

**SCALING UP COMMUNITY DIFFERENTIATED SERVICE DELIVERY TO
IMPROVE ACCESS TO HEALTH CARE AMONG PEOPLE LIVING WITH HIV
IN KAKAMEGA COUNTY, KENYA**

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September; 2024

DECLARATION

“I declare that this research thesis is my original work and has not been presented in any other University”

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ABSTRACT

Access to health services encourages early treatment seeking leading to better health outcomes and significant social and economic benefits. Without adequate access, the impact of HIV treatment and care services is severely diminished. This study aimed to address the existing challenges in healthcare access by scaling up community differentiated service delivery and evaluating its effectiveness in improving health outcomes among people living with HIV in Kakamega County. Two public facilities (cluster) in two sub counties (Butere and Kakamega) were randomly assigned (1:1) to provide community differentiated service delivery model (intervention group) and standard care (control group) to people living with HIV who are established on antiretroviral therapy. Exclusion criteria included patients on transit, those with comorbidities, pregnant and breastfeeding and those unable to give informed consent. At intervention clinic patients were assigned a lay health worker, attended monthly group meetings, received health education, peer counseling, symptom screening and ART refill. The primary outcome was the proportion of patients who had two clinic visits in twelve months. Baseline data was collected through questionnaires, in-depth interviews, and end line data collected through document reviews. Ethical clearance was obtained from relevant authorities. This trial is registered with National Council of Science and Technology clinical trial registry, number Nascosti/P/21/12623. At enrollment, 402 participants (201 in each group) were included, with 295 aged below 35 years and 107 above 35 years. Males comprised 116, and females 286. Baseline assessment established low level of readiness ($p=0.007$, $OR=1.362$), low demand ($p=0.032$, $OR=1.78$), non-comprehensive package of services ($p=0.009$, $OR=1.134$) and poor support ($p=0.009$, $OR=1.20$). At end line scaling up community differentiated service delivery was successful in improving accessibility to health services among people living with HIV odds ratio 1.494 (p -value 0.001). Community differentiated service delivery can substantially improve and should be scaled up to improve health outcomes among people living with HIV. Future research should investigate enhancing visibility and accessibility of community differentiated service delivery for chronic diseases.

TABLE OF CONTENTS

DECLARATION	i
COPYRIGHT.....	ii
ACKNOWLEDGEMENTS	iii
ABSTRACT.....	iv
LIST OF TABLES.....	viii
LIST OF FIGURES.....	x
LIST Of ABBREVIATIONS	xi
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background of the Study	1
1.2 Statement of the Problem.....	3
1.3 Purpose of the Study	4
1.4 Specific Objectives	4
1.5Hypotheses.....	5
1.6 Justification of the study	5
1.7Limitation of the Study	6
1.8 Delimitation of the study	7
1.9 Significance of the study.....	7
1.10 Assumptions of the Study	7
1.11 Operational definition	7
CHAPTER TWO	9
LITERATURE REVIEW	9
2.1 Introduction.....	9
2.2 Community differentiated service delivery model	9
2.3 Community Readiness Assessment	11

2.4 Demand factors for Community differentiated service delivery model	15
2.5 Package of services quality	18
2.6 Mechanisms that support Community differentiated service delivery	22
2.7 Effects of differentiated service delivery	28
2.8 Summary	34
2.9 Gaps in Literature Review	35
2.10 Theoretical Framework	37
CHAPTER THREE	42
METHODOLOGY	42
3.1 Introduction.....	42
3.2 Research Design.....	42
3.3 Target Population.....	45
3.4 Sampling Procedure	46
3.5 Instrumentation	48
3.6 Methods of Data Collection	50
CHAPTER FOUR.....	62
RESULTS AND DISCUSSIONS	62
4.1 Introduction.....	62
4.2 Response rate	62
4.3 Test for Normality.....	62
4.4 Background data	64
4.5 Community readiness to scale up community differentiated service delivery	67
4.6 Determining demand for community differentiated services delivery	73
4.7 Evaluating the package of services in community differentiated service delivery....	77
4.8 Assessing Mechanisms that support community differentiated service delivery	83
4.9 End line results on scaling up community differentiated service delivery	87

CHAPTER FIVE	115
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATION	115
5.1 Introduction.....	115
5.2 Summary	115
5.3 Conclusion	116
5.4 Recommendation	118
REFERENCES.....	120
APPENDICES	137
Appendix A: Research Permit NACOSTI	137
Appendix B: Approval from county government	139
Appendix C: KEMU SERC	140
Appendix D: Questionnaire	143
Appendix E: Interview schedule	146
Appendix F: Document review check list.....	147
Appendix G: Cronbach's alpha	148
Appendix H: Pre Test Results.....	149
Appendix I: Test for Normality	153
Appendix J: Homogeneity of variance	154
Appendix K: Multicollinearity.....	155
Appendix L: Thematic Content Analysis	156
Appendix M: Work Plan	159

LIST OF TABLES

Table 2.1: Knowledge gaps in literature review	36
Table 3.1: Inclusions and Exclusion Criteria	46
Table 3.2: Operationalization of Variables	56
Table 3.3: Research Objectives, Hypothesis and Methods of Analysis	61
Table 4.1: Background Information of the Study Participants	64
Table 4.2: Cross tabulation of gender and level of education.....	65
Table 4.3: Cross tabulation of Age versus level of education	66
Table 4.4: Dimensions of community readiness to scale up community differentiated service delivery model among people living with HIV	68
Table 4.5: Level of Community Readiness to Scale Up Community Differentiated Service.....	72
Table 4.6: Demand factors for Community Differentiated Service Delivery.....	73
Table 4.7: Level of demand for community differentiated service delivery among respondents	77
Table 4.8: Components of Services within Community Differentiated Service Delivery	78
Table 4.9: Package of services offered in community differentiated service delivery among people living with HIV	82
Table 4.10: Mechanisms that Support Scale Up of Community Differentiated Service Delivery.....	83
Table 4.11: Support for scaling up community differentiated service delivery among people living with HIV	87
Table 4.12: Demographics characteristics of study participants at end line.....	88
Table 4.13: Cross tab of model of choice versus level of education	92
Table 4.14: Pre and post intervention means scores	94
Table 4.15: Macnemar test scores.....	95
Table 4.16: Primary outcomes	97
Table 4.17: Secondary outcomes	99

Table 4.18: Omnibus Test of the model Coefficient.....	101
Table 4.19: Summary of the Model	101
Table 4.20: The Hosmer & Lemeshow Test.....	102
Table 4.21: Multivariate logistic regression results	103
Table 4.22: Multivariate logistic Regression Results from End line data	109
Table 4.23: Effects of the intervention at end line 12 months	110
Table 4.24: Summary of Hypothesis and Study Findings	112

LIST OF FIGURES

Figure 2.1 Implementation fidelity Theoretical framework	40
Figure 2.2 Conceptual framework	41
Figure 4.1 Reason for drop out	89
Figure 4.2 Model of choice	90

LIST Of ABBREVIATIONS

ART	Antiretroviral Therapy
ABM	The Andersen Behavioral Model
AIDs	Acquired immune deficiency Syndrome
CADDP	Community ART drug distribution points
CARGs	Community ART Groups
CASCO	County AIDs and STI coordinator
CDSD	Community differentiated service delivery
CHMTs	County Health management team
CHAI	Clinton Health Access
CP	Community pharmacy
CRA	Community Readiness Assessment
CRM	Community readiness Model
DSD	Differentiated service delivery
FFT	Facility first track
FGDs	Focus group discussions
HBM	The Health belief Model
HCWs	Health care workers
HIV	Human immune deficiency Virus
HSD	Health service delivery
KHP	Kenya Health policy
KHSSP	Kenya health sector strategic plan
LHWs	Lay health workers
LTFU	Lost to follow up
MMS	Multi month scripting
MoHKe	Ministry of Health in Kenya
MoHUg	Ministry of health in Uganda
PCC	Patient centered care
PLHIV	People living with HIV
PMTCT	Prevention of Mother to child Transmission
RIC	Retention into care
SC	Standard care
STI	Sexually Transmitted infections
WHO	World health organization

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Access to quality health services constitutes a significant component of any country's health system, serving as a channel towards achieving universal health goals. It is a foundational pillar of health service delivery, beside other key components such as quality, efficiency, and equity (World Health Organization [WHO], 2016). Without satisfactory access, the impact of HIV treatment and care services is severely reduced. In the context of HIV care, ensuring that people living with HIV (PLHIV) can access life-saving antiretroviral therapy (ART) is essential to improving health outcomes and reducing transmission rates (He et al., 2023; The joint united Nations Program on HIV/AIDs[UNAIDS], 2023).

According to UNAIDS (2023), there is an estimated 39.9 million PLHIV globally, of which 26.7 are accessing antiretroviral therapy (ART). In Africa, 26.9 million PLHIV of with 86.6% receiving ART. In Sub-Sahara Africa, 20.7 million are HIV people are positive of and 67% are on ART while in Kenya, an estimated 1.4 million people live with HIV, with 69% accessing ART. This increasing number of PLHIV demonstrates that access remains a significant challenge. According to Mohammadi and Mohammadi (2022), access challenges include structural barriers (distance to clinics, healthcare costs), systemic barriers (long waiting times, understaffed facilities), and social barriers (stigma, discrimination). While global response has made progress, there still exist gaps in access to high quality care in resource limited settings like sub-Sahara Africa.

To make HIV services accessible and of high quality, WHO recommended the Differentiated Service Delivery (DSD) model for PLHIV in their consolidated guidelines on the use of antiretroviral (WHO, 2016). DSD is a patient centered care model which aims to make

healthcare more tailored, efficient, and accessible for PLHIV by modifying who delivers the care, where it's provided, and how frequently it's given (Gansefort et al., 2018).

