



**MASTER OF PUBLIC HEALTH
(IMPLEMENTATION SCIENCE)**

**IMPROVING VISCERAL LEISHMANIASIS SERVICE DELIVERY IN SOMALIA: A
MIXED METHOD IMPLEMENTATION STUDY USING CONSOLIDATED
FRAMEWORK FOR IMPLEMENTATION RESEARCH**

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The Candidate has successfully carried out the study designated to him during practicum training and the approach to the study has been sincere, scientific and analytical. The Practicum research is in fulfillment of the course requirements.

I wish him success in all his future endeavors.

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ABSTRACT

The study is aimed to assess the current state of VL services, identify barriers and enablers, and develop strategies to enhance service delivery. By using the Consolidated Framework for Implementation Research (CFIR), a mixed method approach was used and data was gathered through qualitative and quantitative methods, including field observations, interviews, and focus group discussions, involving stakeholders at various levels of the health system. The study also employed the CFIR-ERIC Matching Tool to suggest an effective implementation strategies.

Key barriers identified include the complexity of Visceral Leishmaniasis service delivery, adaptability of the services to fit the local context and the cost of implementing the VL services, resource availability, critical incidents including emergencies and conflicts, sociocultural beliefs, external funding and resource availability, external policies and laws, access to knowledge and information in shaping VL services. Key enablers included partnerships including referral networks, communication, tension for change, the role of high level leaders, role of opinion leaders, and the processes of assessing, planning, engaging stakeholders, reflecting and evaluating the visceral services in the country.

The CFIR-ERIC Matching Tool was used in developing and prioritizing strategies to address barriers and leverage enablers. A key strategy advanced from ERIC included overcoming the challenges of adaptability as “promoting adaptability”, and were matched to a context-specific strategy like establishing flexible service models that could be adopted to various local contexts for instance, mobile clinics and outreach services. The study concluded that improving VL service delivery in Somalia requires a multi-faceted approach, involving strong leadership, tailored interventions, continuous training, and effective engagement of all stakeholders.

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ABBREVIATION

CFIR: Consolidated Framework for Implementation Research

CL: Cutaneous Leishmaniasis

DHIS2: District Health Information System

ERIC: Expert Recommendation for Implementation Change

FGD: Focus Group Discussion

IDP: Internally Displaced People

LMICs: Low and Middle Income Countries

ML: Mucocutaneous Leishmaniasis

MSF: Medicines Sans Frontiers

NGO: Non Governmental Organization

NIH: National Institute of Health

NTD: Neglected Tropical Diseases

PKDL: Post-Kala Azar Dermal Leishmaniasis

PPP: Public Private Partnership

RDT: Rapid Diagnostic Tests

SARA: Service Availability and Readiness Assessment

SEA: South-East Asia

UNICEF: United Nations Children's Fund

VL: Visceral leishmaniasis

WHO: World Health Organization

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Visceral leishmaniasis, also known as kala-azar, is a severe and often fatal parasitic disease caused by the protozoan parasite of leishmania genus and transmitted through the bites of infected sand fly (1,2). It's characterized by irregular fever, enlarged spleen and liver, anemia and weight loss (3–5). It primarily affects the poor and most vulnerable population, particularly children and immunocompromised individuals (6). The disease is endemic to parts of the world mainly in Southeast Asia and Eastern Africa with Somalia bearing a significant burden of the disease (5,7,8). The context of Somalia is shaped by a combination of environmental, sociopolitical, and economic factors that worsen the public health challenge posed by this disease (9–11).

Visceral leishmaniasis continues to be a major global and public health problem in 4 eco-epidemiological regions of the world including the Americas, East Africa, North Africa, and West and South-East Asia (12). Around 1 billion people live in areas endemic for visceral leishmaniasis and are at risk of contracting the disease. The global incidence of Visceral leishmaniasis is estimated to be 50,000-90,000 deaths annually (1). In East Africa, visceral leishmaniasis is a significant public health problem with frequent outbreaks reported where sandflies are available (13,14). The most prevalent countries include Sudan (15), South Sudan (16), Ethiopia (17), Kenya (18), Uganda (19) and Somalia (9). The transmission dynamics of the disease are closely related to the presence of the vector in the arid and semi-arid regions of these countries. For instance, in Ethiopia, the disease is endemic in northwest lowland areas particularly in Amhara and Tigray region, and also prevalent in the Somali region across the border with Somalia (20–22). In Kenya, the VL is endemic in the northwest and northeast regions, particularly Baringo, Turkana and NFD counties. Where pastoralist communities are at high risk (23,24).

Previously, the region has experienced episodic outbreaks, often associated with displacement due to conflict, environmental changes, and the movement of non-immune individuals into endemic areas (25,26). These outbreaks are further exacerbated by the limited access to healthcare services, diagnostic facilities, and effective treatment in remote and resource poor settings (27,28).

The parasites that cause visceral leishmaniasis are maintained in nature through a cycle involving sandflies and mammalian hosts including humans and rodents. The distribution of the disease is linked to the habitat preferences of the sandfly vectors and their interaction with human populations (29). Changes in the environment including deforestation, urbanization, and irrigation can create favorable conditions for sandfly breeding and increase the risk of visceral leishmaniasis transmission (30).

Somalia, in particular, faces significant challenges in controlling and managing the disease (31). The country has been affected by prolonged conflict and instability that led to the fragmentation and underfunding of health services, which are essential for controlling and eliminating the disease. The conflict resulted in the destruction of health infrastructure, and limited access to essential healthcare services (32). This made the rural and conflict affected areas a challenging environment to deliver effective healthcare particularly for neglected tropical diseases including visceral leishmaniasis. In Somalia, the VL is predominantly found in the semi-arid and arid regions of the country, particularly in the southern regions such as lower Jubba, Bay, Bakool and Gedo regions (9,33,34). These areas provide the ideal environment for the sandfly vectors exacerbated by the rural pastoralist communities living are at higher risk and often lack adequate healthcare, trained medical personnel, and essential medical supplies. Patients from these regions often face numerous barriers in accessing care, including long travel distances to health facilities, insecurities and financial constraints (9).

Visceral leishmaniasis remains a significant challenge in East Africa and Somalia in particular, due to a combination of ecological, socio-economic and healthcare related factors (13). The complex interplay of these factors contributes to the persistence of and spread of the disease, particularly in areas with high levels of poverty and instability (28). Therefore, understanding the challenges is crucial for developing control strategies tailored to the context and improving health outcomes for the effected population. The study aims to improve the delivery of visceral leishmaniasis services by assessing the current availability, accessibility and quality of VL services, and by identifying the existing barriers and enablers to the effective implementation of VL service delivery.

1.2 PROBLEM STATEMENT

Visceral leishmaniasis remains a pressing public health challenge in Somalia, a country plagued by prolonged conflict, political instability, and severely compromised healthcare system. Despite being one of the most severe forms of leishmaniasis leading to high morbidity and mortality if untreated, the services are inadequate and poorly accessible, particularly in rural and remote areas where the majority of cases occur. The current state of visceral leishmaniasis service delivery is characterized by a scarcity of resources, including a shortage of trained healthcare personnel, limited diagnostic tools and insufficient treatment options (9). The challenge in managing is multifaceted with the issues compounded by the internal displacement of populations due to conflict and drought, which further hinders access to VL care and contributes to the underreporting of cases (31).

The geographical barriers such as long distances to health facilities, and related socio-economic factors, such as poverty and lack of transportation, hinder access to care. Patients with the disease travel over 50 Kms to seek medical treatment in the nearest health facility, a journey that is not feasible for many due to insecurity and lack of transportation. In most cases, even when diagnostic and treatment services are available, they are often of poor quality, due to insufficient training of healthcare workers, lack of standard protocols and inadequate infrastructure. Therefore, there is an urgent need for a comprehensive assessment to identify and address these barriers, improve the current state of VL services and develop sustainable evidence-based strategies to reduce the burden of this debilitating disease in Somalia.

1.3 OBJECTIVES OF THE STUDY

1.3.1 General objectives

- To improve the delivery of visceral leishmaniasis (VL) services in Somalia by assessing the current availability, accessibility and quality of existing services, identifying existing barriers and enablers, and developing evidence-based strategies for effective implementation.

1.3.2 Specific Objectives

- To assess the current status availability, accessibility and quality of visceral leishmaniasis service delivery in Somalia
- To identify the barriers and enablers to visceral leishmaniasis service delivery in Somalia
- To develop effective implementation strategies to establish evidence-based recommendations to improve VL service delivery.

1.4 RESEARCH QUESTION

- What is the current state of availability, accessibility and quality of Visceral leishmaniasis diagnostic and treatment services in different regions of the country?
- What are the existing barriers and enablers effective implementation and improvement of VL services in Somalia?
- What strategies can be developed and recommended to improve VL diagnostic and treatment services in Somalia?

1.5 SIGNIFICANCE/IMPORTANCE OF THE STUDY

The significance of this study on improving visceral leishmaniasis service delivery in Somalia is multifaceted, impacting various stakeholders in the healthcare and management of VL. The involved stakeholders include healthcare professionals, policy makers, international and non-governmental organizations, community leaders, and the effected populations.

For the healthcare providers, the study is crucial in identifying gaps in the availability and quality of VL services. By assessing the current state of healthcare facilities, including the availability of diagnostic tools, medications, and trained personnel, the study provides valuable data that can guide resource allocation and training programs. Healthcare workers will benefit from targeted training and capacity-building initiatives designed to improve their ability to diagnose and treat VL effectively. Enhanced training and better-equipped facilities will lead to improved patient outcomes and a reduction in VL-related morbidity and mortality.

Policymakers will gain critical insights from this study regarding the current challenges and barriers to effective VL service delivery. The findings will offer evidence-based data to inform health policy decisions and the formulation of national strategies to combat VL. By understanding

the specific needs and gaps in the healthcare system, policymakers can prioritize funding and support for VL programs. Moreover, the study's recommendations can guide the development of policies that address systemic issues such as healthcare infrastructure, supply chain management, and healthcare worker retention in remote and conflict-affected areas.

International organizations and NGOs play a pivotal role in providing healthcare services in Somalia, especially in areas where government infrastructure is weak or non-existent. This study will help these organizations to identify priority areas for intervention and to tailor their programs to the specific needs of the Somali population. By highlighting the most significant barriers to VL service delivery, the study enables NGOs and international agencies to design more effective and targeted interventions. Additionally, the study's evidence-based recommendations can support grant applications and funding proposals, thereby attracting more resources to combat VL in Somalia.

Community leaders and local authorities are essential stakeholders in the fight against VL, as they can influence public health initiatives and mobilize community resources. The study's findings will provide these leaders with a deeper understanding of the VL burden in their communities and the specific barriers to accessing healthcare services. Equipped with this knowledge, community leaders can advocate more effectively for improved healthcare services and support community-based interventions. The study also highlights the importance of community engagement and education in preventing VL, empowering local leaders to take proactive measures to reduce the incidence of the disease.

