). They further indicated gaps in awareness regarding the geographical distribution of the disease, with limited awareness that VL is predominantly found in tropical and subtropical regions. Overall, the narratives suggest uneven awareness levels among healthcare providers, reinforcing quantitative findings that demonstrated moderate awareness with persistent gaps in specific epidemiological aspects of VL.

Findings on diagnostic capacity revealed notable gaps in preparedness for VL across health facilities as presented in Figure 1. Most respondents, 157 (64.6%), indicated that staff were not trained to suspect or diagnose VL. In addition, 136 (56.0%) reported a lack of diagnostic kits, while 130 (53.5%) noted absence of training in performing and interpreting diagnostic tests. More than half, 131 (53.9%), confirmed that diagnostic algorithms for VL were not available in their facilities. Similarly, 129 (53.1%) reported delays or absence of prompt suspicion and testing of cases. Cumulatively, slightly above a third of the facilities where the participants were drawn from; 92 (37.9%) had an adequate capacity to diagnose VL. The cumulative mean score for diagnostic capacity domains assessed was 2.18 (±2.095SD). The findings demonstrate substantial deficiencies in essential diagnostic resources, staff competencies, and standardized clinical procedures required for timely identification and confirmation of VL cases across the studied health facilities.

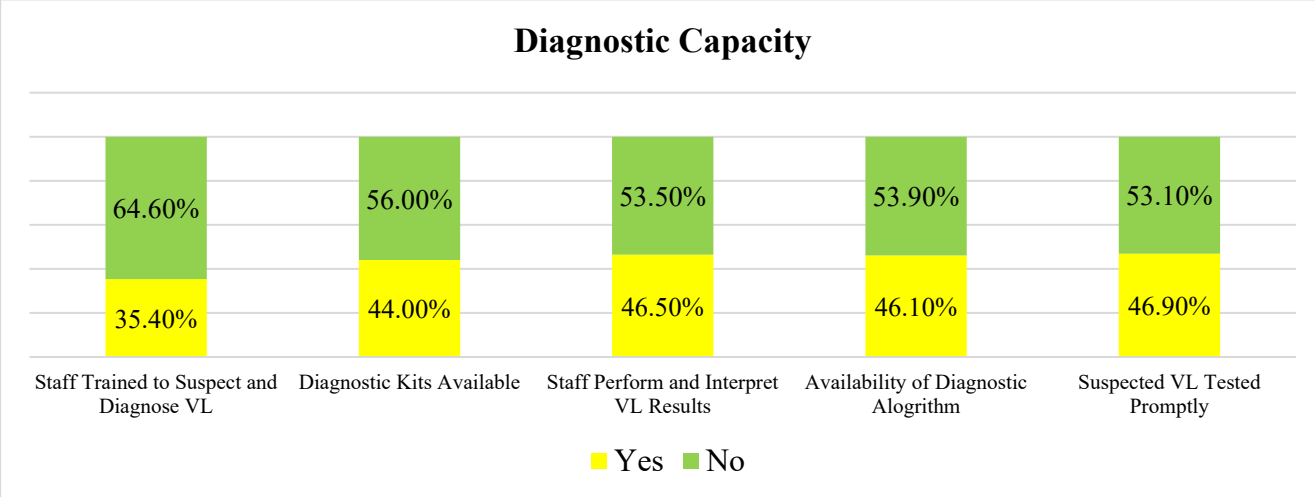

Figure 1: Diagnostic capacity in the health facilities.

Key informant interviews reinforced the quantitative findings on limited diagnostic capacity for VL in public health facilities. Participants highlighted that most facilities lack adequately trained personnel to suspect and diagnose VL, resulting in delays in case identification, particularly during early stages when symptoms are non-specific[KI2, 2025]. It was further emphasized that many healthcare workers have not received sufficient training in performing and interpreting VL diagnostic tests, which undermines both technical accuracy and clinical decision-making. This gap contributes to misdiagnosis, improper test administration, and missed opportunities for timely treatment. The narratives pointed to inadequate hands-on training and limited exposure to diagnostic procedures as major barriers, underscoring persistent weaknesses in capacity-building systems within the health facilities studied[KI7, 2025].