Community differentiated service delivery (CDSD), a component of differentiated service delivery that focuses on community-based model. It is a decentralized patient-centered (PCC) approach to health service provision within the community (Ministry of Health in Kenya [MoH], 2018). Its aim is to address health system strengthening challenges such as long distances to facilities, protracted waiting times, and revenue loss due to time spent accessing services at health facilities (Adjetei et al., 2019). CDSD include community ART groups (CARGs), community drug distribution points (CADDP) and outreach model. In CARGs members meet in a group 6-12 in the community for health education, health assessment, drug distribution and adherence counseling by an expert patient. Members take turns for collecting everyone's ART from the facility each month and bring it back to the community. Outreach model is managed by a health facility staff who distributes ART and provide other services to remote parts of the community for patients experiencing transport challenges. CADDP involves clients picking drugs from a pre-identified location also known as community pharmacy which can be a church, mosque or a school. Drugs are ordered at and distributed from a central level depot directly to the community pharmacy where they are packed and distributed to a specific number of patients who have enrolled in CADDP (Médecins Sans Frontières [MSF], 2013).

Notably, CDSD has proved positive outcomes in different settings. CDSD model was reported to have increased accessibility, mitigated disparities and enhanced adherence leading to favorable patient outcomes in Europe (Tribaudeau & Eyvrard, 2024). In South Africa, CDSD increased Patient Retention in Care (RIC) among PLHIV, while Mozambique reported small number of death and increased retention rates among Community ART groups members (Decroo et al., 2014). Zimbabwe's peer-led CDSD resulted in better health outcomes for adolescents living with HIV (Mavhu et al., 2020), and Uganda's self-formed Community ART

groups made treatment accessible and affordable, reducing travel costs and waiting times (United States Agency for International Development [USAIDs], 2020).

Kenya identifies CDSD as a key recommendation in the Guidelines on the use of ART, aligning with PCC principles outlined in the Kenya Health Policy framework (MoH, 2014). Despite initial successes, challenges such as resource constraints negatively affected the implementation of CDSD models in Kenya. This study proposes the introduction of trained lay health workers to manage and report on CDSD models, aiming to improve access to health services for PLHIV.

In conclusion, CDSD models offer an opportunity to increase access to treatment with limited resources, aligning with global health goals. Introducing trained lay health workers could address challenges and contribute to the sustainability and effectiveness of CDSD models in improving.

1.2 Statement of the Problem

Guidelines on the prevention and treatment of HIV, issued by both Kenya and the World Health Organization (WHO), recommend that all PLHIV commence ART immediately known as "test and start," following the expansion of eligibility (MoH, 2018; WHO, 2016). The UNAIDS HIV global treatment target of 95-95-95 by 2030 aims for 95% identification of PLHIV, 95% of those identified accessing ART, and achieving 95% viral suppression among those on ART (UNAIDs, 2020).

However, these recommendations have led to an overstrained health system, characterized by overcrowded health facilities and a shortage of adequately trained personnel to manage the increasing numbers. This situation intensifies the challenges of accessing health services.

Access to health services remains a significant challenge for PLHIV in Kakamega County, where out of a total of 57,952 PLHIV, only 38,248 (66%) have been able to access health services, falling short of the global target of 95%. Of the 66% initiated on treatment, 15.7% defaulted on ART, and 88.7% achieved viral suppression instead of the 95% global target

(Kakamega County AIDs Strategic Plan [KCASP], 2022). With shrinking resources assigned to HIV programs, there is unrelenting need for an alternative care delivery approach for PLHIV. CDS model can address this by bringing health services closer to where people reside (WHO, 2016).

The National CDS implementation report indicates 29% utilization of Community ART groups and 21% utilization of Community ART drug distribution points in Kakamega County (MoH, 2019). In 2017, Kakamega had 17 Community ART groups and two Community ART drug distribution points, but by 2020, this number had dwindled to two functional Community ART groups and no Community ART drug distribution points. Patients who used to revolve drug pick-ups abandoned this practice due to transport costs. The gross underutilization of CDS implies a substantial unrealized health gain among PLHIV in Kakamega County. This study aims to make health services accessible to PLHIV by scaling up CDS and evaluating its effects in Kakamega County.

1.3 Purpose of the Study

The purpose of this study is to improve access to health service by scaling up community differentiated service delivery model and evaluating its effects among PLHIV in Kakamega County. This study aimed to address the existing challenges in healthcare access and evaluate the model's effectiveness in improving health outcomes among PLHIV.

1.4 Specific Objectives

- i. To assess community readiness for scaling up community differentiated service delivery model to improve access to health services among PLHIV in Kakamega County.
- ii. To determine demand for community differentiated service delivery model to improve access to Health services among PLHIV in Kakamega County.
- iii. To assess the package of services offered while scaling up community differentiated service delivery for improved access to health services among PLHIV in Kakamega County.

- iv. To assess support mechanisms for scaling community differentiated service delivery for improved access to health services among PLHIV in Kakamega County.
- v. To evaluate the effects of community differentiated service delivery on access to health services among PLHIV in Kakamega County.

1.5 Hypotheses

H01 There is no significant relationship between community readiness and the improvement of access to health services among PLHIV in Kakamega County following the scale-up of the differentiated service delivery model.

H02 There may be no significant demand for the community differentiated service delivery model, and even if demand exists, it may not lead to a significant improvement in access to health services among PLHIV in Kakamega County.

H03 There may be no significant difference in the access to health services among PLHIV in Kakamega County based on the specific package of services offered during the scale-up of community differentiated service delivery models.

H04 The support mechanisms provided may not significantly impact the success of scaling up community differentiated service delivery in improving access to health services among PLHIV.

H05 The implementation of community differentiated service delivery may not result in a significant improvement in access to health services among PLHIV in Kakamega County.

1.6 Justification of the study

PLHIV in Kakamega faces challenges with access to health services, 34% of 57,952 are not able to access health services indicating coverage of ART that does not exceed 5%. The stable patients have diverse needs, and the current convectional method of service delivery does not respond to their needs. Patients established on treatment do not require frequent engagement with the health facility staff yet the CDSD has not realized its full potential. No study has been done to scale up CDSD and evaluate its effects on access to health services among PLHIV

although one randomized control trial by Wyatt et al. (2017) has shown the model is effective in improving access to health services by reducing congestion at the facilities, reducing patients waiting time and containing treatment cost. This study adds to important health system strengthening on how community level interventions can utilize resources efficiently and improve access to health services. It further reveals that the success of such intervention occurs when we draw from the strength of the community and especially the use of the lay health providers to manage community model, this shows how task shifting can help improve access to health services. The study was able to make HIV services accessible by increasing uptake of CDS from 29% community ART groups and 21% Community ART drug distribution points to 78%. Through CDS model patients were empowered in management of their own health and cut on cost associated with seeking Care.

1.7 Limitation of the Study

Although this study has produced vital information that will be used in the country's wide scale up of community differentiated service delivery. There are some limitations that provides avenues for further research. The study focused on clients who are already on ART overlooking clients who are newly diagnosed with HIV and need to be initiated on ART. The care and treatment unit can utilize CDS model to initiate newly diagnosed client on ART within the community and improve linkage to care. It also looked at scaling up community differentiated service delivery in HIV care and treatment services overlooking HIV prevention service. The HIV prevention unit can utilize community differentiated service delivery to offer pre-exposure prophylaxis, HIV self-test kits and condoms distribution. The study also focused on HIV clients alone yet the model can be used on other chronic diseases like hypertension, diabetes and cancers. There are little prior studies that have been done to form a foundation for understanding scale up of CDS since the model was introduced in 2015. This required coming up with new research topology which was use exploratory method understanding the challenges with access and use of CDS model.

1.8 Delimitation of the study

The study focused on PLHIV, yet there are many chronic diseases which can utilize CDSD to improve efficiency in health service delivery. The study took a period of one year to enable the researcher focus on improving accessibility to services. The focus was limited to Kakamega County to make it more manageable.

1.9 Significance of the study

The results provide recommendations that will strengthen the health system by providing recommendations which will make health services more accessible. It will also strengthen patient centered care and community engagement in health service delivery. It also suggests optimization of resources by using lay health workers for sustainable CDSD model and integration of management of chronic diseases using CDSD model this contributes to realization SDG three of good health and wellbeing. This study has come up with an orientation package for training lay health providers.

1.10 Assumptions of the Study

The assumptions of this study were that the lay health workers will be committed and motivated by sense of altruism and community solidarity to manage CDSD model. The second assumption was that the three days training done before scale will equip the lay health workers to effectively carry out the activities of the model. The third assumption was that PLHIV would trust and respect the lay health workers to enhance the credibility of the study. The fourth assumption was that the community view CDSD model as its own and take ownership for sustainability.

1.11 Operational definition

Access: This is the ease by which patients can use health services in proportion of their needs.

Community differentiated service delivery: Refers delivery long-acting ART and its related services that differ from the traditional care in terms of location, frequency, provider and the

type of services. ART drugs and related services are delivered within the community by expert patients and patients' visits the health facility after every six months.

Demand: The desire of patients to seek and utilize health services.

Differentiated service delivery: It is patient centered care that aims to respond to the needs and expectations of people living with HIV.

Lay Health workers: Refers to community health volunteers who do not have formal training in health science but are trained to offer specific services to PLHIV.

PLHIV leaders: These are patients who have been assigned responsibility over other patients, they include peer educators, mentor mothers, support group leaders and enrollment assistants.

Stable patient: These are patients who have been on treatment for more one year, virally suppressed; they are above 18 years and currently not pregnant or lactating.

Support mechanism: an Existing structural mechanism that has been put in place to aid in implementation of CDSD model.