For the populations affected by VL, particularly those in rural and remote areas, the study holds significant promise for improving their access to quality healthcare. By addressing the issues of availability, accessibility, and quality of VL services, the study aims to reduce the delays and barriers that currently prevent many individuals from receiving timely and effective treatment. Improved healthcare services mean better health outcomes, reduced mortality, and enhanced quality of life for those affected by VL. Additionally, the study's focus on identifying enablers of effective service delivery ensures that solutions are not only practical but also sustainable and culturally appropriate. Beyond the immediate stakeholders, the study has broader implications for public health in Somalia. By improving VL service delivery, the study contributes to the overall strengthening of the healthcare system. Enhanced capacity for managing VL can spill over into

other areas of healthcare, improving the system's ability to respond to various health challenges. Furthermore, the study's methodologies and findings can serve as a model for addressing other neglected tropical diseases (NTDs) in similar settings, promoting a more comprehensive and effective public health approach.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Visceral leishmaniasis also known as kala-azar, is a parasitic disease caused by protozoa of genus *leishmania donavani* complex, which include *leishmania donavani* and *leishmania infantum* (1,3). It's transmitted to humans through the bite infected female phlebotomine sand flies (4). The *leishmania* disease manifests in three clinical forms including cutaneous leishmaniasis (CL), mucocutaneous leishmaniasis (ML) and visceral leishmaniasis (VL) (2). Visceral leishmaniasis is the most severe and potentially fatal form, which primarily effects internal organs, including the liver, spleen and bone marrow, leading to severe systemic illness. It's a major public health problem, particularly in tropical and subtropical regions, and it's classified as one of the world's neglected tropical diseases (NTDs) (6). Visceral leishmaniasis disproportionately effects the poorest and most marginalized populations in endemic regions. The disease's epidemiology is linked to poverty, malnutrition, displacement, and environmental changes, making it a significant public health challenges in many low and middle income countries (LMICs) (28).

The pathogenesis of VL is complex and involves a combination of parasite factors, host immune response, and environmental influences (35). The immune response plays a crucial role in determining the outcome of infection. In individuals with a strong cell-mediated immune response, the infection may be controlled and remain asymptomatic (36). However, in individuals with a weakened immune system, the parasite can proliferate unchecked, leading to the development of clinical disease (37). Factors such as malnutrition, co-infections (e.g., HIV), and genetic susceptibility can predispose individuals to severe forms of VL (38,39).

The clinical presentation of visceral leishmaniasis varies depending on the stage of the disease and the immune status of the host (4). The incubation period typically ranges from several weeks to months, although it can be longer in some cases. The onset of symptoms is often insidious, with the disease progressing gradually over time. The hallmark symptoms of VL include prolonged fever, significant weight loss, hepatosplenomegaly (enlargement of the liver and spleen), and pancytopenia (a reduction in the number of red and white blood cells, as well as platelets). Patients may also present with generalized weakness, anemia, and hypergammaglobulinemia (elevated levels of antibodies in the blood) (40–43). As the disease progresses, the massive splenomegaly

becomes more pronounced and can lead to complications such as hypersplenism, where the spleen becomes overactive in removing blood cells, exacerbating the anemia and pancytopenia.

In the absence of treatment, VL is almost always fatal, with death typically resulting from complications such as hemorrhage, secondary bacterial infections, or severe malnutrition. Even with treatment, the disease can cause long-term health consequences, including chronic anemia and immune suppression. In some cases, treated individuals may develop post-kala-azar dermal leishmaniasis (PKDL), a condition characterized by the appearance of nodular or hypopigmented skin lesions that can persist for years (44,45).

2.2 Global burden of visceral leishmaniasis

Visceral leishmaniasis is endemic in over 70 countries across Asia, East Africa and Latin America with an estimated 50,000 to 90,000 cases annually (1). However, the true incidence is much higher due to unreporting and misdiagnosing particularly in remote and conflict effected areas (46). In the indian subcontinent, primarily in india, bangladesh, and nepal bear the highest number of visceral leishmaniasis, accounting for approxiamately 50-70% of the global reported cases (47). In india, the state of bihar alone account for over 50% of the cases in india(48). The disease primarily effects the rural populations living in poverty with poor housing conditions, malnutrition and limited access to healthcare (49). Efforts to control the disease in south asia particularly in india, bengladesh and nepal have made significant progress which has led to a substantial decline of reported cases acheiving elimination of visceral leishmaniasis as a public health problem (50–55).

East africa, another region with higher burden of visceral leishmaniasis primarily in Sudan, South Asia, Ethiopia, Kenya and Somalia (13,14). The epidemiology of the disease in this region is very complex, with the disease associted with conflict, displacement and environmental changes. It often encounter frequent outbreaks often linked to population movements and the breakdown of health systems (25,27,28). Visceral leishmaniasis in east africa is often characterized by high morbidity and mortality rates, particularly among malnourished children and immunocompromised individuals. The challenges of accessing and delivering healthcare in conflict effected and remote areas, combined with weak health system, make visceral leishmaniasis a major public health concern in the region (13,28,56,57).

In latin america, Brazil accounts for 90% of the cases in the region. The disease is endemic in several states, particularly in the northeast, where poverty, deforestation, and urbanization have contributed to its spread. The migration of people from rural areas to urban areas, resulted to the emergence of disease in the urban settings, complicating control efforts (58–61). Other countries in the region, such as Paraguay, Venezuela, and colombia, also report cases, though on a much smaller scale as compared to Brazil (62).

With the majority of cases in south asia, east africa and latin america, the disease is also prevalent in other parts of the world, including the Mediterranean, Central Asia and North Africa . These regions report sporadic cases often associated with zoonotic transmission from domestic dogs, which serves as reserviors for leishmania infantum. Like many other endemic regions, the disease in these regions is often associated with rural poverty, limited access to healthcare, and the presence of sandfly vectors (63–66).

2.3 Visceral leishmaniasis burden in somalia

Visceral leishmania in somalia dates back several decades, with sporadic cases reported in the mid 20th century. However in the late 20th and early 21st century, the disease was recognized as a public health problem in the country (67–69). Somalia's complex history of political instability, armed conflict, and displacement has created conditions conducive to the spread of VL, particularly in the southern and central regions where the disease is most prevalent (32,70).

In the colonial era, and during the military government regime, there was a few reported cases of visceral leishmaniasis (71–74), as the focus of public health efforts was on largely other infectious diseases including Malaria, Tuberculosis and cholera. However, with the collapse of the central government in 1991 and the subsequent outbreak of civil wars, the country's health infrastructure broke down, leading to an increase in the emergence of neglected tropical diseases primarily visceral leishmaniasis (24). The conflict resulted large scale displacement of populations to rural areas coupled with poor living conditions, malnutrition, and limited access to healthcare, which created an environment where neglected tropical disease mainly visceral leishmaniasis could spread more easily (70).

In the early 2000s, as many internal humanitarian partners including Medicines sans frontiers (MSF) documented, visceral leishmaniasis emerged as a more visible public health problem

particularly in the south and central regions, including the Bay, Bakool, Gedo and Lower Shabelle regions (33,34). The disease was primarily reported among internally displaced persons (IDPs) and nomadic communities, who were living in overcrowded and poor sanitary conditions, which makes them susceptible to sandfly proliferation. In addition to that, the lack of reliable surveillance systems, and the continuing conflict made it uneasy to assess the true burden of visceral leishmaniasis during this period (75). However, it was believed that the disease was becoming an increasingly public health problem.

The epidemiology of the disease is influenced by a range of factors, including environmental conditions, population movement and the lack of access to health services due to ongoing conflict in the endemic areas (28). The disease is currently prevalent in the south and central regions of the country, where the presence of sandfly parasite and suitable vectors such as domestic animals, contribute to its transmission (67,68). These regions have historically been the hotspots for VL due to their favorable environmental conditions for sandfly breeding and the animal reservoirs. The disease was also reported recently in the northeastern regions including Puntland, although the burden is relatively smaller compared to the southern regions (76). The geographical distribution of VL in Somalia and east Africa in general is closely linked to the presence of specific sandfly species, such as *Phlebotomus orientalis* and *Phlebotomus martini*, which are known vectors of *Leishmania donovani* (22,29,30,77).

While the exact number of cases is difficult to determine due to underreporting and limited surveillance, it is estimated that hundreds of cases occur each year, with the majority of cases reported in the southern regions (78). The disease is often fatal if left untreated, and the case fatality rate in some areas is believed to be from 2% as high as 39%, particularly in settings where access to treatment is limited and in among specific groups such as VL/HIV coinfection (79,80). The transmission of VL in Somalia is influenced by seasonal patterns, with the peak transmission period typically occurring during the rainy season, when sandfly populations are most active. The disease is transmitted by the bite of infected sandflies, which acquire the parasite from animal reservoirs, such as domestic dogs and livestock, before transmitting it to humans. The presence of these animal reservoirs in close proximity to human dwellings contributes to the ongoing transmission of VL in endemic areas (81).

2.4 Current status of visceral leishmaniasis service delivery in somalia

The provision of visceral leishmaniasis service delivery in somalia faces significant challenges due to the country's ongoing political instability, financial hardships and the limited health infrastructure (75). The availability of services is heavily influenced by the country's healthcare infrastructure, which has been severely damaged by decades of conflict and instability. Healthcare facilities providing visceral leishmaniasis services are limited or not available, particularly in the rural and conflict affected areas where the endemicity of the disease is the highest (82). Majority of the facilities are not equipped to diagnose and treat visceral leishmaniasis. Most of visceral leishmaniasis services are concentrated in urban centres and large towns, where hospitals and health clinics are more likely to be staffed with trained personnel and equipped with the necessary diagnostic tools and medications (9). For example, the capital city of Mogadishu, despite its own challenges, has some facilities capable of managing VL cases, though these are often overwhelmed by the demand. In contrast, rural areas, where many of the at-risk populations reside, are often devoid of even basic healthcare services, let alone specialized VL care. This geographical disparity significantly impacts the availability of VL services, leaving many patients in rural areas without access to timely diagnosis and treatment.

Diagnostic services for visceral leishmaniasis are limited, with a scarcity of laboratories capable of conducting the necessary tests to confirm VL cases (83). The diagnosis of VL typically relies on a combination of clinical evaluation, serological tests (such as the rK39 rapid diagnostic test), and parasitological confirmation (e.g., spleen or bone marrow aspiration) (84). However, the availability of these diagnostic tools varies widely across the country. In urban centers, some hospitals and clinics have the capacity to perform serological tests, but parasitological confirmation, which requires more specialized equipment and expertise, is often unavailable (85). In many rural areas, diagnostic services are virtually non-existent, leading to underdiagnosis and misdiagnosis of the disease. The treatment of visceral leishmaniasis is also severely limited, with many healthcare facilities lacking the necessary medications and resources to manage the disease effectively (86). The standard treatment for VL includes antimonial drugs, such as sodium stibogluconate, or paromycin and in some areas a limited amount of liposomal amphotericin B, which is considered the treatment of choice in many settings (87). However, the availability of these drugs remains inconsistent, with stockouts and supply chain disruptions common,

particularly in conflict affected regions. In some areas, traditional healers may be the only option for patients, leading to delays in receiving effective treatment and increasing the risk of mortality (88).

The surveillance of the disease is hindered by the country's weak health information systems and the lack of a coordinated national strategy for disease monitoring and relative priority to other communicable diseases such as polio and others (89). The ongoing conflict and insecurity in many parts of the country have made it difficult to establish and maintain robust surveillance systems (90,91). As a result, data on the incidence and prevalence of VL is often incomplete or outdated, complicating efforts to target resources and interventions effectively. In areas where surveillance systems do exist, they are often rudimentary, relying on passive case detection through healthcare facilities, which may miss a significant number of cases, particularly in remote or underserved areas.