Table 3 provides findings on capacity to manage and treat VL across health facilities. A majority of participants, 166 (68.3%), reported no prior training on VL management, while 154 (63.4%) noted the absence of an emergency response plan. Even where such plans existed, only 64 (26.3%) confirmed they were regularly reviewed, and 82 (33.7%) were familiar with them. Additionally, 147 (60.5%) indicated that essential drugs and treatment guidelines for VL were unavailable in their facilities. Cumulative capacity to manage and treat VL was inadequate as reported by a majority; 173 (71.2%) of the participants with the cumulative mean score for the capacity to treat and manage variables being 2.77 (±3.235 SD). These results highlight weak preparedness systems, limited clinical capacity, and inadequate resource availability, all of which collectively undermine effective VL control and timely patient management in the study area.

Qualitative insights from key informants further emphasized diagnostic and operational weaknesses in VL management. Participants reported that most facilities lack emergency response plans, and where available, they are seldom updated, reducing their usefulness during outbreaks (KI_4, 2025). This creates uncertainty in response procedures and weakens preparedness. Additionally, the absence of standardized diagnostic algorithms was highlighted as a major challenge, leading to inconsistent clinical decision-making. Health workers often rely on personal judgment or default to more common febrile illnesses such as malaria, resulting in delayed suspicion and missed or late VL diagnoses[KI3, 2025]. These systemic gaps contribute to inefficient case detection and reduced effectiveness of disease surveillance and control efforts.

As shown in Table 4, chi-square results showed that awareness of VL was not significantly linked to diagnostic capacity across all examined areas at 95% CI. Understanding of disease cause (χ^2=3.248, p=0.355), transmitting organism (χ^2=2.753, p=0.253), and mode of transmission (χ^2=1.649, p=0.648) showed no meaningful relationship with diagnostic ability. Likewise, awareness of symptoms, affected organs, laboratory investigations, and treatment options did not demonstrate significant associations (all p>0.05). Further, awareness of high-risk groups, prevention measures, and endemic regions also lacked statistical significance that VL awareness levels did not correspond with improved diagnostic capacity in assessed health facilities.

As shown in Table 5, there was a significant association between diagnostic and management capacity for VL and awareness of the major organ affected (χ^2=8.294, df=3, p=0.040). However, subsequent logistic regression showed an inverse relationship, where awareness of the affected organ corresponded to markedly lower odds of possessing adequate capacity for treatment and management (OR=0.092, 95% CI: 0.010-0.850, p=0.035), indicating a 91% reduction in likelihood. In contrast, no significant associations were observed between management capacity and other awareness variables, including awareness of disease cause, transmission organism and route, clinical symptoms, laboratory tests, treatment guidelines, high-risk groups, prevention strategies, and endemic areas (all p>0.05).

Table 1: Profile of the study participants, (n=243).

Characteristic	N	Percentage (%)
Type of facility		
Dispensary	73	30.0
Health centre	41	16.9
Hospital	129	53.1*
Position (Cadre)		
CHA	29	11.9
Clinical officer	53	21.8
Laboratory technologist	13	5.3
Medical officer	11	4.5
Nurse	70	28.8*
Nutritionist	29	11.9
Pharmacist	11	4.5
Public health officer	27	11.1

Continued.

Characteristic	N	Percentage (%)
Age categories (in years)		
18-28	62	25.5
29-29	97	39.9*
40-50	62	25.5
51-61	20	8.2
>61	2	0.8
Mean age: 36.62 (±10.29 SD)		
Years of experience		
<5	56	23.0
5-10	132	54.3*
11-16	43	17.7
17-22	12	4.9
Mean years of experience: 7.35 (±4.27 SD)		

*Majority of the study participants, derived from descriptive statistical analysis.

Table 2: Awareness levels on VL, (243).