Undetectable viral load: This is amount of HIV virus in blood sample equivalent to or below 400 copies per milliliter of blood.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter offers all-inclusive review of the literature relating to CDSD model and how to effectively scale up. The probe in this literature review is strategically affiliated with the specific objectives of the study, highlighting community readiness, demand, package of services, support mechanisms, and the effects of the CDSD model.

The chapter also examines the theoretical models and conceptual frameworks that strengthen the understanding of CDSD. It critically scrutinizes existing literature, identifying gaps that pave the way for the current study. The synthesis of this literature review functions as the groundwork for the successive chapters, contributing to degree to understanding of the landscape surrounding CDSD among PLHIV.

2.2 Community differentiated service delivery model

The CDSD model is a PCC approach to health service delivery for PLHIV. It is designed to offer HIV services throughout the entire course, bearing in mind the varied necessities and prospects of various groups of PLHIV and concurrently making HIV services accessible within the community (WHO, 2016). As HIV epidemic matures, the population of PLHIV reveal different health needs. This compels a shift in the health system's focus from the convectional mode of HIV care to deliberate allocation of resources to address the specific needs of those requiring them the most. The decentralized system allows stable patients to have fewer interfaces with the health system (Long et al., 2019; Lujintanon et al., 2021). By embracing CDSD, there is a promise to enhance the quality of life for PLHIV, enhance health system efficiency, outcomes, and contribute to achieving the global HIV target of 95-95-95. (Pascoe et al., 2023)

The primary objective of CDSD model is the eradication of barriers deterring access to HIV services. Additional objective of CDSD is to nurture patient self-management through PCC

approach, increase patient satisfaction, contain the cost of patient care, and inaugurate efficient and convenient health service delivery (UNAIDS, 2020). To realize its objectives, the CDSD model employs four fundamental building blocks that describe the method in which service delivery is structured. These blocks involve "who," demonstrating the service provider, who may be either lay health workers or treatment-experienced patients equipped with basic training on CDSD. The aspect of "when" relates to the frequency of looking for services, whether it be on a monthly, bi-monthly, quarterly or twice per year. "Where" represents the service location, underscoring the importance of community-based services. The final building block is "what," which covers the nature of services to be provided. The CDSD model, therefore, intricately addresses the key elements of service delivery, ensuring an inclusive and patient-centric approach to HIV care (Amstutz et al., 2021; UNAIDS, 2020).

Evidence from previous studies by Geng and Holmes (2019) and Roy et al. (2019) identified barriers to access health care arises from high volumes of clients with scarce staffing, causing congestion at the facility, long wait times, overburden staff and poor patient satisfaction. In addition to usual clinical visits, clients repeatedly make visits to health facilities to collect up their monthly supply of life-saving ART which additional drains patients and often adds to poor patient outcomes and high degrees of disruption in treatment. Taking services closer to the patient within the community through decentralization helps address these barriers thereby minimizing the burden of the client and the entire health system (Abelman et al., 2020).

The core aim of CDSD is to lessen limitations to accessing ART sites, decongest high volumes of patients in health facilities, increase community involvement, improve patient self-management, and eliminate monetary losses linked to transport costs and missed work time incurred by frequent visits to the facility and long waiting times (Huber et al. 2021; MSF, 2013). Scaling up CDSD model requires ownership by the community, making community readiness assessment important before up scaling (WHO, 2016). Studies by Musafiri et al. (2024) and Okere et al. (2021) found out that for effective implementation and sustainability of

CDSD model it is imperative to leverage on the willingness and preparedness of the community which is achieved through Community readiness assessment (CRA). Community readiness assessment is a crucial step in the pre-implementation level of health interventions. It allows for a more strategic, custom-made, and effective methodology, fostering collaboration, community ownership, and long-term achievement.

2.3 Community Readiness Assessment

The Community Readiness Model (CRM) refers to how the community is prepared to take up action to address specific health issue, it is topic-specific, varying centered on the factors influencing health status (Solomon et al., 2021). Stewart and Thompson (2016) note that community readiness model delineates distinctive features related to varying stages of issue awareness and preparedness to change. For health-linked issues allied with low service demand, community readiness model offers procedures for assessing, diagnosing, and instigating changes. Emphasizing the need for high level of community readiness, Bintabara et al. (2021) established that providing accessible, patient-centered, and high-quality services is subject upon community readiness. Understanding the readiness of the community allows for the customization of CDSD model to respond to the precise needs, values, and features of the community. This ensures that the intervention is traditionally sensitive and resounds with the community members. Communities differ in their readiness levels to adopt and back up health interventions. Measuring readiness helps in shaping the suitable timing for scaling up the CDSD model. Preceding studies by Moss et al. (2023) and Prust et al. (2017) identified that CRA facilitated communities in ranking resources and efforts, focusing on communities that are more ready and possible to benefit from the intervention. They established that when a community is ready for CDSD model, there is likely to be better community commitment and proprietorship. Evidence by Butler et. al. (2023) demonstrates that assessing readiness allows for the identification of prospective challenges and the development of approaches to address them proactively which makes it key prior to commencing the scaling up process. Community

readiness assessment comprises of alluring community members, constructing relationships, and securing their trust. In their study Prust et al. (2018) established that assessing readiness helps in creating interventions that fit into the existing social fabric and are integrated into the community's daily life. It ensures that interventions are implemented with respect for the autonomy and values of the community, avoiding potential harm or imposition of interventions that may not be well-received.

Shanley et al. (2021) and Sheldon et al. (2016) site community readiness as a defining attribute that measures the functionality of a health system, incorporating six dimensions: community efforts, knowledge of these efforts, leadership, community climate, knowledge of the issue, and resources. Notably, community readiness can vary across dimensions and different segments of the community. Jarpe-Ratner et al. (2013) learned in their study that high levels of readiness aided the implementation of community interventions, motivated by effective leadership, the presence of resources, and knowledge. Equally, low levels of readiness were identified as a significant obstacle, leading to challenges to implementation staff during the initial stages. The readiness level is assessed on a scale of 1-9, with following order of priority no awareness, denial, vague awareness, preplanning, preparation, initiation, stabilization, confirmation, and the last stage which is nine community ownership. Each stage reflects a crucial step in the preparedness process (Keefe et al., 2024; Roy et al., 2019).

In the context of scaling up CDSD model understanding the readiness levels across the various dimensions outlined by community readiness model can inform strategies for successful implementation and adoption of CDSD models.

2.3.1 Community efforts and knowledge of the efforts

Community efforts provide information on efforts, program, and guidelines that respond the problem being experienced by the community (Kostadinov et al., 2015). The CDSD models require that the community understands it and how it can address barriers to accessing ART. Previous study by Islam et al. (2019) identified community effort dimension at a mean

score of five. This indicates that efforts had been made to improve issues surrounding social health in the community, but it did not translate into knowledge of the effort as it scored three. This indicates that although there were interventions within the community the members were not aware of what was on offer. However, Capetra et al. (2018) established a mean score of three in both efforts and knowledge of efforts. This was stage of vague awareness meaning there were minimal efforts and awareness of the same that there few HIV prevention programs within the community and awareness of this program was low. This helped to develop strategies that were aimed at raising awareness of HIV infection by having individual contacts with community leaders and planning on how to educate the community. In another study by Naslund et al. (2014) identified that communities were recognizing the problem and was planning on how to implement HIV prevention strategies. Communities with knowledge about CDS model are able to utilize it to address challenges with accessing services.

2.3.2 Community Leadership

Community leaders have a comprehensive understanding of local background which is crucial in tailoring CDS model with the needs of the community. They are powerful people in the community who can foster dynamic community engagement by boosting community members to contribute to scaling up the model. Preceding studies by Keefe et al. (2024) and Islam et al. (2019) established that community leaders provided guidance on adaptation of community interventions to match their cultural preferences and traditions making it more satisfactory and effective. Capetra et al. (2018) identified a score of four on the dimension of leadership consistent with preplanning stage of community readiness model. Community leaders were able to express the benefits of the model to the community members which helped in gaining community support that is crucial in implementation (Jarpe-Ratner et al., 2013). Community leaders are key in resource mobilization, both human and financial, from within the community and through external corporations or leveraging on local resources which is needed for sustainability. Community leadership is integral to the readiness and success of scaling up a

CDSD model. Community leaders understand the best ways to make CDSD model culturally relevant, socially accepted, and effectively implemented within the unique context of each community.

2.3.3 Community Climate

Community climate refers to the chief community attitude toward the challenges of accessing ART. The community can either be helplessness or an endowed community that is ready to take responsibility. Al-Mahroos et al. (2021) and Naslund et al. (2014) in their studies found a low score of community climate at two and three corresponding to stage resistance/denial and vague awareness on HIV prevention interventions. A community that has optimistic outlook is always prepared to identify venue for the meeting and motivating its members to utilize existing models and avoid long queues witnessed at the health facility. A community with positive attitude towards implementation will actively participate in planning, implementation, and decision-making processes related to ensuring the model is functional. Evidence by Aberman et al. (2022) identified communities that were willing to adapt and modify the service model based on feedback and changing needs this showed a forward-looking and adaptable approach. They gauged the community attitude to determine levels of readiness by evaluating adaptability, flexibility, engagement, and ownership.

2.3.4 Community knowledge about the issue

Knowledge about the issue is the degree at which the community can identify the causes of the access, the penalties and how it affects the community. It was established by Al-Mahroos et al. (2021) and Islam et al. (2019) that the community has low awareness on HIV prevention services and how important it was for them to utilize them; their exiting knowledge was deficient and people in community was not concerned about likely spread of HIV. When communities lack knowledge of challenges of access and how CDSD model has been underutilized, it affects its implementation (Nanyonjo et al., 2020).