2.5 The accessibility of visceral leishmaniasis services in Somalia

The accessibility of health services in general is severely compromised by the country's poor infrastructure and the vast distances that many patients must travel to reach healthcare facilities. The road network in Somalia is underdeveloped, with many areas, particularly in rural regions, lacking paved roads or reliable transportation. During the rainy season, many roads become impassable, further isolating communities and limiting access to healthcare services. For patients in remote areas, the nearest healthcare facility may be several hours or even days away, making it difficult to seek timely diagnosis and treatment (92,93).

The insecurity in many parts of the country, particularly in southern and central regions, also restricts movement and access to healthcare services. Conflict-related barriers, such as roadblocks, checkpoints, and violence, can prevent patients from reaching healthcare facilities, leading to delays in diagnosis and treatment. In some cases, entire regions may be cut off from healthcare services due to ongoing fighting or the presence of armed groups, leaving populations without any access to VL care (94,95) .

The standard treatment for patients, including the cost of medications, hospitalization, and supportive care, is often prohibitively expensive for many patients (96). While some international organizations and NGOs provide free or subsidized treatment in certain areas, these services are

not universally available, and many patients are forced to pay out of pocket for their care. This financial burden can lead to delays in seeking treatment, as patients may need to borrow money or sell assets to afford the necessary care. In some cases, patients may forego treatment altogether, leading to fatal outcomes. Free of-charge VL services are available in some parts of Somalia, primarily through the efforts of international organizations, NGOs, and humanitarian agencies including UNICEF and WHO (97). These organizations often operate in partnership with local health authorities to provide free diagnosis, treatment, and follow-up care for patients. However, the availability of these services is limited and often concentrated in specific regions or urban centers (27). In many rural and conflict-affected areas, free services including free VL services are not available, leaving patients without access to essential care. Even where free services are available, patients may still face indirect costs, such as transportation, accommodation, and lost income, which can further limit access to care (98).

2.6 Barriers to visceral leishmaniasis service delivery in somalia

The delivery of health services particularly NTD services including VL in Somalia faces significant barriers that compromise the ability to diagnose, treat, and control the disease effectively. These barriers are multifaceted, including health system constraints, infrastructural challenges, sociocultural factors, economic difficulties, and political and security issues.

2.6.1 Health System Barriers

2.6.1.1 Resource Limitations: The Somali health system has been severely weakened by decades of conflict, political instability, and underinvestment. This has resulted in a lack of essential resources, including trained healthcare staff, medical equipment, and medications necessary for the diagnosis and treatment of VL (92).

2.6.1.2 Staffing Shortages: There is a critical shortage of trained healthcare professionals in Somalia, particularly in rural and conflict-affected areas where VL is most prevalent. The limited number of doctors, nurses, and laboratory technicians has been exacerbated by the ongoing emigration of skilled workers seeking better opportunities abroad and the concentration of these health personell in the urban areas and large towns. The healthcare workers often lack specialized training in the management of VL, leading to misdiagnosis and suboptimal treatment. Additionally,

the overburdened staff are unable to provide the necessary follow-up care for VL patients, increasing the risk of relapse and mortality (92,99).

2.6.1.3 Equipment Deficiencies: The diagnostic process for VL requires specific equipment and laboratory facilities, such as serological test kits, microscopes, and centrifuges. However, many healthcare facilities in Somalia lack these essential tools, especially in remote and underserved areas. The absence of proper diagnostic equipment leads to delays in diagnosis, misdiagnosis, and underreporting of VL cases. Even in facilities where basic diagnostic tools are available, they are often outdated, poorly maintained, or in short supply, further hindering accurate and timely diagnosis (11).

2.6.1.4 Medication Shortages: The treatment of VL requires specific medications, including antimonial drugs like sodium stibogluconate, paromycine and liposomal amphotericin B. However, the availability of these medications in Somalia is inconsistent due to supply chain disruptions, lack of funding, and logistical challenges. Frequent stockouts of essential drugs are common, forcing healthcare providers to resort to less effective or inappropriate treatments. Additionally, the lack of standardized treatment protocols and the irregular supply of medications contribute to the emergence of drug-resistant strains of the *Leishmania* parasite, complicating efforts to control the disease (92).

2.6.2 Infrastructural Challenges

2.6.2.1 Healthcare Infrastructure: The infrastructure of healthcare facilities in Somalia is inadequate, particularly in regions where VL is endemic. Many hospitals and clinics operate in dilapidated buildings with limited access to clean water, electricity, and sanitation facilities. This lack of basic infrastructure hampers the ability of healthcare providers to deliver quality care and maintain hygienic conditions, which are crucial for the treatment of immunocompromised VL patients (92).

2.6.2.2 Transportation and Communication: The geographical landscape of Somalia, combined with its underdeveloped transportation network, poses significant challenges to accessing healthcare services. The majority of roads in rural areas are unpaved and often become impassable during the rainy season. The lack of reliable transportation means that patients, particularly those in remote areas, must travel long distances on foot or by makeshift means to reach the nearest

healthcare facility. This not only delays the diagnosis and treatment of VL but also discourages patients from seeking care altogether. Additionally, the lack of communication infrastructure in many parts of the country limits the ability to coordinate healthcare services, share information, and respond to disease outbreaks. The absence of reliable communication channels makes it difficult for healthcare workers to receive training, report cases, and access the latest guidelines on VL management (100).

2.6.3 Sociocultural Barriers

2.6.3.1 Stigma and Community Perceptions: Stigma associated with NTDs in particular Leprosy and Visceral Leishmaniasis is a significant barrier to service delivery in Somalia. The visible symptoms of VL, such as severe weight loss, splenomegaly (enlarged spleen), and skin changes, can lead to social isolation and discrimination. In some communities, VL is mistakenly believed to be a curse or punishment from a higher power, leading to further marginalization of affected individuals. This stigma discourages patients from seeking timely medical care, as they may fear being ostracized by their community or judged by healthcare providers (101).

2.6.3.2 Community Perceptions: Misconceptions about NTD in particular visceral leishmaniasis are widespread in many parts of Somalia, particularly in rural and low-literacy populations. Some communities may not recognize VL as a medical condition that requires treatment and may instead attribute the symptoms to supernatural causes or other illnesses including Malaria and Typhoid. This lack of understanding about the disease can lead to delays in seeking treatment and a preference for traditional healers over formal healthcare services. In some cases, families may prioritize traditional remedies, believing them to be more effective or safer than biomedical treatments, despite the lack of evidence supporting their efficacy (102).

2.6.3.3 Traditional Beliefs and Practices: Traditional beliefs and practices play a significant role in shaping health-seeking behavior in Somalia. Many communities have long-standing traditions of consulting traditional healers, who are often the first point of contact for individuals with health concerns. While traditional healers may provide supportive care and remedies, they are generally not equipped to diagnose or treat VL effectively. Reliance on traditional medicine can result in delays in seeking appropriate care, leading to worsening of the disease and increased mortality. Additionally, some traditional practices, such as the use of herbal concoctions or bloodletting, can have harmful effects and may exacerbate the condition of VL patients (88).

2.6.4 Economic Barriers

The economic impact of VL on affected households is substantial. In addition to the direct costs of medical care, families must also contend with indirect costs, such as transportation to healthcare facilities, lost income due to illness, and the need to care for sick relatives. For many families, the financial strain of VL can push them further into poverty, creating a cycle of vulnerability that is difficult to break. In some cases, families may resort to selling assets, borrowing money, or withdrawing children from school to cover the costs of treatment, further exacerbating their economic hardship (103).

2.6.5 Political and Security Barriers

2.6.5.1 Impact of Conflict and Instability: Somalia has been plagued by ongoing conflict and political instability for several decades, which has had a profound impact on the delivery of healthcare services, including those for VL. In regions where VL is endemic, such as southern and central Somalia, conflict and insecurity have severely disrupted healthcare services, making it difficult for patients to access care (75). The presence of armed groups, frequent clashes, and widespread violence have led to the destruction of healthcare facilities, displacement of populations, and a general breakdown of law and order in many parts of Somalia. Insecurity in these regions restricts the movement of healthcare workers, patients, and supplies, making it difficult to establish and maintain VL services. Healthcare providers operating in conflict zones face significant risks, including the threat of attacks, abductions, and killings, which further exacerbates the shortage of healthcare personnel in these areas. Additionally, ongoing conflict has led to the displacement of millions of people, many of whom live in overcrowded and unsanitary conditions in internally displaced persons (IDP) camps, where the risk of VL transmission is high and access to healthcare is limited (82).

2.6.5.2 Governance and Policy Challenges: The governance and policy environment in Somalia poses significant barriers to the effective delivery of VL services. The central government in Somalia has limited control over large parts of the country, particularly in the south and central regions, where armed groups and local clans exert considerable influence (75). This lack of centralized authority hampers efforts to coordinate and implement national health programs, including those for VL. The Somali health system suffers from weak governance, characterized by limited oversight, accountability, and regulatory capacity. This has led to the fragmentation of

health services, with different regions and actors implementing their own programs and priorities, often with little coordination or standardization (82). The absence of a coherent national strategy for VL control has resulted in gaps in service delivery, with some regions receiving more attention and resources than others. Additionally, the lack of reliable health data and surveillance systems makes it difficult to assess the true burden of VL in Somalia and to allocate resources effectively.

2.6.5.3 Policy Gaps: Despite the significant burden of VL in Somalia, there has been limited attention to the disease in national health policies and strategies. The focus of health policy in Somalia has largely been on addressing more visible and immediate health crises, such as cholera outbreaks, malnutrition, and maternal and child health. As a result, VL has not received the necessary attention and resources to mount an effective response. The lack of a national VL control program, inadequate funding, and insufficient integration of VL services into the broader health system are significant barriers to improving service delivery for the disease.

2.7 RECOMMENDATIONS AND WAY FORWARD

Enhancing visceral leishmaniasis (VL) service delivery in Somalia requires addressing the challenges and leveraging the strengths within the healthcare system. Key strengths include ongoing VL control programs, established in collaboration with international organizations and NGOs, which have played a crucial role in managing the disease through surveillance, case management, and vector control. These programs should be expanded, integrated into the broader healthcare system, and supported by continuous monitoring and evaluation to ensure sustained effectiveness. Integrating VL services into primary healthcare allows for a comprehensive approach to patient care, enabling early diagnosis and treatment within existing health infrastructures. This integration should be strengthened through sustained capacity-building initiatives, ensuring that primary healthcare workers are adequately trained to manage VL cases, particularly in regions with a shortage of specialized providers.

International aid and partnerships have been instrumental in supporting Somalia's efforts to combat VL, providing crucial funding, technical assistance, and resources. To ensure sustainability, the Somali government should continue fostering these partnerships while increasing domestic funding for VL programs to reduce reliance on international aid and promote local ownership of VL control initiatives. Capacity-building efforts facilitated by these partnerships have been essential, equipping Somali healthcare professionals with the skills needed to provide effective

care. Institutionalizing these training programs and developing local training capacities will be crucial for the continued success of VL management.

Collaborative research and development initiatives have enhanced the understanding of VL in Somalia, informing evidence-based strategies for control and leading to innovations in diagnosis and treatment. Expanding these research efforts, with a focus on operational research, and building local research capacities are recommended to ensure Somali researchers contribute actively to global VL knowledge. Community engagement has been another critical enabler, with local leaders and NGOs playing a vital role in raising awareness and promoting health-seeking behavior. Intensifying these efforts and empowering local leaders and NGOs will further enhance community acceptance and uptake of VL services.