Awareness domain	N	Percentage (%)
VL cause		
Parasite	132	54.3*
Virus	52	21.4
Bacteria	34	14.0
Fungi	25	10.3
Transmission organism		
Sandfly	152	62.6*
Tsetse fly	57	23.5
Mosquito	34	14.0
Transmission route		
Bite from an infected female sandfly	150	61.7*
Person to person contact	48	19.8
Contaminated food and water	28	11.5
Airborne droplets	17	7.0
Common symptom		
Persistent fever	144	59.3*
Severe cough	61	25.1
Skin rush	25	10.3
Diarrhea only	13	5.3
Major organ affected		
Spleen	163	67.1*
Liver	64	26.3
Pancreas	11	4.5
Kidneys	5	2.1
Recommended lab test for VL		
rK39 antigen test	146	60.1*
Blood culture	49	20.2
Liver function test	31	12.8
Complete blood count	17	7.0
Recommended drug therapy		
Amphotericin B	146	60.1*
Paracetamol	50	20.6
Penicillin	26	10.7
Ciprofloxacin	21	8.6
High risk individuals		
Persons with weak immune systems	156	64.2*
People who exercise frequently	62	25.5
Children	25	10.3

Continued.

Awareness domain	N	Percentage (%)
Prevention/control measure		
Sleeping under insecticide treated bed nets	154	63.4*
Drinking boiled water	61	25.1
Taking antibiotics regularly	28	11.5
VL susceptible regions		
Tropical and sub-tropical regions	117	48.1*
Desert areas only	83	34.2
Cold mountainous regions	43	17.7
Cumulative awareness categories		
Low awareness	15	6.2
Moderate awareness	178	73.3*
High awareness	50	20.6
Mean cumulative awareness score: 6.03 (±1.678)		

*Majority of the study participants, derived from descriptive statistical analysis

Table 3: Health facility capacity to manage and treat VL, (243).

Capacity to manage and treat VL	N	Percentage (%)
Trained on VL diagnosis		
Yes	77	31.7
No	166	68.3*
Presence of VL emergency response plan		
Yes	89	36.6
No	154	63.4*
Frequency of review of plan		
Frequently	64	26.3
Biannually	5	2.1
Annually	17	7.0
Never	3	1.2
Staff familiarity with the emergency plan		
Yes	82	33.7*
No	7	2.9
Availability of essential medications and treatment guidelines		
Yes	147	60.5*
No	96	39.5

*Majority of the study participants, derived from descriptive statistical analysis.

Table 4: Associations between awareness level on visceral leishmaniasis and capacity to diagnose VL.

Awareness level on VL	Capacity to diagnose VL			χ^2	P value
	Inadequate, N (%)	Adequate, N (%)	Total, N (%)		
VL cause					
Parasite	78 (32.1)	54 (22.2)	132 (54.3)	3.248	0.355
Virus	37 (15.2)	15 (6.2)	52 (21.4)		
Bacteria	19 (7.8)	15 (6.2)	34 (14.0)		
Fungi	17 (7.0)	8 (3.3)	25 (10.3)		
VL transmission organism					
Sandfly	94 (38.7)	58 (23.9)	152 (62.6)	2.753	0.253
Tsetse fly	32 (13.2)	25 (10.3)	57 (23.5)		
Mosquito	25 (10.3)	9 (3.7)	34 (14.0)		
Transmission route					
Bite from infected female sandfly	91 (37.4)	59 (24.3)	150 (61.7)	1.649	0.648
Person to person contact	30 (12.3)	18 (7.4)	48 (19.8)		
Contaminated water	17 (7.0)	11 (4.5)	28 (11.5))		
Airborne droplets	13 (5.3)	4 (1.6)	17 (7.0)		
Common symptom					
Persistent fever	85 (35.0)	59 (24.3)	144 (59.3)	1.934	0.586
Severe cough	40 (16.5)	21 (8.6)	61 (25.1)		
Skin rush	18 (7.4)	7 (2.9)	25 (10.3)		

Continued.