2.3.5 Community Resources

The availability physical, human, financial, and material resources, combined with community knowledge and support, collectively indicate a community's readiness for community-level interventions (Aberman et al., 2022). Readiness can be measured by the community's willingness to donate resources, whether it is time, manpower, or materials, to support the scaled-up of CDSD model. These resources contribute to the successful planning, implementation, and sustainability of health initiatives within the community. Fox et al. (2019) established inadequate resources as a challenge leading to insufficient community readiness in implementing HIV prevention interventions. While the community was ready to provide venues for conducting trainings, they expressed a need for training materials.

Similarly, Bintabara et al. (2021) recognized the scarcity of health care workers, diagnostic tools, and drugs as the main hindrance that led to low levels of readiness in providing Prevention of Mother-to-Child Transmission (PMTCT) services in rural areas. In their recommendations, it was suggested to mobilize resources to add-on existing community resources. Long et al. (2019) and Pradeilles et al. (2019) found that the community had identified resources to support the communities that care model for youth, which was viewed as a positive sign towards implementation.

Inadequate resources hamper the community from attaining their targets of guaranteeing every patient access to health services. Limited resources were identified as one of the factors that cause decreased awareness, absence of sustainability, poor quality of services, challenges in monitoring and evaluation and limited community engagement (Harle et al., 2022)

2.4 Demand factors for Community differentiated service delivery model

Demand for health care determines allocation of resources to prevent underutilization or over utilization (Borresen et al., 2016). Evaluating the factors that determine the demand for CDSD provides a road map on approaches and interventions that will encourage the utilization of the model. Harvey et al. (2021) identified knowledge by PLHIV about the intervention, the cost of

services, the preference of PLHIV, income, and expected future plans as determinants for the demand for health services.

2.4.1 Awareness about community differentiated services

Knowledge is a major determinant of demand for utilization of health services. creating awareness, understanding, and dissemination of accurate information about interventions can positively impact the community health by increasing the demand for and utilization of relevant services. Lack of awareness or misinformation can lead to skepticism, fear, or hesitancy, decreasing the demand for CDSD model (Jobarteh et al., 2017). Earlier Study by Killingo et al. (2017) noted that demand creation for HIV intervention motivated and increased utilization of services leading to optimal HIV treatment. They recommended HIV treatment literacy for patients and community mobilization as means of creating demand. Jobarteh et al. (2017) identified lack of information about Community ART groups as one of the obstacles that prevented patient from joining a CDSD model. He noted that targeted patient literacy before enrolling in a CDSD model was needed to gain their support and fully involve them. He further noted that well-informed patients are likely to join the model and act as champions. After patients receive orientation to the existing models, they were able to select the one that responds to their needs. Empowered and informed patients demand CDSD as part of their right to access the best possible treatment and care (Killingo et al., 2017; Willis et al., 2018). Evidence by Jobarteh et al. (2017) identified that most patients preferred to engage in treatment literacy session while waiting to receive care in the facilities or during support group meetings. The pointed out that this increased their level of awareness about existing modes. Creating awareness is conducted by peers who have been trained so that when the clients enter the clinician's room, they can inquire to understand further on their eligibility status. Increasing awareness on the model motivates clients to demand for the services.

2.4.2 Affordability of community differentiated service delivery care

The ability and willingness to pay for health services is a determining factor in demand. Affordability eliminates financial barriers ensuring that substantial number of patients can benefit from the services. Geleto et al. (2017) established that patients who were able to pay for services felt that the principle of inclusivity and equity had been considered. If patients from different socioeconomic backgrounds can access the services then such services, align with the principles of CDSD, which aims to address the unique needs of various groups. (Mhlana and Gardizirai, 2020) identified that patients with low income together with high prices of health services had negatively affected their demand for health care. However, Okere et al. (2022) established contrary findings in his study they identified that low salaries and wages had no significant relationship with demand of health services he argued that recipients of care will demand for services if the services are available and of high quality. They will use all means to obtain them even if it's expensive. According to Agranal and Kosgi (2021) affordability can contribute to reducing disparities in access to services among different communities. By making services more accessible to all, regardless of socioeconomic status, the demand for CDSD is likely to increase, addressing disparities in service provision. Affordability of services is a key driver of demand for CDSD model. It enables a broader range of individuals to access services, promotes inclusivity, and empowers communities to actively seek and participate in the design of services that align with their specific needs and context.

2.4.3 Availability of services within community differentiated service delivery

Demand for CDSD services is associated with availability of health services that responds to the needs of patients, provided by a provider that is trained to offer services. According to Schwartz et al. (2019), for services to be available the recipient of care should be informed on the types of services and the location where they can be found. Sometimes the patients may perceive facility services to be better than the CDSD model or they may fail to utilize services because they have not been informed about them or they have inadequate exposure. Mashungu

et al. (2018) and Vandendyck et al. al (2015) noted that availability of CDSD models had led to client to enroll in Community ART groups and high retention rates at 24 months (Macpherson et al., 2015).

2.4.4 Acceptability of the services

The acceptability of health services and their demand are interconnected. Community interventions that are well-acknowledged, culturally sensitive, and perceived as addressing a sincere need are likely to be in higher demand within the community (Roy et al., 2019). On the other hand, interventions with low acceptability may face challenges in generating demand and achieving their intended effect. Acceptability is one of the key considerations when designing, implementing, and evaluating health interventions (Long et al., 2019). The acceptability of health services involves various aspects, mainly the expectations of clients, community, and cultural preferences (Mpofu et al., 2021). It reflects the extent to which service providers or recipients of care consider it appropriate based on their anticipated expectations.

Adjetey et al. (2019) and Mashungu et al. (2018) found that clients newly enrolled in CARGs had high acceptability of CARGs among adult patients but discovered that it was not ideal for adolescents. However, stigma and discrimination continued to pose as a challenge that needed to be addressed by both the patients and the community for the effective implementation of the CDSD model. They further identified that for the CDSD model to be sustainable, collaborative efforts are needed from the national, county and community to ensure patients are empowered to embrace the model. Acceptability is a significant factor in raising demand for CDSD model. By ensuring that services are culturally sensitive, trustworthy, manageable, and adapted to local contexts, health workers can foster a sense of acceptability that leads to greater engagement and demand from the communities they serve.

2.5 Package of services quality

Package of services provided in CDSD has a prospective to optimize PLHIV's access to health services (Atuhaire et al., 2022). It has been established as a key component of service delivery

that contributes to PLHIV pursuing, utilizing and being retained into care (Okere et al., 2022). The package of services and the responsible provider is clearly outlined in the differentiated care manual 2023 (MoH, 2023). The package of services comprises the key services to be delivered at community level, client literacy and who should deliver which kind of services.

2.5.1 Client Literacy

Client literacy on CDSD refers to the understanding and awareness that PLHIV and their caregivers have regarding the model and approaches adopted in the provision of health services inducing adherence support within their communities. Godfrey et al. (2022) and Howell et al. (2018) established that PLHIV treatment literacy in CDSD models leads to a more informed and engaged clientele, positively impacting access, engagement, and the overall quality of HIV services. Doward et al. (2020) established that clients who were educated mobilized other clients to enroll in the model. This played a crucial role in promoting PCC, reducing barriers to access, and fostering a helpful community environment (Ford et al. (2020). Clients should be aware of the range of services available under the CDSD approach and how to navigate the CDSD system effectively. Stice et al. (2023) established that health education on CDSD positively affected client's ability to self-manage their health and adherence to ART treatment. Clients who understand the benefits attached to CDSD are more likely to adhere to recommended health practices within the model. Clients who are literate in CDSD may be better equipped to address and overcome stigma and discrimination associated with HIV status. Understanding how services are designed to respond to diverse needs can contribute to constructing a round and helpful environment (Pellecchia et al., 2017). Studies by Doward et al. (2020) found that client literacy on CDSD motivated client to be part of advocacy groups within the community. Literate clients may actively take part in community engagement initiatives, advocating for improved services, reducing barriers to access, and promoting a more supportive healthcare environment. Clients who understand CDSD models may provide valuable feedback on their experiences, contributing to the continuous improvement of service

delivery (Okere et al. 2022; Pellecchia et al., 2017). This feedback loop is essential for adapting services to evolving community needs. Understanding CDSD models enables PLHIV to use healthcare resources more efficiently. For example, they may be aware of the availability of peer to peer counseling, ART distribution, reducing the burden on the primary health facilities and ensuring timely access to services. (Amustutz et al., 2021).

2.5.3 Components of the Package of services

A comprehensive package of services within CDSD model improves the quality of healthcare services by highlighting accessibility, client centered care, plasticity, community involvement, and efficiency (Doward et al., 2020). Prior studies by Fox et al. (2019) and Godfrey et al., (2022) identified that for CDSD to be functional there is need for a package of services that addresses the unique features of varied populations, CDSD adds to improved health outcomes and the general welfare of communities. MoHKe (2018) and WHO (2016) recommends a package that has ART distribution, viral load monitoring, adherence counseling, psychosocial support, symptoms screening and referral (MoHKe, 2018; WHO, 2016). In this model patients are supposed to get their pre packed ART which is picked by an expert client, clients rotate to collect drugs on behalf of other group members. An appropriate package ensures more PLHIV access timely and right services. According to WHO (2016) the services are patient centered to meeting individual needs promoting a more client centered care approach to health care. Howell et al. (2018), and Holmes and Sanne (2015) found out that in order to meet the need of PLHIV at community level having a new cadre during implementation period CDSD to makes it sustainable. To achieve quality service and prevent long queues at the facility some of the services like health assessment, drug distribution, adherence counseling and reporting be done with support of Lay health workers. Study by Ford et al. (2020) established that ART initiation, adherence counseling testing and laboratory testing at community level made treatment accessible especially for those who could not travel to facilities due to work related issues. Similarly, Atuhaire et al. (2022) established in their study that although CDSD were physically

accessible they were least chosen due to lack of some aspects of services that patient felt they were essential. This led to clients to preferring standard care model. In a different study it was established that Lay health workers are trained to offer a comprehensive package, they were now able to identify red flags through symptom screening and refer clients to the facility for management by clinician (MSF, 2013). In other facilities sample networking enabled blood sample for patients due for viral load monitoring to taken and then send to facility for evaluation to determine how patient is responding to management. However, the Kenyan context recommends patient due for viral load monitoring to visit a health facility annually for those above 25 years and after six months for those aged between 15-24 years of age (MoH, (2018).