Technological innovations, such as the adoption of the District Health Information Software 2 (DHIS2) and telemedicine, have the potential to transform VL service delivery by improving disease surveillance, patient management, and access to care. Expanding the use of DHIS2 and scaling up telemedicine initiatives, particularly in underserved areas, are recommended to enhance service delivery. Recent innovations in VL diagnosis and treatment, such as rapid diagnostic tests (RDTs) and combination therapies, should be further integrated into the standard of care, ensuring wide accessibility and monitoring their impact on patient outcomes.

The private sector plays a significant role in VL service delivery in Somalia, offering specialized care and resources. Strengthening public-private partnerships (PPPs) can enhance the reach and effectiveness of VL control programs, ensuring essential medications and supplies reach those in need. Pharmaceutical companies, both local and international, also play a crucial role in ensuring the availability of affordable and effective VL treatments. Strengthening collaborations between the Somali government, international organizations, and pharmaceutical companies, and expanding drug donation programs, are essential to making new and effective treatments accessible and affordable, reducing the financial burden on patients and improving treatment adherence.

2.8 CONCLUSION

The review highlights that while there are existing VL services in Somalia, their availability, accessibility, and quality vary widely across different regions. Diagnostic services are often concentrated in urban centers, leaving rural and remote populations underserved. Treatment facilities are similarly limited, with a significant reliance on international aid and NGO-run clinics. Surveillance systems, though present, are hampered by resource constraints and the ongoing instability in many parts of the country, leading to underreporting and delays in outbreak detection and response.

The review also identifies several critical barriers to effective VL service delivery in Somalia. Health system challenges, including insufficient healthcare infrastructure, shortages of trained staff, and limited access to essential medicines and diagnostic tools, are pervasive. These issues are exacerbated by infrastructural challenges such as poor road networks and lack of transportation, which make it difficult for patients to reach healthcare facilities. Sociocultural barriers, including stigma, traditional beliefs, and reliance on traditional medicine, further complicate the landscape, leading to delays in seeking appropriate care. Economic barriers, particularly the high cost of treatment and the financial burden on families, pose additional challenges, particularly in a country where poverty is widespread. Political and security barriers, including the impact of conflict, weak governance, and policy gaps, further undermine efforts to improve VL service delivery, particularly in conflict-affected and remote regions. Despite these challenges, there are several enablers that offer hope for improving VL service delivery in Somalia. The presence of international aid and partnerships has been crucial in supporting existing VL control programs, providing much-needed resources, training, and technical assistance. Community engagement initiatives, driven by local leaders, NGOs, and awareness campaigns, have shown promise in mobilizing communities and promoting health-seeking behaviors. Technological and innovative solutions, such as the use of digital health apps like DHIS2, telemedicine, and advances in diagnostic and treatment methods, have the potential to transform the delivery of VL services, particularly in remote and underserved areas. The role of the private sector, including private healthcare providers and pharmaceutical companies, has also been significant, offering alternative avenues for care and contributing to the availability of essential medicines.

The review lastly underscores the need for a multifaceted and collaborative approach to address the barriers to VL service delivery in Somalia. Strengthening the health system through capacity building, resource allocation, and infrastructural improvements is essential. There is also a need for targeted interventions to address sociocultural barriers, including community-based education and engagement programs that are culturally sensitive and contextually relevant. Economic barriers can be mitigated through financial support mechanisms, such as subsidies or free treatment programs, particularly for the most vulnerable populations. Finally, addressing political and security barriers requires a concerted effort from the Somali government, international organizations, and local stakeholders to create a stable and supportive environment for VL service delivery.

CHAPTER THREE: MATERIALS AND METHODS

3.1 STUDY DESIGN

The study employed a mixed methods sequential explanatory design, an integrated qualitative and quantitative research approaches to comprehensively assess the current state of visceral leishmaniasis service delivery and identify barriers and enablers to effective service delivery.

3.1.1 Quantitative component

The quantitative part of the study began with analysis of VL registry data to review the diagnosis and treatment services provided by healthcare facilities in selected sites. This initial phase aimed to establish a baseline understanding of the availability, accessibility, and quality of VL services. After conducting the registry data review, the study used the World Health Organization's Service Availability and Readiness Assessment (SARA) checklist to assess the current state of VL services. The SARA tool was designed to evaluate the availability of essential health services and the readiness of health facilities to provide those services (104). This assessment was conducted in a representative sample of healthcare facilities across Somalia, focusing on key indicators such as the presence of diagnostic tools, availability of medications, and the capacity of healthcare personnel. The data collected through the SARA checklist provided a comprehensive overview of the structural and operational aspects of VL service delivery in the country.

3.1.2 Qualitative Component

The qualitative part of the study involved conducting in-depth interviews with healthcare providers, program managers and decision-makers, as well as focus group discussions with patients and family members affected by VL. The aim was to gather insights into the barriers and enablers of effective VL diagnosis and treatment services. These interviews covered topics such as policy implementation, resource allocation, training and support for healthcare workers, and the impact of external factors like conflict and displacement on service delivery. The qualitative approach used the Consolidated Framework for Implementation Research (CFIR) to develop interview guides (105). The CFIR provided a structured approach to identify various factors influencing the implementation of healthcare interventions, ensuring that all relevant aspects were considered.

Focus group discussions with patients and their families provided a grassroots perspective on the VL service delivery. These discussions explored the experiences and challenges faced by VL-affected individuals in accessing and receiving healthcare services. Topics included awareness and understanding of VL, accessibility of healthcare facilities, quality of care received, and any socio-economic or cultural barriers that might impede effective treatment. The use of focus group discussions allowed for a deeper understanding of community-level issues and the direct impact of VL on people's lives.

3.2 STUDY SETTING

The study was conducted across 5 sites in somalia, these sites were chosen for their significance in diagnosis and treating visceral leishmaniasis. Two of these sites were in Bay Region, while the remaining three were located in benadir region.

3.2.1 SITES IN THE BAY REGION

3.2.1.1 Kala-azar center operated by SOS

This facility for visceral leishmaniasis diagnosis and treatment serves patients from the bay region as well as from endemic regions such as gedo, middle jubba and bakool region. It also serves patients from the neighboring somali states of Ethiopia. The facility is known for its comprehensive diagnostic services and effective treatment protocols .

3.2.1.2 Bay regional hospital in baidoa

Bay regional hospital is a 200 bed capacity referral hospital for patients from the southern part of somalia particularly from bay, bakool and gedo regions, and it also serves as a referral center for patients with suspected visceral leishmaniasis from various endemic regions.

3.2.2 SITES IN THE BENADIR REGION

3.2.2.1 SOS Hospital

SOS hospital in benadir region, a primary healthcare facility offering inpatient and outpatient service particularly for the pediatrics and obstetric services. The hospital also serves for pediatric patients with suspected visceral leishmaniasis.

3.2.2.2 De Martino Hospital

Distinguished by its provision of inpatient services for adult patients with visceral leishmaniasis. Located at the heart of the capital city.

3.2.2.3 Benaadir Hospital

A mother and child hospital, located at the center of the capital, serves pediatric patients with suspected visceral leishmaniasis.

3.3 STUDY PARTICIPANTS AND SAMPLING PROCEDURE

3.3.1 Purposive Sampling

Purposive sampling was utilized to select participants who were most relevant to the study's objectives. This purposive sampling technique allowed for the deliberate selection of individuals with specific knowledge, experience, and roles related to VL service delivery. The aim was to gather rich, detailed data from those who could provide the most insight into the availability, accessibility, quality, barriers, and enablers of VL services in the selected regions.

3.3.2 In-Depth Interviews

A total of 57 in-depth interviews were conducted with a diverse group of participants. The participants included program managers, health service providers including medical doctors, qualified nurses, laboratory technicians, and pharmacists. The in-depth interviews were guided by the Consolidated Framework for Implementation Research (CFIR), ensuring that all relevant aspects of implementation were explored, from the intervention characteristics to the inner and outer settings that influence service delivery.

3.3.3 Focus Group Discussions

In addition to the interviews, the study conducted two separate focus group discussions (FGDs) involving 16 participants who were either patients with suspected VL or family members of those affected. These FGDs were designed to capture the perspectives of patients and their families on the barriers and enablers to effective VL service delivery.

3.4 IMPLEMENTATION FRAMEWORK

The Consolidated Framework for Implementation Research (CFIR) 2.0 was used as the guiding framework to evaluate and improve visceral leishmaniasis (VL) service delivery in Somalia (106–108). CFIR 2.0 is an updated version of the original CFIR framework, designed to provide a structured approach for assessing the implementation of interventions in complex healthcare settings. This comprehensive framework helps researchers and practitioners understand the myriad factors that can influence the success or failure of implementing new practices or improving existing ones. CFIR 2.0 organizes implementation factors into five major domains, each containing multiple constructs that represent different aspects of the implementation process: 1) Intervention characteristics, 2) Outer setting, 3) Inner setting, 4) Characteristics of individuals, and 5) Process. The aim of using CFIR 2.0 in this study was to systematically assess the various factors affecting the implementation of VL services in Somalia. The framework provided a comprehensive structure for identifying the barriers and enablers within each domain that could influence the success of VL service delivery. In addition to CFIR 2.0, the study utilized the CFIR-ERIC Matching Tool to develop and prioritize relevant strategies that address the identified barriers. The CFIR-ERIC tool is an evidence-based resource that matches specific CFIR-identified barriers to corresponding implementation strategies recommended by the Expert Recommendations for Implementing Change (ERIC) project (109–112).

3.5 DATA COLLECTION AND ANALYSIS PROCESS

The process of data collection began with the selection of participants through purposive sampling, ensuring that those included in the study were individuals with direct experience and knowledge of visceral leishmaniasis services. These participants included program managers, health service providers such as medical doctors, qualified nurses, laboratory technicians, and pharmacists, as well as patients and their family members affected by VL. The inclusion of such a diverse group of participants was essential for capturing a wide range of perspectives on VL service delivery, from both the supply and demand sides of healthcare.

To ensure that all of the discussions were captured, the interviews and focus group discussions were recorded using an audiotape recorder. Following the data collection, the recordings were translated from the local language, Somali, into English. Once the translations were completed, the interviews were transcribed into text form. These transcripts were then organized using Excel

software, where each interview or focus group discussion was systematically entered. Each transcript was thoroughly reviewed to ensure accuracy and completeness, providing a solid foundation for the subsequent stages of data analysis.

In addition to the interviews and focus group discussions, the researchers also conducted site visits to each of the selected study locations. An observation checklist, developed from the WHO Service Availability and Readiness Assessment (SARA) checklist, was used to systematically assess the infrastructure, staff, registers, and instruments in place for VL service delivery at each site. This checklist was specifically tailored to evaluate the facilities' capacity to provide effective VL services, including the availability and condition of diagnostic tools, the adequacy of medical supplies, the organization and completeness of patient registers, and the overall quality of the healthcare infrastructure. With the transcripts and observational data prepared, the next step was to code the data using the Consolidated Framework for Implementation Research (CFIR). The CFIR framework served as the guiding structure for the coding process, helping to categorize the data into relevant themes based on the five major domains of the framework: Intervention Characteristics, Outer Setting, Inner Setting, Characteristics of Individuals, and Process. Coding involved systematically identifying segments of the text that corresponded to specific constructs within these domains. For example, discussions about the complexity of VL services were coded under the "Intervention Characteristics" domain, while comments on the influence of external policies were coded under the "Outer Setting" domain.