Awareness level on VL	Capacity to diagnose VL			χ^2	P value
	Inadequate, N (%)	Adequate, N (%)	Total, N (%)		
Diarrhea only	8 (3.3)	5 (2.1)	13 (5.3)		
Major organ affected					
Spleen	96 (39.5)	67 (27.6)	163 (67.1)	2.452	0.484
Liver	44 (18.1))	20 (8.2)	64 (26.3)		
Pancreas	8 (3.3)	3 (1.2)	11 (4.5)		
Kidneys	3 (1.2)	2 (0.8)	5 (2.1)		
Laboratory test for VL					
rK39 antigen test	88 (36.2)	58 (23.9)	146 (60.1)	4.254	0.235
Blood culture	34 (14.0)	15 (6.2)	49 (20.2)		
Liver function test	16 (6.6)	15 (6.2)	31 (12.8)		
Complete blood count	13 (5.3)	4 (1.6)	17 (7.0)		
Recommended drug therapy					
Amphotericin B	92 (37.9)	54 (22.2)	146 (60.1)	4.709	0.194
Paracetamol	29 (11.9)	21 (8.6)	50 (20.6)		
Penicillin	20 (8.2)	6 (2.5)	26 (10.7)		
Ciprofloxacin	10 (4.1)	11 (4.5)	21 (8.6)		
At risk individuals					
Persons with weakened immunity	104 (42.8)	52 (21.4)	156 (64.2)	3.856	0.145
People who exercise frequently	34 (14.0)	28 (11.5)	62 (25.5)		
Children	13 (5.3)	12 (4.9)	25 (10.3)		
Control measure					
Use of insecticide treated mosquito net	94 (38.7)	60 (24.7)	154 (63.4)	0.218	0.897
Drinking boiled water	39 (16.0)	22 (9.1)	61 (25.1)		
Taking antibiotics	18 (7.4)	10 (4.1)	28 (11.5)		
VL susceptible regions					
Tropical and sub-tropical regions	75 (30.9)	42 (17.3)	117 (48.1)	2.847	0.241
Desert areas	46 (18.9)	37 (15.2)	83 (34.2)		
Cold mountainous regions	30 (12.3)	13 (5.3)	43 (17.7)		

* Pearson Chi-Square ($\chi 2$) test for associations. Statistically significant $\chi 2$ association at $\alpha \leq 0.05$.

Table 5: Associations between awareness level and capacity to managed and treat VL.

Awareness level on VL	Capacity to manage and treat VL			χ^2	P value
	Inadequate, N (%)	Adequate, N (%)	Total, N (%)		
VL cause					
Parasite	99 (40.7)	33 (13.6)	132 (54.3)	3.955	0.266
Virus	37 (15.2)	15 (6.2)	52 (21.4)		
Bacteria	23 (9.5)	11 (4.5)	34 (14.0)		
Fungi	14 (5.8)	11 (4.5)	25 (10.3)		
VL transmission organism					
Sandfly	107 (44.0)	45 (18.5)	152 (62.6)	1.745	0.418
Tsetse fly	44 (18.1)	13 (5.3)	57 (23.5)		
Mosquito	22 (9.1)	12 (4.9)	34 (14.0)		
Transmission route					
Bite from infected female sandfly	104 (42.8)	46 (18.9)	150 (61.7)	0.751	0.861
Person to person contact	35 (14.4)	13 (5.3)	48 (19.8)		
Contaminated water	21 (8.6)	7 (2.9)	28 (11.5)		
Airborne droplets	13 (5.3)	4 (1.6)	17 (7.0)		
Common symptom					
Persistent fever	106 (43.6)	38 (15.6)	144 (59.3)	2.975	0.396
Severe cough	44 (18.1)	17 (7.0)	61 (25.1)		
Skin rush	16 (6.6)	9 (3.7)	25 (10.3)		
Diarrhea only	7 (2.9)	6 (2.5)	13 (5.3)		
Major organ affected					
Spleen	119 (49.0)	44 (18.1)	163 (67.1)	8.294	0.040**
Liver	47 (19.3)	17 (7.0)	64 (26.3)		
Pancreas	6 (2.5)	5 (2.1)	11 (4.5)		
Kidneys	1 (0.4)	4 (1.6)	5 (2.1)		

Continued.