Adherence support is the basis of viral load suppression and require support environment. WHO (2018) highly recommends adherence counseling to be done to all client receiving ART at community level by LHW or expert who have been trained on basic counseling skills. Adherence counseling by community health workers produced better results concerning RIC and viral load suppression compared to those patients at facility level (Fox et al., 2019) Psychological support by peer's fosters support and access to treatment which leads to improved outcomes for patients (Doward et al., 2020). There is high level evidence between peer led and psychological counseling and better health outcomes among PLHIV.

2.5.3 Competence of the provider of community differentiated service delivery

The aptitude of Lay health workers is decisive in warranting the delivery of high-quality service in CDSD model (Kopo et al., 2023). Lay health workers, also known as community health volunteers (CHVs) or peer educators, perform a momentous role in extending healthcare services to communities, precisely in resource-limited settings (Mangombe et al., 2020). the skills essential in supporting processes of CDSD model include their knowledge, skills, and abilities to effectively perform their roles at community level. Lay health workers that support CDSD frequently belong to the communities they assist and have cultural competence that

helps them understand and navigate through communities. This understanding is critical for establishing trust and rapport with the community. According to Ibiloye et al. (2022) Lay health workers act as a link between communities and the primary healthcare facilities. One of key functions is the ability to identify opportunistic infections on time and refer for timely management (Stice et al., 2023). Evidence by Jobarteh et al. (2017) established that the extent to which health services for PLHIV increases the probability of desired outcomes is dependable with the competence of the person providing the services. This has fourfold disheveled component that comprises of the knowledge that the LHW poses, the skills in providing the services, the attitude and the judgment (John et al., 2023; Mekolle et al., 2023; Wellay et al., 2018). The satisfaction of the patient originates from effective care, the LHW is required to provide services that are patients centered and esteem their rights. At the middle of quality is the competence which contains having good interpersonal relationships and assurance to offer services (John et al., 2023; Naidoo et al., 2018). Lack of a competent provider is one of the reasons why there is underutilization of the CDS model. Evidence by Kopo et al. (2023) demonstrated that service provision by peer educators at CDS compared to those provided by nurses did not yield any significant change in patient outcomes especially viral load suppression and attributed this to competence of peer providers. Their capacity to comprehend, participate, and react to the unique needs of their communities contributes meaningfully to the overall quality and effectiveness of healthcare services.

2.6 Mechanisms that support Community differentiated service delivery

Support mechanisms play a key role in facilitating the scaling up of CDS model, ensuring the timely and high-quality delivery of services for PLHIV. This includes active engagement of PLHIV network also referred to as civil society organizations, effective leadership, adequate allocation of resources, robust policy guidelines and rigorous monitoring and evaluation.

2.6.1 Engagement of Community Networks

Community networks comprises of PLHIV who promote implementation of CDSD models, solidifying the voice of PLHIV inside the communities, national response and linking CDSD models to other enterprises like the income generating activities and treatment literacy (WHO,2018). Evidence by Mukumbang et al. (2021) indicate that PLHIV played a key role in implementation of CDSD model and especially given their involvement in health education and adherence counseling which has an essential element of peer support. This peer support not only provided psychosocial support but also allowed dividing logistical constraints experienced by patients during drug refills. He emphasized on the importance of engaging PLHIV networks in planning and eventual implementation of CDSD. This was supported by Pellecchia et al. (2017) in his study which identified that PLHIV networks have the power of encouraging increased demand for accountability by monitoring drug stock outs and quality of care provided to the patients.

Accomplishing and sustaining these top-tier services also requires PLHIV who are well trained both from the community and the networks. Collectively, these organizations can campaign and generate demand for services that are best personalized to the needs of clients in each situation (Wilkinson & Grimsurd, 2020). In another study, Root and Whitesides (2013) demonstrated that PLWHIV experiences of community model should be netted and assimilated into any program aimed at fruitful execution. Their experience shaped the way CDSD model was rolled out in Swaziland leading to high enrollment and RIC rates. In Contrast, Wilkinson and Grimsurd (2020) had contrary findings, they found out that key actors that have positive effects in improving access to health care using CDSD are facility staff mainly the nurses and clinical officer who categorize patients to identify eligibility and provide clinical care. The pharmacy staff who prepack drugs for pick up by revolving patients and data clerk who updates records to ensure that data for decision making is available. The PLHIV networks were required to promote formation of CDSD model and linkage of patients to exiting model near their locality.

2.6.2 Sufficient allocation of Resources

Adequate resource support is central for the successful scaling up of CDSD model and lack/ inadequate resources can be a hindrance to implementation process (Sharer et al.,2019). Evidence by Bemelmans et al. (2014) demonstrated that adequate funding is essential to implement and sustain CDSD initiatives. The funds are needed to support training of lay health workers, establishing, and maintaining set-up, securing needed commodities, and supporting ongoing monitoring and evaluation efforts. Pascoe et al. (2020) emphasized the role of national and county governments, implementing partners, and faith based organization in providing financial resources for CDSD programs. Evidence by Prust et al. (2018) suggest that constructing and maintaining infrastructure, such as drug distribution points and community centers is essential for the effective delivery of services. Nkwemu et al. (2016) noted that, to retain PLHIV on care and prevent lost to follow up access to reliable transportation is particularly important in reaching remote or underserved communities. Logistics support is important for the timely and efficient collection of ARVs from the primary health facility to Community ART drug distribution points.

Resources are need for community engagement efforts, development of interactive education communication (IEC) materials, community meetings, and sensitization meetings to enable community members to actively contribute in decision-making processes related to their health and well-being (Zakamumpa et al., 2019). Resources should be allocated for data collection, analysis, and reporting to ensure that the CDSD models are achieving their intended outcomes. Adequate resource support in these areas is essential for the sustainable and successful implementation of CDSD initiatives.

2.6.3 Policy that support implementation of CDSD Model

Effective policies create a favorable environment, provide an outline for implementation, and ensure that funds are allocated appropriately (Abelman et al., 2020). The ministry of health in Kenya through national AIDs and STI control program established a regulatory framework that

facilitates the integration of CDSD into the healthcare system. A manual to guide healthcare and updating existing Kenya HIV prevention and treatment guidelines 2022 to accommodate flexible service delivery models and community engagement practices was developed. According to Grimsrud and Wilkinson (2021) found out that formulation of policies to provide guidance precede the implementation of CDSD model. The policies encouraged and supported community involvement in decision-making processes related to how the model should be implemented. This also shaped mechanisms for community representation, feedback, and partnership in the planning and implementation of CDSD program. Liu et al. (2021) put more weight in formulating policies that support advocacy efforts to raise awareness about the importance of CDSD among policymakers, healthcare workers, and the general public. They established that this could aid gather support for scaling up CDSD model. With policies PLHIV are guaranteed standard care across all established models nationally. Study by Sharer et al. (2019) demonstrated that award of standardized guidance on DSD enabled HCWs to promote CDSD model, guidelines provided road map on how to make decisions by the health workers. Guidelines guaranteed improved quality of care by supporting all health care workers to offer similar type of care across all health facilities. Grimsrud et al. (2023) established that sustainability and successful of the DSD programs depend largely on backing of national policies. They further identified that National policies was needed during the process of scaling up HIV services. Clear policy guidelines create a good environment for roll out of community strategies and reinforce ownership of the model by the community. Studies established a difference the length of drug refill received instead of three months they received two months. Health care distributed drugs according to their own understanding and attributed this to lack of the policy guideline in use by the respective Community ART groups (MSF, 2013). The policies strengthen existing structures between community and the facility to ensure that the patients receive quality care and there is no duplication of the services.

2.6.4 Monitoring and evaluation

Monitoring and evaluation (M&E) provide methodical and continuous measurement of programs, helping health facilities make informed decisions, improve interventions, and ensure efficient resource allocation (Lakoh, 2021). Bemelmans et al. (2014) identified that by gathering and analyzing data, the national program can determine the impact of CDSD model on health outcomes and identify areas for improvement. Macpherson et al. (2015) noted that understanding which constituents of the service delivery are most effective, resources can be directed towards those areas, capitalizing the impact of the program. Analysis by International Centre for health Programs[ICAP], (2022) identified that there is need to track CDSD model progress and share results with stakeholders, including community members, donors, and policymakers, health facilities demonstrate their commitment to delivering effective and measurable outcomes. By backing on evidence, leaders can reach informed choices about program adjustments, resource allocation, and strategic planning, contributing to the success of scaling up efforts (Roy et al, 2019). Effective M&E provides evidence of the impact of community-differentiated service delivery. According to Wills et al. (2018) established that monitoring and evaluation assisted in demonstrating positive outcomes thus being able to get donor support, policymakers, and other stakeholders, simplifying the scaling-up process. The purpose of continuous monitoring is not to identify breaches in service delivery but know what is working well not working so as to leverage on what is working and come up with solutions to correct what is not working. Previous studies by internal Treatment Preparedness Coalition and AIDs Rights Alliance of South Africa (Treatment Preparedness Coalition [TPC] & AIDs and Rights Alliance of South Africa [ARASA], 2017) confirmed the need to have DSD performance monitored using numerous measures of performance (feedback surveys, grievances, patient satisfaction measures, and rates of voluntary withdrawal). They acknowledged that monitoring warranted patients to receive high quality of care leading to better health outcomes. It also helped in assessing informed decision on the model of care at the same time provided

accountability. Bemelmans et al. (2014) supported ITPC and ARSA (2017) by accentuating that DSD models need continuous assessment and extra transformation to be reach out too many clients, including specific groups who may be disadvantaged to respond to the demands of numerous clinic visits and chronic disease management. According to (Clinton Health Access Initiative [CHAI], 2017) and WHO (2018) after evaluation of PCC services it was possible to know how health services were utilized and cost of implication of the services. DSD models among PLHIV indicated viral suppression and increased RIC for those on CSDD model while those who preferred the traditional models were lost to follow up due to logistic issues as they needed time and money to travel to facilities for care (Ehrekrenza et al., 2019; WHO, 2018). Faturiyele et al. (2018) established that continuous initiatives to monitor the impact of PCC contributed to sustainability of the model and gave implementer ideas to make changes to the model to suit the end users. Reidy et al. (2018) established that monitoring implementation of DSD is challenging and necessitate new methods to ensure that enough data is collected to inform management of patients. They recommended modification of existing monitoring and evaluation systems in all health facilities implementing CDSD model to align the community data to the facility (WHO, 2016).