After coding, the data was analyzed using a thematic analysis approach, guided by the CFIR framework. This involved organizing the coded data into themes that aligned with the CFIR domains. The thematic analysis allowed the researchers to identify patterns and relationships within the data, such as common barriers to VL service delivery or recurring enablers across different sites. Following the thematic analysis, the CFIR-ERIC Matching tool was employed to develop and prioritize relevant strategies that addressed the negative CFIR barriers identified during the analysis. This tool allowed the researchers to match the barriers with a set of evidence-based implementation strategies that were most likely to mitigate these challenges. By using the CFIR-ERIC Matching tool, the study was able to provide a set of effective implementation strategies tailored to the specific barriers identified in the context of VL service delivery in

Somalia. This strategic approach ensured that the recommendations for improving VL services were not only theoretically sound but also practical and contextually relevant.

3.6 ETHICAL CLEARANCE

Ethical clearance were obtained from the somali National Institute of Health (NIH) under the reference number **NIH/IRB/11/DEC/2023**. An informed consent was sought from all the participants in the study, ensuring they were fully informed and voluntarily participated in the research. For participants who were unable to provide written consent, verbal consent were obtained and documented appropriately.

CHAPTER FOUR: RESULTS

4.1 STATUS OF VISCERAL LEISHMANIASIS CENTERS

Table 4.1 Status of visceral leishmaniasis centers

	Visceral leishmaniasis centers				
	SOS Mogadishu	De Martino Hospital	Benaadir Hospital	SOS Baidoa	Bay Regional Hospital
Staffing	+++	+++	+++	+++	+++
Inpatient and observation beds	+++	++	+++	+++	+++
Infrastructure	++	++	++	+++	++
Basic amenities	+++	+++	+++	+++	+++
Medicines and commodities	+++	+	+++	+++	++
Diagnostics	+++	+	++	+++	+
Information system	+++	+	++	+++	+

From the observation field notes, the current access and quality of care for visceral leishmaniasis (VL) in Somalia were assessed across five key sites using the WHO Service Availability and Readiness Assessment (SARA) tool. The data collected from SOS Mogadishu, De Martino Hospital, Benaadir Hospital, SOS Baidoa, and Bay Regional Hospital revealed variations in the availability of essential services. The + signs in the table indicate the level of service availability, with "+" representing a lower grade of availability and "+++" representing the highest grade.

Staffing was consistently rated highly across all sites, indicating that most of these centers had adequate human resources to manage VL cases. However, infrastructure varied, with SOS Baidoa showing the highest level of infrastructure readiness, while other centers like De Martino Hospital and Bay Regional Hospital had relatively lower infrastructure scores. In terms of inpatient and observation beds, SOS Mogadishu, Benaadir Hospital, and SOS Baidoa performed better, while De Martino Hospital and Bay Regional Hospital had fewer beds available for patients.

Basic amenities such as water, sanitation, and electricity were mostly adequate, with all hospitals performing well in this category, except for Bay Regional Hospital, which showed slight

limitations. The availability of medicines and commodities was also uneven, with De Martino Hospital and Bay Regional Hospital showing lower availability compared to other sites that maintained consistent supplies.

Diagnostics and information systems followed a similar pattern, with SOS Mogadishu and SOS Baidoa showing higher availability, while other hospitals lagged behind. This assessment highlights significant disparities in the availability of key resources necessary for effective VL care, underscoring the need for targeted improvements in certain facilities.

4.2 Barriers and enablers to improving visceral leishmaniasis service delivery

4.2.1 INTERVENTION CHARACTERISTICS

4.2.1.1 Adaptability of visceral leishmaniasis services

The adaptability of visceral leishmaniasis services emerged as a barrier in the effective implementation of VL diagnosis and treatment in the country. Many participants including program managers, health service providers, and patients expressed concerns about the current VL services particularly the treatment protocols in adapting to local context.

One program manager highlighted this issue, stating, *"The treatment protocols are very specific, and while they are based on strong evidence, they don't always take into account the realities we face here in Somalia. For instance, we might not have all the recommended drugs available, or the diagnostic equipment might be outdated."*

A qualified nurse stated, *"We have to follow the protocols, but sometimes it's impossible. The patients we see come from remote areas, and they can't always return for follow-up visits. The guidelines don't account for these kinds of challenges."* This illustrates how the lack of adaptability in the VL intervention can result in suboptimal care, particularly in regions where patients face significant barriers to accessing healthcare services. Patients and their families also felt the impact of the intervention's limited adaptability. A family member of a patient expressed frustration, saying, *"We were told to come back for more tests, but we live far away, and it costs too much to travel. The doctors here are doing their best, but the system doesn't work for us."*

4.2.1.2 The complexity of VL services

The protocols for diagnosing and treating VL are complicated, requiring specialized training, specific diagnostic tools, and a series of steps that must be followed precisely to ensure effective treatment. This complexity posed significant challenges for health service providers, particularly in settings with limited resources and infrastructure.

A program manager described the issue, saying, *"The VL treatment protocols are very detailed, which is good for ensuring quality care, but they are also very demanding. Not all of our staff are fully trained on every aspect, and the equipment we need isn't always available."* This complexity was seen as a double-edged sword necessary for high-quality care but difficult to implement in practice.

Health service providers often struggled with the complexity of the intervention, particularly in terms of the diagnostic procedures. A laboratory technician shared, *"In the lab, we only use rapid tests to diagnose VL, while other preferred existing diagnostic tools including DAT and microscopic tests are not available and the lab staff are not even trained if they were available, so it's very difficult to reach a final decision sometimes, even when the patient is clinically ill."*

4.2.1.3 Cost of Implementing VL services

The cost of implementing VL services was frequently expressed as a barrier to effective service delivery. An executive manager explained the situation, stating, *"The cost of running these programs is very high. We rely heavily on support from international partners to fund everything from the medicines to the training programs. Without their help, we wouldn't be able to provide these services at all."* This reliance on external funding highlights the vulnerability of the VL services in Somalia, as the sustainability of the intervention is closely tied to continued international support. Health service providers also expressed concerns about the financial constraints they faced. One doctor mentioned, *"We have to be very careful with our resources. Sometimes, we have to make difficult decisions about who can receive treatment based on what we can afford."* This underscores the harsh realities of working within a constrained budget, where financial limitations directly impact the quality and availability of care.

Patients, too, felt the impact of these financial constraints. A patient shared their experience, saying, *"The treatment is supposed to be free, but sometimes we are asked to pay for certain tests*

or medications because the hospital doesn't have enough supplies." This situation often led to delays in treatment or, in some cases, patients abandoning treatment altogether due to the costs involved.

4.2.2 OUTER SETTING

4.2.2.1 Critical incidents: Emergencies and Outbreaks

The delivery of visceral leishmaniasis (VL) services in Somalia is deeply impacted by critical incidents, such as emergencies and disease outbreaks, which can severely disrupt the provision of healthcare. Many program managers, health service providers, and patients reported that these events often divert attention and resources away from VL services, leading to delays in diagnosis and treatment, and sometimes, the complete cessation of services.

A health manager described the challenges during the COVID-19 pandemic: *"When COVID hit, all our resources, including staff and supplies, were redirected to manage the emergency. VL services were almost entirely suspended, and patients had to wait longer for treatment, which is dangerous given the rapid progression of VL if untreated."*

Health service providers echoed this concern, noting the strain on the healthcare system during emergencies. A qualified nurse shared, *"When there's an outbreak or any kind of emergency, we are overwhelmed. The focus shifts entirely to the emergency at hand, and VL patients are often left waiting. It's heartbreaking because you know that these delays can be fatal."*

Patients and their families also experienced the consequences of these disruptions. A patient said, *"I was supposed to get my treatment, but when I came to the hospital, they told me they were dealing with an emergency and that I had to come back later. But I was already very sick, and traveling back and forth is not easy."*

4.2.2.2 Local attitudes: sociocultural values and beliefs

The participants noted that the misconceptions about the VL and its treatment are widespread, often leading to delays in seeking care or reluctance to adhere to treatment regimens.

A Health Manager stated *"There is a lot of misinformation about VL in the community. Some people believe that it's caused by a curse or that traditional medicine is more effective than what we offer in the clinics. This makes it very difficult to get patients to come in for diagnosis and treatment."*

Health service providers also reported challenges related to local beliefs about VL. A doctor shared, *"Patients sometimes come to us only after they've tried traditional remedies that don't work. By the time they arrive, the disease has often progressed to a more severe stage, making treatment more complicated and less effective."*

However, there were also examples of local attitudes serving as enablers. A health worker noted, *"In some communities, we've been able to work with traditional healers to refer patients to us. This has been very helpful because it means we're catching cases earlier and can start treatment sooner."*

4.2.2.3 Local conditions: Economic, environmental, political and technological factors

As participants highlighted, the economic situation, characterized by widespread poverty, limits the ability of many patients to access care, even when services are theoretically available.

A hospital director commented on the economic challenges: *"Many of our patients come from very poor backgrounds. Even though the treatment is free, the cost of transportation, time away from work, and other indirect costs make it difficult for them to access the services. This is a huge barrier."*

The participants also expressed that environmental conditions play a role, particularly in rural areas where access to healthcare facilities is limited by poor infrastructure and challenging terrain. A doctor noted, *"During the rainy season, roads become impassable, and patients simply can't reach us. We've had cases where people couldn't get treatment in time because they were stranded by floods."*

The political situation in Somalia, marked by instability and conflict, further complicated the delivery of VL services. An executive director explained, *"Insecurity in some regions makes it impossible to provide consistent services. Our staff can't travel to certain areas, and we have to rely on local partners, who may not always have the capacity to deliver the same level of care."*

Technological limitations, such as the lack of advanced diagnostic tools and electronic health records, also hindered VL service delivery. A laboratory technician mentioned, *"We are still using very basic equipment, and there's no way to share patient records between facilities. This makes follow-up difficult and leads to gaps in care."*

4.2.2.4 Partnerships: referral networks, international and local partners

Many program managers and health service providers emphasized the importance of partnerships in overcoming the challenges associated with VL service delivery. A hospital director highlighted *"We have established strong referral networks with smaller clinics and community health workers. This means that even if we can't reach every patient directly, we can ensure that they are referred to the nearest facility that can provide the necessary care."*

International and local partners also play a crucial role in supporting VL services, particularly in terms of funding, training, and providing essential supplies. An executive manager noted, *"Without the support of our international partners, we wouldn't have the medicines, training, or even the basic equipment we need to treat VL. They have been instrumental in keeping these services running."*

4.2.2.5 Policies and laws: Regulations, Guidelines, and the health system structure

Most of the participants noted that while there are guidelines in place, their implementation is often inconsistent due to a lack of oversight and resources.

A program manager explained, *"We have good guidelines for VL treatment, but the challenge is in ensuring that they are followed consistently across all facilities. There's a lack of monitoring and support to make sure that every clinic is providing care according to these standards."*

Health service providers also expressed concerns about the overall health system structure, which they felt was not well equipped to handle the complexities of VL service delivery. A doctor shared, *"The health system here is very fragmented. There's no clear chain of command, and sometimes it's unclear who is responsible for what. This makes it difficult to implement guidelines effectively."*

4.2.2.6 Financing: External and internal funding

The financing of VL services in Somalia is heavily dependent on external funding from international organizations and donors. This reliance on external sources of funding is both a strength and a weakness for VL service delivery.