Awareness level on VL	Capacity to manage and treat VL			χ^2	P value
	Inadequate, N (%)	Adequate, N (%)	Total, N (%)		
Laboratory test for VL					
rK39 antigen test	101 (41.6)	45 (18.5)	146 (60.1)	1.002	0.801
Blood culture	36 (14.8)	13 (5.3)	49 (20.2)		
Liver function test	24 (9.9)	7 (2.9)	31 (12.8)		
Complete blood count	12 (4.9)	5 (2.1)	17 (7.0)		
Recommended drug therapy					
Amphotericin B	102 (42.0)	44 (18.1)	146 (60.1)	1.684	0.641
Paracetamol	39 (16.0)	11 (4.5)	50 (20.6)		
Penicillin	17 (7.0)	9 (3.7)	26 (10.7)		
Ciprofloxacin	15 (6.2)	6 (2.5)	21 (8.6)		
At risk individuals					
Persons with weakened immunity	113 (46.5)	43 (17.7)	156 (64.2)	0.485	0.784
People who exercise frequently	42 (17.3)	20 (8.2)	62 (25.5)		
Children	18 (7.4)	7 (2.9)	25 (10.3)		
Control measure					
Use of insecticide treated mosquito net	105 (43.2)	49 (20.2)	154 (63.4)	2.353	0.308
Drinking boiled water	48 (19.8)	13 (5.3)	61 (25.1)		
Taking antibiotics	20 (8.2)	8 (3.3)	28 (11.5)		
VL susceptible regions					
Tropical and sub-tropical regions	90 (37.0)	27 (11.1)	117 (48.1)	5.516	0.063
Desert areas	58 (23.9)	25 (10.3)	83 (34.2)		
Cold mountainous regions	25 (10.3)	18 (7.4)	43 (17.7)		

*Pearson Chi-Square ($\chi 2$) test for associations. **Statistically significant $\chi 2$ association at $\alpha \leq 0.05$.

DISCUSSION

The results indicate that awareness of VL does not significantly affect diagnostic capacity, as all examined domains produced p values above 0.05. Awareness of the disease cause, transmission agent, and route of infection alone was insufficient to improve diagnostic performance. Evidence from recent literature shows that effective diagnosis is more strongly driven by hands-on clinical training, availability of diagnostic tools, and well-functioning health systems rather than theoretical understanding.[9] In many endemic settings, healthcare workers may understand disease concepts but lack practical experience and infrastructure to apply them.[10] This highlights a critical gap between awareness and practice, emphasizing the importance of competency-based training and continuous professional development.[11] The study findings therefore align with current evidence that awareness alone does not translate into improved diagnostic performance without strengthened clinical capacity and supportive system inputs.

Similarly, no significant association was observed between awareness of symptoms and affected organs with diagnostic capacity, underscoring the limitations of relying on awareness-based approaches. Although recognition of clinical features is important, VL symptoms often overlap with other endemic illnesses such as malaria, complicating clinical diagnosis without laboratory confirmation.[12] This overlap reduces the practical utility of symptom awareness in improving diagnostic accuracy.[13] Furthermore, clinical decision-making depends not only on awareness but also on experience, availability of diagnostic algorithms, and access to confirmatory testing.[14] These findings highlight the need to strengthen differential diagnostic skills and integrate clinical suspicion with laboratory support systems. Improving diagnostic outcomes therefore requires combining symptom recognition training with improved diagnostic infrastructure and clearer clinical guidelines in endemic regions.

In addition, the lack of significant associations between awareness of laboratory tests, treatment options, and diagnostic capacity suggests that awareness does not automatically translate into practice. Existing literature shows that structural barriers such as limited diagnostic tools, weak laboratory systems, and inconsistent drug availability hinder effective VL management.[15] Even when healthcare workers are aware of recommended protocols, systemic constraints restrict their application in routine practice.[16] Similarly, awareness of epidemiological factors such as risk groups, control measures, and endemic regions showed no influence on diagnostic capacity, indicating limited impact of broad public health awareness on clinical performance. These findings emphasize that improving VL diagnosis requires integrated strategies combining training, resource provision, and health system strengthening rather than awareness creation alone.[17]