2.6.6 Sound Leadership

Leadership plays a key role in guiding, synchronizing, and supporting interventions to expand and improve access to healthcare services in communities (Atuhaire et al., 2022). Effective execution of CDSD requires leaders to nurture strong relationships with the communities they serve. This involves active commitment, attending to community needs, and including community members in decision-making processes (WHO, 2016). Sharer et al. (2019) established that leaders advocated helpful policies to make implementation effective at the community, sub county, county, and national levels. Leaders need to consider the long-term sustainability of scaled-up services (Islam et al., 2019). Sustainability of CDSD models involves planning for monetary sustainability, community ownership, and integration into

existing healthcare system. Sound leadership at both National and County level warranties accountability and community adaptation. Prior to execution there is need to check both levels including PLHIV civil society governance and community agents to come up with best initiatives of ensuring consistent resources, dependable training, and constant guidance from these teams for a successful scale (MoHKe, 2018). Macpherson et al. (2015) established those successful operations of Community ART groups was due to extensive support of local leaders. Local leaders had formed consultative committee involving community members, chiefs and village elders to support the initiative by encouraging by in members and full involvement.

2.7 Effects of differentiated service delivery

The impact assessment of the CDS model on access to health services is critical, with significant evaluation factors including reduced waiting time, reduced frequency of clinic visits, cost containment, retention in care, and viral load suppression.

2.7.1 Reduced waiting time

Scaling up CDS model can help reduce waiting times through numerous mechanisms that improve the efficiency and accessibility of healthcare services. Reduced waiting time mirrors appropriate access to health care services. Previous study by Belay et al. (2022) and Wilkinson and Grimsrud (2020) identified that timely care was linked to better health outcomes and patient satisfaction. There is a connection between waiting times and availability of services, little waiting times indicates that needed services are readily available and accessible. Decentralized health service delivery model makes health services accessible minimizing the need to travel to primary health facilities (USAID, 2022). Rather than spending time on queues to be seen by a clinician at CDS model lay health workers provide the essential services recommended in the package of services decongesting health facilities and minimizing waiting times for routine services (Mukumbang, 2021). However, Nakambale et al. (2023) found out that providers of Pre exposure prophylaxis in CDS model reported that it was time consuming, and it interrupted their work flow. Geng and Holmes 2019 identified that during

health treatment literacy session more emphasis is put on prevention of opportunistic infections and other diseases like malaria, diarrheal diseases as a way of helping address health issues at an earlier stage, preventing the acceleration of problems that might need more time to be seen by a health care professional (Eshun-Wilson et al., 2019). This preemptive approach can reduce the demand for critical services and decrease waiting times giving clinician time to see clients who require acute care. Scaling up of CDSd ensures that resources are augmented, and health care workers at primary health facility can manage their schedules effectively, lessening the time patients spend waiting to be attended to (Rabkin et al., 2020). Clients who enroll in CDSd are empowered to be part of decision making process and on self-management which makes clinical decision making process easy and decreases time clients spent in the consultation rooms. Implementing effective time management systems, especially during community ART groups meetings, community pharmacies and at the drug distribution points can help identify and prioritize patients based on the urgency of their health requirements. This ensures that those requiring acute care are referred on time, contributing to reduced waiting times. Prior study by Pellecchia et al. (2017) training of Lay health workers on managing CDSd models improves periodic assessment. This consistent assessment of service delivery processes allows for the identification of tailbacks and areas for improvement, contributing to the continuous refinement of both CDSd and primary care facilities and reducing waiting times.

CDSd model improves proficiency and capacity of clients to acquire time to do their own work at home or places of employment (Atuhaire et al., 2022). Evidence demonstrates that reduced waiting time can increase patient's satisfaction (Adjetei et al., 2019). Patient satisfaction occurs when patients perceive the services of pronounced worth to them and their families. In a mixed method focus groups discussions and in-depth interviews in Mozambique it was identified that patients was satisfied with Community ART groups because of cost containment and better patient outcomes, the model offered a safe space for peer to peer counseling to the members (Atuhaire et al., 2022; Faturiyele et al., 2018; Hirsch et al., 2011); Heyi et al.,2023;)The

engagement of clients in various activities in the clinics and the community led to increased awareness, low stigma, better health seeking behavior and good service quality (Pellecchia et al., 2017; Rasschaert et al., 2018). Through adjusting health services to the unique needs of members of the communities and leveraging resources within the community, CDSD can significantly contribute to the reduction of waiting times, improving overall access to timely and appropriate healthcare services.

2.7.2 Reduced clinic frequency

Scaling up CDSD can contribute to a reduction in health facility visits through numerous strategic approaches that focus on conveying health services closer to communities. According to Eshun-Wilson et al. (2019) clients who enrolled in CDSD received health checks by looking for danger signs that might indicate presence of opportunistic infections, health educations and peer to peer adherence counseling to identify any illness early on and start treatment. Through this the intensity of facilities visits is reduced because focus is on prevention. Kayode and Babatunde (2021) established that assimilating community pharmacies into CDSD model can make HIV services accessible to the target population within the community. They observed that this eliminated the need to visits health facilities just for ART refill except when they were due for clinical review and collection of blood sample for laboratory investigations (Avong et al., 2018). Through clients gain skills on self management espically ability to prevent diseases and adhere to treatment plans. This includes initiatives that educate them on self-monitoring, adherence to ART and other treatment plans, and identifying danger signs that require professional intervention, potentially reducing unnecessary health facility visits. The Lay health workers reduces the client's facility visits by monitoring them during each group meeting before they distribute prepacked ART and other opportunistic infection prevention drugs. This allows for timely referral and support, minimizing the possibility of emergency circumstances and reducing the necessity for frequent health facility visits. (Asieba et al., 2021) Patients enrolled in CDSD models are required to visit health facilities twice per year and during other

times they take their drugs in the community as opposed to standard care where the client can have visits that can amount to as far as 10 visits (Burengelo et al., 2023). This reduces the frequency of health facilities visits and gives them an opportunity to stay at home and do other activities (Kasande et al., 2022). According to Pellecchia et al. (2017) patients who had joined CAG reported reduced frequency of clinic visit which enabled them save on the transport cost and time. They reported that they had enough time to engage in other activities. The scaling up of CDSd aims to make healthcare more accessible at the community level, thereby decreasing the dependence on health facility visits for routine, preventive, and basic healthcare needs. By addressing health issues closer to where people live, CDSd contributes to a more efficient and patient-centered healthcare delivery model.

2.7.3 Reduced cost of services

CDSd is largely more cost-efficient equated to standard or conventional model of care. CDSd often utilizes Lay health workers who are inhabitants of that community and attached to the primary facility which provides essential health services at no cost (Kuo et al. 2022). Services in CDSd models are decentralized and culturally sensitive. Evidence from a study done by Musafiri et al. (2024) demonstrates that making HIV services accessible in communities can mitigate the cost of travelling and opportunity cost related to time wasted while seeking services at the primary health facility thus containing the cost. CDSd allows for personalized interventions based on the specific needs of different communities. However, evidence by Nakambale et al. (2023) and Barnabas et al. (2020) established high cost of services associated with community pharmacies they established that most community pharmacies were private and had a service charge. These targeted methods ensure that they are able to pay for the staff working in the pharmacy. In CDSd model patients receive health education and empowerment that make them make informed decisions. Informed and empowered clients are more likely to observe preventive behaviors, manage their health effectively, and adhere to treatment plans, reducing the chance of getting diseases that could incur extra healthcare costs. CDSd models that

involve Community ART drug distribution points and adherence support can improve adherence to treatment. Sanwo et al. (2021) identified that good adherence is associated with viral suppression which leads to better health outcomes, reducing the need for expensive treatments resulting from advanced HIV disease. Most of the cost attached to accessing HIV service stems from opportunity cost since the cost of drugs is donor funded. The cost of accessing HIV services is a crucial aspect affecting utilization of care and retention to treatment. In their findings Kasande et al. (2022) found out that CDSD models reduced the cost of accessing care by reducing transport and opportunity cost associated with getting compared with the standard model of care for improved health outcomes. Nachega et al. (2016) and Bemelmans et al. (2014) established that the community pharmacy model demonstrated lower cost of human resources expenditure per patient who received their drugs from community pharmacy especially the Community ART drug distribution points than at the clinic, transport cost for those who visited facilities was three times higher than those who visited community ART drug distribution points. Patients also saved on time they spend an average of 14 minutes at the Community ART Drug Distribution Points while those at a facility spend 85 minutes. However, studies by Guthire et al. (2022) established contrary results on the cost of obtaining services; they found a similar cost of services in both CDSD model and standard care model. In a mixed study on community pharmacies Hirsch et al. (2011) and Okere et al. (2021) found out that the cost of accessing services in CDSD was lower compared to those in standard care model and this improved access to HIV services. Due to cost containment patients constantly had excellent adherence to drugs and were able to use first line regimens for a prolonged duration. In a qualitative study by Oseni and Erhun (2021) the patient collecting ART at CPM reported increased satisfaction with care citing convenience and safety of the CPM as it was difficult for people to know their HIV status. Scaling up CDSD can contribute to cost reduction by promoting preventive care, increasing access to basic healthcare, utilizing cost-

efficient care models, empowering patients, and optimizing resource allocation. These efforts jointly contribute to a more sustainable and cost-effective healthcare system.