An executive manager highlighted the importance of external funding: *"Our VL programs are almost entirely funded by international partners. Without their support, we wouldn't be able to offer these services at all. The medicines, training, and even the salaries for some of our staff are covered by external funds."*

However, according to the participants, this dependency raises concerns about the sustainability of VL services. A health facility manager expressed this concern, saying, *"What worries us is what happens if the funding stops. There is no local funding to replace it, and that would mean the end of VL services here. It's a constant source of anxiety."*

4.2.3 INNER SETTING

4.2.3.1 Structural characteristics

The structural characteristics within the health facilities delivering visceral leishmaniasis (VL) services in Somalia, including physical infrastructure, information technology infrastructure, and work infrastructure, were identified as significant factors influencing service delivery. These structural components serve as both barriers and enablers, depending on their adequacy and functionality.

4.2.3.1.1 Physical Infrastructure

The state of physical infrastructure was often expressed as a barrier to effective VL service delivery. Many health service providers and program managers expressed concerns about the inadequacy of the facilities. A health facility manager remarked, *"Most of our facilities are in poor condition. We lack basic amenities such as consistent electricity, clean water, and adequate space for patient care. This makes it very challenging to provide quality services, especially for a disease as complex as VL."*

Patients also expressed concerns about the physical conditions of the facilities. One patient shared, *"The clinic was overcrowded, and there were not enough beds. Some patients had to wait outside for their turn. It's hard to feel confident in the treatment when the facility itself seems so rundown."*

4.2.3.1.2 Information Technology Infrastructure

The lack of a robust information technology (IT) infrastructure was another barrier identified by participants. Health service providers emphasized the absence of electronic health records and

communication systems that could streamline patient management and coordination across different levels of care. A qualified nurse stated, *"We still rely on paper records, and there is no system for tracking patients across different facilities. This makes it difficult to follow up on cases or share information between hospitals."*

4.2.3.1.3 Work Infrastructure

Work infrastructure, including the availability of necessary tools, equipment, and materials, was also highlighted as a critical factor. Hospital managers pointed out that the lack of essential diagnostic tools, such as the Direct Agglutination Test (DAT) and microscopic examination capabilities, severely limits the ability to accurately diagnose VL. A hospital director noted, *"Our labs are not equipped with the necessary tools to perform advanced diagnostic tests. We rely heavily on rapid tests, which are not always reliable. This compromises our ability to diagnose and treat VL effectively."*

4.2.3.2 Communication

Effective communication within the health system was identified as a key enabler of VL service delivery, particularly in terms of integration with other services. Several participants highlighted the importance of communication and coordination between VL services and other health programs, such as malaria control, as a way to optimize resource use and improve patient outcomes.

An executive manager described the integration of VL and malaria services as a positive development: *"We've started integrating our VL services with malaria programs, and this has been very effective. The same teams that go out to diagnose and treat malaria can now also screen for VL. This has improved our coverage and allowed us to reach more patients."*

Health service providers also noted the benefits of improved communication within the health system. A doctor shared, *"The integration with malaria services has made it easier for us to identify VL cases early on. Patients who come in with fever are now routinely screened for both malaria and VL, which means we can start treatment sooner if needed."*

Patients also recognized the importance of these communication efforts. A patient mentioned, *"When I went to the clinic for malaria suspect, they also tested me for VL. I didn't even know I had it until then. I'm grateful that they were able to catch it early."*

4.2.3.3 Human Equity-Centeredness

Many health service providers and program managers emphasized a commitment to human equity in their approach to VL service delivery. This focus on equity was seen as a strength of the program, with efforts to ensure that all patients, regardless of their background or socioeconomic status, received the care they needed. A program manager stated, *"We are committed to providing equitable care to all our patients. VL is a disease that disproportionately affects the poor, so it's essential that our services are accessible to everyone who needs them."* Health service providers also expressed a strong commitment to patient-centered care. A qualified nurse said *"We do our best to make sure that every patient feels valued and cared for. Many of them come from very difficult circumstances, and it's important that we treat them with dignity and respect."*

4.2.3.4 Tension for Change

There was a palpable tension for change within the health facilities, with many participants expressing a desire for improvements in VL service delivery. This tension was driven by the recognition of existing gaps and the belief that better outcomes could be achieved with the right support and resources. A doctor noted, *"We know that the current system is not perfect, and there is a strong desire among the staff to make changes that will improve patient care. The challenge is finding the resources and support to make those changes happen."*

4.2.3.5 Compatibility and Relative Priority

Participants highlighted the compatibility of VL services with other health programs and the relative priority given to VL within the broader health system. Program managers noted that while VL was recognized as an important health issue, it often competed with other priorities for attention and resources. An executive manager explained, *"VL is a serious disease, but it doesn't always get the attention it deserves because there are so many other health issues that we're dealing with. It's a constant struggle to keep it on the agenda."*

Health service providers also expressed concerns about the relative priority given to VL. A doctor remarked, *"We're often told that VL is important, but when it comes to allocating resources, it doesn't always seem to be the top priority. This can be frustrating because we know how critical it is to address this disease."*

4.2.3.6 Incentive Systems

Program managers noted that while there were some incentives in place for staff working on VL programs, these were often insufficient to fully motivate the workforce. An executive manager commented, *"We do have some incentives for staff, such as additional training and recognition, but they are not always enough to keep people motivated, especially given the challenging conditions they work under."*

4.2.3.7 Available Resources

The availability of resources, including funding, physical space, materials, and equipment, was identified as a crucial factor in the delivery of VL services. Participants consistently highlighted the challenges posed by limited resources, which often constrained their ability to provide effective care.

4.2.3.8 Funding

The reliance on external funding for VL services was seen as both a strength and a weakness. Program managers expressed gratitude for the support provided by international partners but also voiced concerns about the sustainability of these funds. A Health manager explained, *"Our entire VL program is funded by external donors. While we're grateful for their support, there's always a concern about what will happen if the funding dries up. We don't have a local funding base to fall back on."*

4.2.3.9 Physical Space

The availability of physical space within health facilities was another challenge identified by participants. Many facilities were overcrowded, with limited space for patient care, diagnostic testing, and treatment. A qualified nurse noted, *"We simply don't have enough space to accommodate all the patients who need VL treatment. Sometimes we have to turn people away or ask them to come back later, which is not ideal."*

4.2.3.10 Materials and Equipment

The lack of necessary materials and equipment was a recurring theme among participants. Health service providers frequently mentioned the scarcity of diagnostic tools, medicines, and other essential supplies. A hospital director stated, *"We often run out of rapid tests we need for testing, and there are times when we don't have the medicines we need to treat patients. This makes it very difficult to provide the level of care that our patients deserve."*

4.2.3.11 Access to Knowledge and Information

Program managers and health service providers highlighted that continuous training and education regarding visceral leishmaniasis are not consistently available for healthcare providers. They also emphasized the importance of regular training to keep up with the latest developments in VL diagnosis and treatment. A health manager noted, *"Continuous education and training are crucial, but unfortunately, we don't always have access to these resources. This gap in knowledge can affect the quality of care we provide"*.

Health service providers echoed this concern, with a doctor stating, *"We need ongoing training to stay updated on the best practices for diagnosing and treating VL. However, these opportunities are infrequent, which leaves us feeling unprepared at times."* The lack of continuous training and education was seen as a significant barrier to providing high-quality VL services, as it limits the ability of healthcare workers to stay informed about the latest advancements in treatment protocols and diagnostic techniques.

4.2.3 INDIVIDUAL CHARACTERISTICS

4.2.3.1 Roles of high level leaders (Decision makers)

High-level leaders and decision-makers within the health system in terms of their commitment, vision, and leadership were expressed as a significant enabler on the implementation and sustainability of VL services. An executive manager highlighted the importance of strong leadership, stating, *"The commitment from our leadership team is vital. They have the influence to communicate and inform the partners to allocate resources, mobilize support, and ensure that VL services remain a priority. Without their backing, it would be difficult to sustain our efforts."*

However, the absence of such leadership can also serve as a barrier. A health manager noted, *"When leadership is not fully engaged or prioritizes other health issues, it becomes a challenge to maintain momentum for VL initiatives. We need more consistent advocacy from the top to keep VL on the agenda."*

4.2.3.2 Roles of Opinion Leaders

Opinion leaders, who often serve as trusted voices within communities and the health system, were also seen as a key enabler who plays a pivotal role in influencing attitudes and behaviors related to VL service delivery. These individuals can act as champions for VL initiatives, advocating for their importance and helping to foster a supportive environment for implementation. A health facility manager mentioned, *"Opinion leaders in our community have been instrumental in raising awareness about VL. Their support helps us gain the trust of the community and encourages more people to seek care."*

4.2.3.3 Roles of VL Service Facilitators

VL service facilitators, who may include facility managers and program managers, play a critical role in ensuring that services are delivered effectively. A program manager emphasized the importance of these roles, stating, *"Our facilitators are the backbone of the VL program. They ensure that everything runs smoothly, from training health workers to coordinating with other departments. Their work is essential for the success of our program."*

Facilitators are often the ones who ensure that health workers are adequately trained and that the necessary resources are in place for effective service delivery. However, the lack of sufficient facilitators or gaps in their training can pose significant barriers. A hospital director noted, *"We sometimes struggle with a shortage of facilitators, which means that training and support are not always consistent. This can lead to gaps in our ability to deliver high-quality VL services."*

4.2.3.5 Roles of VL Service Recipients

The patients, as recipients of VL services, commented that they have unique needs that must be addressed to ensure effective care. Understanding these needs and incorporating patient perspectives into service delivery were seen as essential for improving outcomes. A patient expressed their needs, saying, *"We need more accessible services and better communication from*

healthcare providers. Sometimes, it's difficult to understand the treatment process, and we feel left out of decisions about our care."