A statistically significant relationship was observed between awareness of the major organ affected by VL and the capacity to treat and manage the disease (p=0.040), suggesting that awareness of disease pathology may contribute to clinical competence. Awareness of organ involvement, particularly the spleen, liver, and bone marrow, is recognized as important for identifying disease severity and guiding clinical decisions.[18] Such awareness can enhance clinicians' ability to suspect VL in patients presenting with organ enlargement and systemic symptoms.[19] However, clinical competence is not determined by awareness alone, as effective management also depends on experience, training exposure, and availability of diagnostic and treatment resources.[20] Therefore, while statistically significant, this association reflects only one dimension of a more complex set of factors influencing VL management capacity.

Despite the observed association, logistic regression revealed an inverse relationship, where awareness of the major organ affected was linked to a 91% reduction in the likelihood of adequate management capacity (OR=0.092, p=0.035). This finding may be explained by confounding influences such as differences in training quality, clinical exposure, or institutional support systems. Healthcare workers with theoretical awareness may still lack practical skills or confidence required for effective case management, particularly in resource-limited settings.[21] Similar discrepancies between awareness and practice have been reported in other infectious disease contexts, where awareness does not necessarily translate into improved clinical performance.[22] Additionally, this result may reflect unmeasured variables or contextual constraints affecting service delivery, highlighting the need for cautious interpretation and further investigation into underlying determinants.[23]

In contrast, most other awareness variables showed no significant association with VL management capacity, reinforcing the idea that awareness alone is insufficient for effective clinical practice.[24] Awareness of disease cause, transmission, symptoms, diagnostic tests, treatment protocols, and risk factors did not significantly influence management outcomes, indicating that other determinants are more influential. Literature emphasizes that health system factors such as drug availability, diagnostic infrastructure, and adherence to treatment guidelines play a central role in determining clinical effectiveness.[25] In many endemic settings, healthcare workers are constrained by systemic limitations that hinder application of best practices.[26] These findings highlight the need for integrated strategies combining education with structural improvements to strengthen VL management.

Furthermore, the lack of association between awareness of epidemiological factors such as at-risk populations, prevention strategies, and endemic regions and management capacity suggests that broad public health awareness has limited influence on individual clinical decision-making.[27] While such awareness is essential for surveillance and prevention, it does not necessarily translate into improved patient care at the facility level.[28] Effective VL management requires not only theoretical understanding but also practical clinical skills, access to standardized treatment protocols, and supportive health infrastructure.[29] These findings support calls for capacity-building approaches that integrate classroom awareness with hands-on training, mentorship, and improved resource availability.[30] Strengthening health systems and ensuring consistent access to diagnostics and medications remain critical for improving VL management outcomes in endemic settings.[31]

While this study provides important insights into health system preparedness for VL, it had certain limitations. The cross-sectional design assessed healthcare workers' awareness and diagnostic capacity at a single point in time, limiting the ability to establish causal relationships. The study was conducted only in public health facilities in Isiolo County, reducing the generalizability of the findings to private facilities and other VL-endemic regions in Kenya. In addition, awareness was assessed using self-reported data, which may be affected by recall and social desirability bias. Furthermore, diagnostic capacity was not validated through direct observation of clinical practice or actual diagnostic performance.

CONCLUSION

The study advances understanding of VL preparedness by demonstrating that, although healthcare workers in Isiolo County possess moderate awareness of the disease, knowledge alone is insufficient to improve diagnostic and management capacity. The findings show that awareness of VL causation, transmission, symptoms, diagnosis, treatment, prevention, and epidemiological risk factors was not significantly associated with diagnostic capacity, while the observed association between organ awareness and management capacity was not sustained after adjustment. These results highlight that effective VL diagnosis and management depend more on practical clinical competencies, continuous training, availability of diagnostic resources, and overall health system preparedness than on awareness alone. Study therefore provides evidence to guide policymakers and health managers in prioritizing capacity strengthening, resource allocation, and targeted in-service training to improve VL detection and case management in endemic settings.

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