2.7.4 Patients' Retention in to Care

Patient RIC allows for continuous follow-up of patients who are on drugs that manage chronic diseases. Jo et al. (2023), Rasschaert et al. (2018), and Wyatt et al. (2017) identified in their findings that CDSD is an effective initiative that resulted in active patient engagement and empowerment, creating a favorable environment that improved rates of RIC. The community felt it was involved in health matters and was ready to support PLHIV. They identified that patients in CDSD had greater survival rates, reducing mortality, and lost to follow up rates. Prust et al. (2017) supported these findings in a mixed-process evaluation from 30 ART sites, suggesting that the CDSD model may reduce lost to follow up but has no significant effect on the cost of travel and time. In contrast, previous studies by Geng and Holmes (2019), established that adults taking ART with an undetectable viral load, identified a retention of 88% in CDSD and 93% in standard facility ART delivery (Geng and Holmes, 2019).

The Community ART group (CAGs) was identified as a valuable model for PMTCT mothers starting ART who were referred to the community model being managed by lay health workers (Myer et al., 2017). Kintu et al. (2021) indicated that the lack of community ART groups was a barrier to successful CDSD model activities because community ART groups played an important role in encouraging RIC and providing social support to group members.

2.7.5 Patient's Viral Load Suppression

The goal of ART is viral load suppression to undetectable levels. According to CHAI (2017), Mulowoza (2022) and Uetela et al. (2023), there were better rates for viral load suppression for clients who were receiving their care in CDSD model. However, findings from a study done by Mbwewe (2022), who established that both clients in CDSD and the standard care model had almost similar results on viral suppression, with 99.2% in CDSD and 98.7% in standard care. Although clients in the CDSD model had access to viral load measurement, they also perceived

that it decongested health facilities thereby reducing the burden imposed to health care workers by high volume of clients, giving them adequate time to attend to patients who need acute care. Recommendation by the national program allow for viral load monitoring for stable clients to be done annually for clients aged above 25 years and twice per year for those less than 24 years. Viral load suppression is classified into low undetectable level (LDL) for viral load below 50 copies, low level viremia for copies between 50-999 and suspected treatment failure of levels above 1000 copies. The goal of treatment is to have copies below 50 copies, clients with copies above 200 are considered unstable and referred back to the facility for conventional care.

In a randomized control trial in 16 public primary health facilities in Zambia involving 496 adolescents in 20 ART sites, Mavhu et al. (2020) and Wyatt et al. (2017) established that peer-supported CDSD markedly improved HIV load suppression in adolescents living with HIV (ALHIV), showing the effectiveness of community interventions in improving health outcomes in a group with unreasonably poor HIV treatment outcomes. CDSD improved viral load suppression by 86 per 10,000 persons compared to standard care, which improved it by 52 per 10,000 persons (Mekuria et al., 2023). This proves that the CDSD model is likely to contribute to UNAIDS global targets of 95-95-95."

2.8 Summary

The CDSD model is a patient-centered approach to health service delivery for PLHIV, aiming to overcome barriers to healthcare access by decentralizing services to those who need them most. The literature reviews primarily focused on the research objectives mainly community readiness assessment, demand factors, package of services, support mechanisms and effects of CDSD model.

The main highlights in the review were on the community readiness assessment that looked at knowledge of efforts, community leadership, community climate, community resources, and knowledge of the issues. The second focus was on demand and factors influencing the demand

for the CDSD model, mainly awareness, acceptability, availability of services, and the cost of service. The third focus was on the package of services, assessing the comprehensiveness of the package, client literacy, and provider competence. Lastly, the review explored the effects of CDSD on access of health services mainly reduced waiting time, decreased facility visits, cost containment, and patient outcomes (Retention in Care and viral load suppression).

Key ideas suggest that the effective implementation of the CDSD model depends on the stage of community readiness. An assessment using the community readiness model protocol yields to the level of readiness and helps rationalize resources depending on the level of preparedness. Existing evidence indicates that community readiness advances through diverse stages, from no awareness to high-level community ownership.

Additionally, literature indicates that demand creation increases the uptake of the CDSD model. This is realized through patient education, advocacy, and community mobilization. The packages of services offered in the model facilitate access to services, including ART refill, adherence and psychological support, clinical monitoring, treatment of opportunistic infections, and referral services.

Several aspects support the implementation of the CDSD model, these factors involve engagement by community network for demand creation and monitoring. Policy guidelines provide direction on how to scale up CDSD model, and a good monitoring system is crucial for recognizing the functionality of the model and addressing existing gaps. Despite the appeal of CDSD for improving access to HIV services, there is relatively little evidence on its effect client waiting time, facility visits and cost containment.

2.9 Gaps in Literature Review

The literature review process identified several gaps that helped to shape this study. The gaps ranges from the research methodology, data collection methods and analysis, target population, sample size, type and location of the study. The research variables were also identified to have gaps. The identified gaps have been summarized and presented in table 1.

Table 2.1*Knowledge gaps in literature review*

Study	Focus of the study	Findings	Knowledge gap	Focus of this study
Capetra et al., (2018)	Evaluation of communities that care	Community insights can be used in implementation of community services	Focused on building coalition among different actors in the community	This study focused on scaling up of Community model
Killingo et al. (2017)	Community led demand creation for viral load testing	HIV treatment education and mobilization are critical components in demand creation for access to optimal HIV treatment especially HIV testing	Focused PLHIV activist only	This study involved all PLHIV leaders (activist, peer educators, support group leaders and mentor mothers)
Ford et al. (2020)	Emerging priorities for health service delivery	Community ART initiation improved access to treatment among PLHIV experiencing problems with access to health services	Focused on adolescents only and ART initiation.	This study focused on Adults PLHIV, ART distribution and related health services
Fox et al. (2019)	Evaluation of community-based strategies and facility-based strategies	Community based strategies are vital in reducing congestion at the facility and improve access to services	Not all patients eligible for intervention received it.	This study design was RCT, all eligible clients were enrolled in CDS model.
Zakamumpa et al. (2019)	Exploring perspectives of patients and HIV service manager on barriers to implementation of differentiated service delivery	Multilevel intervention is needed to accelerate implementation of DSD addressing demand and community involvement	Failed to address health system factors	This study evaluated community, individual and health system factors affecting access to health services
Mavhu et al.	Effects of	Peer-supported	The focus was	This study focused

(2020)	differentiated service delivery on virological failure in adolescents	community-based differentiated service delivery can substantially improve HIV virological Suppression in adolescents with HIV and should be scaled up to reduce their high rates of morbidity and mortality.	HIV outcomes among adolescents	HIV services access among adults
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2.10 Theoretical Framework

The principal theory that guided this study was systems theory, which views a whole system with various interdependent subsystems that interconnect and adapt to an ever-changing environment (WHO, 2009). According to this theory, weaknesses in one subsystem can affect all other systems, while strengthening one subsystem can lead to the strengthening of other sections. However, other theoretical frameworks have been employed for each objective researched in this study as follows:

Objective 1: To assess community readiness for scaling up CDS model to improve access to health services among PLHIV in Kakamega County.

Theoretical Framework: The community readiness model was utilized to assess the community's stage of readiness for change. Community readiness model aids in appreciating the community's capability and willingness to adopt new health interventions, enabling custom-made interventions centered on the level of preparedness (Capetra et al., 2018). This theoretical framework was employed utilized to define the CDS model, assess community knowledge, leadership, and climate, as well as identify available resources and knowledge of the issue. Subsequent to the assessment, the readiness level was determined to expedite the implementation of tailored interventions.

Objective 2: To determine demand for scaling up CDSD model to improve access to health services among PLHIV in Kakamega county.

Theoretical Framework: The Health Belief Model (HBM) was applied to assess the demand for CDSD among PLHIV, gaining ideas into their perceptions of determinants of demand for the CDSD model. This permitted for the development of targeted interventions during scale-up that enhanced achievement of their specific needs and promote the implementation of CDSD (Alhaimer, 2021). In this study, we looked at perceived vulnerability to assess PLHIV's perception of their susceptibility to poor treatment outcomes, including the potential consequences of noninvolvement in CDSD. This included understanding their current health status (whether stable on ART or unstable), adherence to ART, and knowledge about CDSD benefits. Perceived severity was assessed by getting to know their perception of poor access to health services and how CDSD could make health services accessible. Perceived barriers were explored by examining if awareness of the model, acceptability, availability of services and cost of services could prevent them from utilizing CDSD.

Objective 1: To assess package of services offered during scale up of CDSD model to improve access to health services among PLHIV in Kakamega County.