Patients' needs, including access to services, clear communication, and involvement in care decisions, were critical for the success of VL programs. When these needs are met, patients are more likely to adhere to treatment and engage with healthcare providers. However, barriers such as limited access to services, cultural stigmas, and financial constraints were noted as a hinder for patient's ability to receive care. Another patient mentioned, *"Traveling to the clinic is expensive and time-consuming. If the services were closer, it would be easier for us to get the care we need."*

4.2.3.6 Capability of Service Providers

The capability of service providers, including their competency, knowledge, and skills, was a key determinant of the quality of VL services. High levels of competency and skills among healthcare providers enable the effective diagnosis and treatment of VL. A health service provider emphasized this, stating, *"Our ability to diagnose and treat VL accurately is critical. We are well-trained, but we need ongoing education to keep up with new developments in the field."*

However, gaps in training and knowledge can serve as barriers to effective service delivery. Continuous education and training opportunities are not always available, as highlighted by participants. A program manager noted, *"There are limited opportunities for continuous education in VL. This can leave our healthcare providers feeling unprepared and less confident in their ability to manage complex cases."*

4.2.3.6 Motivation of Service Providers

The motivation of service providers, including their commitment to delivering VL services, is a powerful enabler in the fight against VL. Motivated and committed healthcare providers are more likely to go above and beyond to ensure that patients receive the care they need. A program manager highlighted this, saying, *"Our team is incredibly dedicated. Despite the challenges, they are committed to providing the best care possible. Their motivation is what keeps our program going."* However, motivation can be undermined by various barriers, including inadequate compensation, high workloads, and lack of recognition. A health service provider expressed their frustration, stating, *"We are passionate about our work, but the high workload and lack of support can be demotivating. We need more recognition and support to keep going."*

4.2.4 PROCESS

4.2.4.1 Assessing the Needs and context

Assessing the needs of both the service providers and the patients were seen as a critical step in ensuring that VL services to be appropriately designed and delivered. A health manager commented on the challenges of needs assessment, saying, *"We often lack comprehensive data on the needs of our patients, which makes it difficult to tailor our services effectively. We need better tools and processes to assess and address these needs."*

An executive manager discussed the importance of context assessment, stating, *"Understanding the local context is crucial for implementing VL services effectively. We need to consider factors such as infrastructure, cultural beliefs, and policy environments."* A doctor added, *"The local context can greatly affect how we deliver services. For example, understanding community attitudes and infrastructure limitations helps us navigate challenges and find solutions."*

4.2.4.2 Planning

Participants highlighted that effective planning ensures that resources are allocated appropriately, timelines are established, and goals are clearly defined. A program manager emphasized the importance of planning, stating, *"We need detailed plans to ensure that all aspects of VL service delivery are covered. Without proper planning, we risk delays and inefficiencies in implementation."*

A health manager noted, *"Having a clear work plan helps us stay organized and focused on our objectives. However, sometimes our plans are not detailed enough, leading to confusion and inconsistencies in service delivery."*

4.2.4.3 Engaging

A program manager highlighted the role of engagement, stating, *"Engaging stakeholders helps us understand their perspectives and incorporate their feedback into our services. However, we often face challenges in effectively involving all relevant parties."*

Health service providers also shared their experiences, with one noting, *"Engaging with patients and community members helps build trust and ensures that our services meet their needs. But we sometimes struggle to engage all stakeholders effectively."*

4.2.4.4 Reflecting and Evaluating

Reflecting and evaluating to assess the effectiveness of VL services, identifying areas for improvement, and making necessary adjustments based on feedback and outcomes were expressed as an important enabling factor. A health manager emphasized the importance of reflection and evaluation, stating, *"Regular evaluation helps us understand what is working and what needs improvement. Without it, we cannot effectively adapt our services to address emerging challenges."* Health service providers added, *"Reflecting on our practices and evaluating our outcomes allows us to make necessary changes and improve our service delivery. However, we often lack the resources and time to conduct thorough evaluations."*

4.3 RECOMMENDED IMPLEMENTATION STRATEGIES TO IMPROVE VISCERAL LEISHMANIASIS SERVICE DELIVERY USING CFIR-ERIC MATCHING TOOL

By utilizing the CFIR-ERIC Matching tool, As provided in table 2, the study was able to translate the complex landscape of CFIR generated barriers into recommended strategies specifically tailored to the context of visceral leishmaniasis service delivery in Somalia. For example, CFIR barriers like complexity of VL services, particularly in diagnostic processes where healthcare providers struggled with limited tools and trainings were matched with strategies such as developing a formal implementation blueprint and promoting ongoing training to build local capacity.

The systematic approach provided by the CFIR-ERIC Matching tool ensured that the strategies developed were not only theoretically sound but also practically feasible within the specific context of Somalia. This tailored approach is crucial for addressing the unique challenges faced in VL service delivery, enabling a more effective and sustainable implementation of services that can adapt to both the immediate and long-term needs of the population. The study's use of the CFIR-ERIC tool highlights the importance of integrating evidence-based implementation strategies with a deep understanding of local barriers to improve health outcomes in complex settings like Somalia.

Table 2 Implementation strategies matched using CFIR-ERIC Matching tool

CFIR Barriers	ERIC Strategies	Ranks (%) **	Proposed context-specific strategies
Adaptability	Promote adaptability	73	Develop flexible VL service delivery models that adapt to changing local conditions and patient needs, such as mobile clinics and outreach teams.
Complexity	Develop a formal implementation blueprint. Promote adaptability Conduct ongoing training	43 40 37	Create detailed guidelines for VL service delivery and provide continuous training to health workers, ensuring they can adapt to complex cases.
Cost of Implementing VL services	Access new funding Alter incentive/allowance structures	72 44	Secure external funding from, domestic, NGOs and international donors to reduce the cost burden. Adjust healthcare provider incentives to improve service delivery.
Critical incidents: emergencies and outbreaks			
Sociocultural beliefs and values			
Economic, environmental and political conditions			
Partnerships, referral networks and Connections	Build a coalition Develop academic partnerships Promote network weaving Use advisory boards and workgroups Visit other sites	62 50 50 35 35	Strengthen referral networks between health facilities, build coalitions with NGOs, and form academic partnerships for technical and research support.
Policies, guidelines and health system structure			Advocate for national policies and guidelines that prioritize VL service delivery and integrate it into the routine health system.
Internal and external funding			Strengthen partnerships with NTD donors and government entities to secure consistent funding for VL services.
Competing priorities			Elevate VL as a public health priority through advocacy and awareness campaigns to ensure it receives adequate resources and attention.

Culture-centered equity and patient care	Obtain and use patients/consumers and family feedback	76	Involve patients and their families in care decisions and use their feedback to improve services. Conduct community-driven needs assessments to tailor interventions.
	Involve patients/consumers and family members	71	
	Conduct local needs assessment	57	
	Prepare patients/consumers to be active participants	48	
	Conduct local consensus discussions	29	
Structural Characteristics: physical, information technology and work infrastructure	Assess for readiness and identify barriers and facilitators	36	Upgrade clinic infrastructure to accommodate VL services and ensure access to essential medical equipment and technology for effective treatment.
	Change physical structure and equipment	32	
Communication			Improve communication between healthcare workers, patients, and external partners to streamline service delivery and enhance information sharing.
Culture	Identify and prepare champions	52	Empower local opinion leaders and health champions to promote VL treatment, increasing community awareness and service uptake.
Tension for change	Identify and prepare champions	48	Identify key community leaders to champion change, foster consensus on VL treatment, and continuously assess local needs to adjust services accordingly.
	Conduct local consensus discussions	43	
	Conduct local needs assessment	43	
	Inform local opinion leaders	39	
Incentive systems for healthcare providers to deliver VL services	Alter incentive/allowance structures	71	Implement performance-based incentives for health workers delivering VL services to boost motivation and improve patient outcomes.
	Access new funding	38	
Available Resources: Physical space,	Access new funding	78	Secure funding to upgrade health facility infrastructure and procure necessary medical equipment for VL diagnostics and treatment.

materials and equipment	Change physical structure and equipment	48	
	Fund and contract for clinical innovation	39	
Access to continuous training, updated knowledge & information	Conduct educational meetings	79	Organize regular training sessions and workshops to update health workers on VL service guidelines. Develop and distribute educational materials tailored to local conditions.
	Develop educational materials	59	
	Distribute educational materials	55	
	Create a learning collaborative	45	
	Conduct ongoing training	38	
High level leaders			Engage high-level health leaders to advocate for increased resource allocation and policy support for VL services.
Opinion Leaders	Identify and prepare champions	64	Empower respected community figures to act as opinion leaders and VL service advocates, ensuring they spread awareness and promote service uptake.
	Inform local opinion leaders	57	
	Build a coalition	32	
Role of service facilitators			Train facilitators to coordinate service delivery, manage resources effectively, and support frontline workers.
Planning	Develop a formal implementation blueprint	73	Develop a structured VL implementation plan based on local assessments, clearly defining roles, timelines, and resource needs.
	Conduct local needs assessment	50	
	Assess for readiness and identify barriers and facilitators	42	
Stakeholder engagement	Identify and prepare champions	63	Actively engage patients, families, and community members in VL care through awareness campaigns and patient-centered education to ensure adherence to treatment.
	Involve patients/consumers and family members	59	
	Prepare patients/consumers to be active participants	59	
		55	

	Intervene with patients/consumers to enhance uptake & adherence	50	
Reflecting & evaluating	Develop and implement tools for quality monitoring	60	Establish systems for regular quality audits of VL services and provide feedback to health workers to ensure continuous service improvement.
	Audit and provide feedback	56	
	Develop and organize quality monitoring systems	40	

CHAPTER FIVE: DISCUSSION AND CONCLUSION

The study examined the implementation of visceral leishmaniasis services in somalia, identifying key barriers and enablers using the determinant framework CFIR. The results showed in the study provide a detailed understanding of the complexities surround with delivering effective VL services in a resource limited and conflict effected setting like somalia.

5.1 INTERVENTION CHARACTERISTICS

The adaptability or the degree to which VL services can be modified to fit the local context emerged as a significant barrier. In this study, it's revealed that the treatment guideline and the diagnostic processess are often fail to account for the variability in service availability and patient needs which hampers patient outcomes. The participants in the study also noted the existing surveillance systems are outdated and not adaptable to changing epidemiological conditions. The complexity, which refers to the perceived difficulty of implementing VL services, was another significant barrier identified in the study. Healthcare providers and program managers reported that the current VL services are often too complex for the available infrastructure and workforce. There is an inadequacy in supply chain for instance diagnostic processes, consistent access to treatment, specialized training, and effective integration of VL services with other health services. Other countries in east Africa had the same adaptation and complexity challenges in terms of adapting the services to the local context, supply chain of diagnostic processes and access to treatment (27). In our study, the cost associated with implementing VL services was also identified as a significant barrier. This includes both the direct costs of procuring drugs, diagnostic tools, and other essential supplies, as well as the indirect costs associated with training healthcare providers, maintaining infrastructure, and conducting surveillance. The reliance on international partners for funding and support was highlighted as a vulnerability, with one program manager noting, "The program is supported by international partners, but this support is not guaranteed. A similar study on barriers to treatment for visceral leishmaniasis in hyperendemic areas including India, Brazil, Nepal, Bangladesh and Sudan revealed similar instances regarding the cost of treatment for visceral leishmaniasis (113).

5.2 OUTER SETTING

The study found that critical incidents, such as emergencies and outbreaks, can significantly disrupt VL service delivery. Program managers and healthcare providers reported that during periods of conflict or natural disasters, resources are often diverted away from VL services to address more immediate concerns. Local attitudes and sociocultural factors also play a significant role in the implementation of VL services. An earlier review found that challenges related with sociocultural beliefs, poor health system and political instability in eastern African regions impede the implementation of effective visceral leishmaniasis control (88). Another study noted that conflicts contribute to increase in cases of visceral leishmaniasis through population displacement and health system deterioration (114). Our study also found that there are widespread misconceptions about VL among the population, leading to delays in seeking treatment. Patients often rely on traditional healers or self-medication before seeking medical care, which can result in advanced disease and poorer outcomes. Program managers noted that these attitudes are influenced by a lack of awareness about VL and the availability of treatment. A study in Sudan revealed that misconceptions about VL were the main driving factors for delay in earlier seeking treatment (115). In this study, we found that collaboration and partnership with international organizations has provided essential funding, technical support, and resources for VL services in Somalia. Program managers emphasized the importance of building local partnerships and referral networks to enhance the sustainability of VL services. We also found that the regulatory environment in Somalia is not fully supportive of VL service delivery. Program managers reported that there are gaps in the existing policies and laws, which do not adequately address the specific needs of VL control. Additionally, the overall health system structure, characterized by limited coordination and fragmentation, hampers the effective implementation of VL services. The study revealed that financing is a significant barrier to VL service delivery, with funding often coming from external entities. This dependence on external funding creates uncertainty and limits the ability to plan and implement long-term VL control strategies. Program managers also highlighted the impact of external pressure, including social pressure from mass media campaigns and advocacy groups, which can influence the prioritization of VL services. An earlier study in east Africa confirms that challenges related with coordination, stable funding, regulatory requirements, and overall health system structure hamper effective implementation of visceral leishmaniasis service delivery (27).

5.3 INNER SETTING

The study found that the physical infrastructure, information technology infrastructure, and work infrastructure in Somalia are inadequate to support effective VL service delivery. Healthcare facilities often lack the necessary equipment, space, and technological support to provide comprehensive VL care. Communication within the health system was also identified as a barrier. The study found that there are significant gaps in communication between different levels of the health system, which leads to inefficiencies and delays in service delivery. Program managers reported that the lack of clear communication channels and protocols often results in confusion and misalignment of priorities. Similar communication and infrastructure challenges were also found in other regions including east Africa and Asia (56). Relative priority and incentive systems were also identified as barriers in the inner setting domain. The study found that VL services are often not prioritized within the health system, which leads to limited resources and support for these services. Program managers reported that other health issues, such as malaria and tuberculosis, often take precedence over VL, which affects the allocation of resources and attention. The study also found that there is a significant gap in access to knowledge and information within the health system. Healthcare providers and program managers reported that they often lack access to the latest guidelines, research, and best practices for VL service delivery.

5.4 INDIVIDUAL CHARACTERISTICS

The study highlighted a complex interplay among various stakeholders and highlighted critical roles in shaping the effectiveness of VL services. For instance, the high-level leaders and decision-makers were identified as crucial enablers of VL service implementation. Their commitment, vision, and leadership were seen as essential for sustaining VL initiatives and mobilizing resources. Conversely, the absence of engaged leadership often acted as a barrier, as noted by a health manager who emphasized the difficulties faced when leadership shifted focus to other health issues. Opinion leaders, including respected figures within communities and the health system, were also pivotal in VL service delivery. These individuals served as champions for VL initiatives, influencing attitudes and behaviors related to VL care. Their support was instrumental in raising awareness and fostering a supportive environment for the implementation of VL services. A health facility manager acknowledged the critical role of opinion leaders in gaining community trust and

encouraging care-seeking behavior. Other individual roles were also identified as significant enablers in effective implementation of visceral leishmaniasis service delivery.

5.5 PROCESS

Regarding the implementation process of delivering visceral leishmaniasis service delivery, the study revealed that assessing the needs and context was a critical process. Planning was identified as a vital process for ensuring the effective delivery of VL services. A program manager stressed the importance of having comprehensive plans to cover all aspects of VL service delivery. Engagement with stakeholders was highlighted as crucial for incorporating feedback and understanding different perspectives. A program manager observed that engaging stakeholders helped in refining services based on their input. However, challenges in involving all relevant parties effectively were noted. Reflecting and evaluating VL services were essential for assessing their effectiveness and making necessary adjustments. A health manager emphasized that regular evaluation was vital for understanding what worked well and what needed improvement. Without systematic reflection and evaluation, it was challenging to adapt services to emerging challenges.

5.6 CONCLUSION

The study provides a comprehensive analysis on the current status, availability, accessibility, barriers and enablers to effective implementation of visceral leishmaniasis service delivery in somalia. The study also highlights recommended strategies to develop an effective implementation strategy to improve the VL service delivery in the country. By addressing identified gaps, its possible to improve and implement the recommended strategies to achieve elimination of visceral leishmaniasis as a public health problem in Somalia. This requires a multi-faceted approach, involving strong leadership, tailored interventions, continuous training, and effective engagement of all stakeholders.

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APPENDIX

VISCERAL LEISHMANIASIS CHECKLIST AND INTERVIEW GUIDE

Name of facility: _____

Location of facility: _____

Region/province: _____

Type of facility: _____

Dates of Visits (in dd/mm/yyyy): _____

Urban/rural: _____

Visceral leishmaniasis

PART I- Service Statistics (This needs to be filled in by the concerned facility)

	Employed	Unemployed
Staffing		
• General medical doctors trained for VL diagnosis and treatment		
• Specialist medical doctors		
• Nursing professionals		
• Laboratory technicians		
• Pharmacists		
• Community Health Workers		
Inpatient and observation beds		
1) Excluding any delivery beds, how many overnight/inpatient beds in total does this facility have, both for adults and children?		
2) Of the overnight/inpatient beds in this facility, how many are dedicated VL beds?		
Infrastructure	Yes	No
• Does this facility have a functioning computer?		
• Is there access to email or internet within the facility today?		
• Does this facility have a functional ambulance or other vehicle for emergency transportation for clients that is stationed at this facility or operates from this facility?		
• Is fuel for the ambulance or other emergency vehicle available today?		
• Does your facility have electricity from any source (e.g., electricity grid, generator, solar, or other)?		
• Is there a designated area for waste disposal?		
• Are there microscopes available for VL diagnosis?		
• Are there centrifuges available for VL diagnosis?		
• Are there refrigerators available to store VL diagnostic reagents?		
• Are there other essential equipment for VL diagnosis and treatment available, such as RDTs, personal protective equipment, and syringes?		
• Does this facility have any guidelines on standard precautions for infection prevention?		
Basic amenities		
• On average, how many hours per day is this facility open?	1) 4 hours to 5 hours	

	2) 6 hours to 8 hours	
	3) 9 hours to 12 hours	
	4) 13 hours to 24 hours	
	5) More than 24 hours	
Medicines and commodities	Yes	No
• Are essential medicines for VL treatment available, such as antiparasitic drugs?		
• Are laboratory reagents for VL diagnosis available?		
• Are personal protective equipment for healthcare providers available?		
Diagnostics	Yes	No
• Are RDTs for VL diagnosis available?		
• Are other diagnostic tests for VL available, such as PCR?		
Training	Yes	No
• Are healthcare providers (medical doctors and laboratory technicians) trained in VL diagnosis and treatment for the last 6 months?		
• Are healthcare providers up to date on the latest VL treatment guidelines?		
• Are there opportunities for continuing medical education (CME) on VL for healthcare providers?		
Readiness	Yes	No
• Are there standard operating procedures (SOPs) in place for VL diagnosis and treatment?		
• Is there a referral mechanism for patients with complicated VL cases?		
• Is there a data collection system in place to track VL cases?		
Accessibility	Yes	No
• Are VL diagnosis and treatment services available within a reasonable distance for all patients?		
• Is there adequate transportation available for patients to access VL diagnosis and treatment services?		
• Are VL diagnosis and treatment services affordable for all patients?		
• Is there a fee-for-service system for VL diagnosis and treatment?		
• Are there any subsidies or exemptions available for VL diagnosis and treatment?		
• Are healthcare providers culturally sensitive to the needs of VL patients?		
• Are there language interpreters available to assist patients who do not speak the local language?		
• Are there culturally appropriate communication materials available for patients?		
	Yes	No
• Are RDTs for VL diagnosis accurate?		

• Is microscopy for VL diagnosis accurate?		
• Are other diagnostic tests for VL accurate?		
• Are essential medicines for VL treatment effective?		
• Are the treatment regimens for VL effective?		
• Is there a system in place to monitor treatment outcomes?		
• Are patients satisfied with the quality of VL diagnosis and treatment services?		
• Are patients satisfied with the communication from healthcare providers?		
• Are patients satisfied with the overall experience of receiving VL diagnosis and treatment?		

Part III.A – Provider Interaction**A. Provider Interaction – Service provider****I. Demographics**

1. Age: _____ Yrs.: _____

2. Gender: _____

3. Current affiliation and designation: _____

4. Can you describe the availability of VL diagnosis and treatment services at your facility?

5. What are the main challenges you face in providing VL diagnosis and treatment services at your facility?

6. What are the available resources and infrastructure for VL diagnosis and treatment at your facility?

7. What training and support have you received in managing VL cases?

8. What factors, from your perspective, hinder effective VL service delivery?

9. What factors, in your opinion, facilitate the improvement of VL service delivery?

10. What changes or interventions do you believe would significantly enhance VL service delivery?

11. What role do you think technology can play in improving VL service delivery?

12. What suggestions do you have for enhancing the collaboration between health providers, patients, and decision-makers?

13. How do you collaborate with other healthcare providers, such as community health workers, to provide VL services?

**PART III B. Decision makers & partners –MoH, MSF, SOS,
UNICEF, WHO**

1. Can you provide an overview of the current state of VL service delivery in Somalia?

2. What are the key challenges and opportunities in improving VL control at a national level?

3. How are resources allocated for VL control and service delivery?

4. What role does the Ministry of Health (MOH) play in overseeing and regulating VL control efforts?

5. How do international NGOs collaborate with the MOH and other stakeholders to improve VL control?

6. What are the potential barriers and facilitators to implementing effective VL control strategies?

7. What are the top priorities for improving VL service delivery in Somalia?

8. What mechanisms are in place to monitor and evaluate the effectiveness of VL control interventions?

9. How can evidence-based recommendations be translated into effective VL control programs?

Part IV

Community Interaction –Patient interaction

	1	2
Age of the patient		
Gender	M ☐ F ☐	M ☐ F ☐
Resident of the patient		
1. Can you describe your experiences with accessing and receiving VL diagnosis and treatment services?		
2. What were the barriers you faced in accessing and receiving VL diagnosis and treatment services?		
3. What aspects of your experiences with VL diagnosis and treatment services could be improved?		
4. Can you describe the challenges you faced during your interactions with healthcare providers?		
5. What were the factors that influenced your decision to seek VL diagnosis and treatment?		

6. How did you learn about VL and its symptoms?		
7. What steps did you take to seek diagnosis and treatment?		
8. What were your experiences with transportation and logistics in accessing VL services?		
9. How did the cost of VL diagnosis and treatment affect your decision to seek care?		
10. What suggestions do you have for improving the patient experience with VL diagnosis and treatment services?		

Ref: NIH/IRB/11/DEC/2023

12/27/2023/Mogadishu

Subject: Study Approval

Dear Dr Abdirahman M. Ibrahim (Investigator),

Your study titled: **Improving Visceral Leishmaniasis Service Delivery in Somalia: A Mixed Method Implementation Research**, upon expedited review of critical information about the proposed study, it was agreed that the proposed study does not cause more than the minimum risk. This is therefore to inform you that the Ethical Review Board of the National Institute of Health (NIH) - Somalia has granted approval for your study.

Note that your study approval number is **NIH/IRB/11/DEC/2023**. Reference this number in any correspondences with the research directorate of NIH.

Continued approval is conditional upon your compliance with the following:

1. Permission must be sought from relevant authorities for this study.
2. Informed consent must be obtained from respective study respondents before commencement of any data collection procedures and must be documented.
3. Any significant changes in the approved study that have the potential to negatively affect the safety and welfare of the study respondents must be reported immediately to the research directorate of NIH.
4. A report should be sent to the research directorate of NIH within 90 days of completion of the study

IRB decision: Approved

Dr Hussein Abukar Muhiadin



Executive Director, NIH



Dr Mohamed Abdelrahman



Research Director, NIH

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