Theoretical Framework: The Andersen Behavioral Model (ABM) comprises three main components: predisposing factors, enabling factors, and need-based factors. Predisposing factors helped explore and understand the characteristics of PLHIV, such as social structure, health beliefs, and attitudes that may influence their predisposition to use the CDSD model. Enabling factors involved assessing the comprehensiveness of the package of services to support the scaling up of the CDSD model. The need factors facilitated the assessment of healthcare needs in the community, both perceived and actual. Understanding the factors that influence the acknowledgement of CDSD needs and the decision to utilize the model improves health literacy, package of services and promotes understanding of the importance of using the CDSD model to improve access to health services.

Objective 4: To assess support mechanisms for scaling up community differentiated service delivery for improved access to health services among PLHIV in Kakamega county.

Objective 5: To evaluate the effects of community differentiated service delivery on access to health services among PLHIV in Kakamega County.

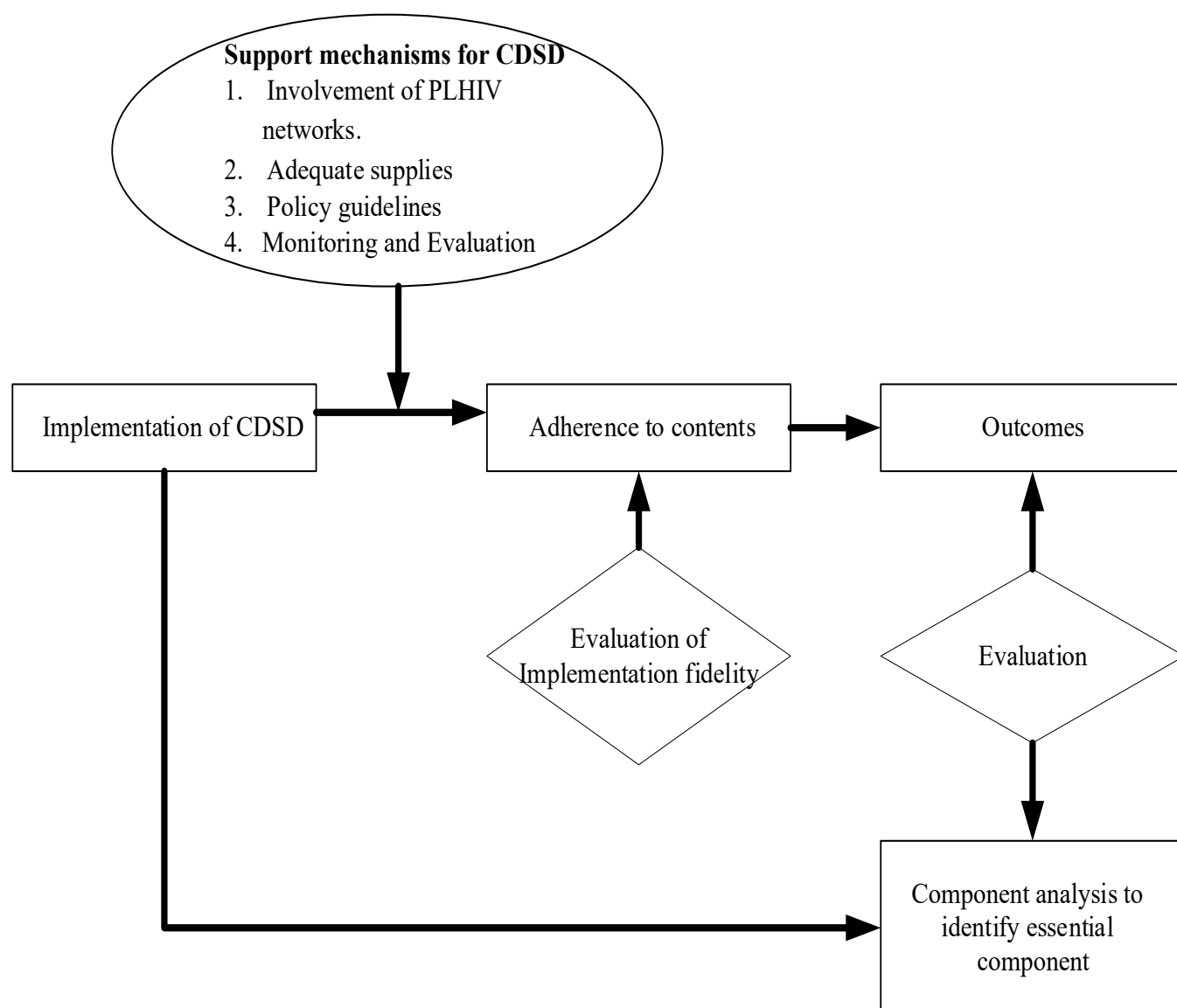
The variables related to support mechanisms and the effects of the CDSD model were established based on implementation fidelity. Implementation fidelity refers to the extent to which programs are executed as envisioned by the program developer and turns as a probable arbiter of the relationship between strategies and their projected outcomes (Perez et al. 2016)

According to Perez et al. (2015), the measurement of implementation fidelity involves assessing adherence, looking at how far those responsible for delivering an intervention actually adhere (content, frequency, duration), and the coverage of interventions as outlined by the policy. The CDSD model can be successfully implemented if its essential components are adhered to, and an analysis of outcomes may help identify those components that are crucial (Perez, et al., 2015).

This theory was employed with the understanding that the implementation of CDSD requires adherence to policies, support from leadership, provision of adequate resources, and the establishment of a robust monitoring and evaluation system.

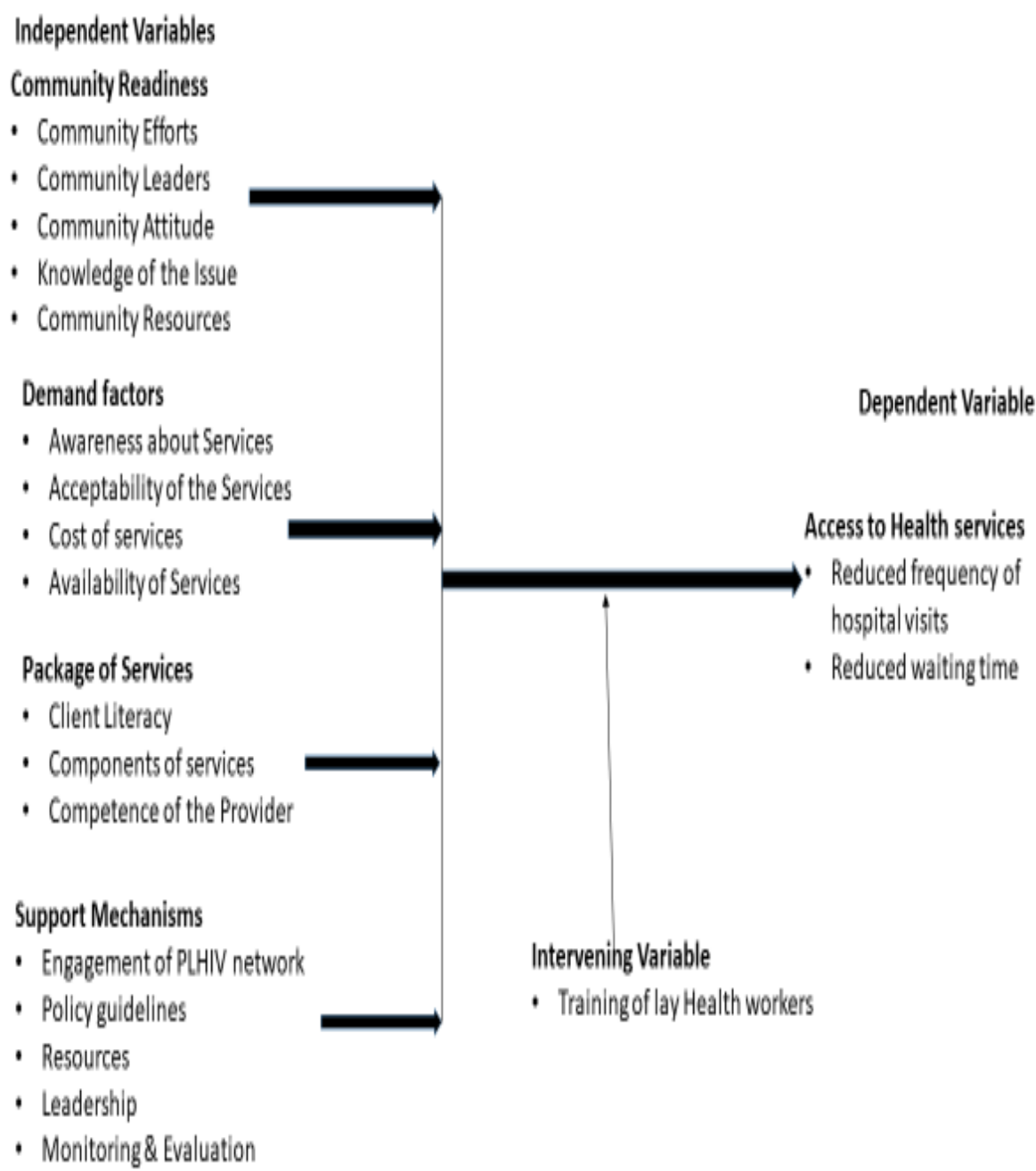
Figure 2.1

Implementation Fidelity Theoretical Framework



Note. This figure was produced by Perez et al. (2015) and summarizes how to effectively implement a model and successfully analyze the outcomes. Adopted from A modified theoretical framework to assess implementation fidelity of adaptive public health interventions. *Implementation science journal*, 11(2), p.93.

Figure 2.2
Conceptual framework on scaling up community differentiated service delivery



CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter provides a broad overview of the research methodology that were used in this study. It comprises of the research design, target population, sampling procedures, preparation of data collection instruments, data collection procedures, and the methods of data analysis. A rigorous research methodology is crucial for the validity and reliability of the study findings. Each element of the methodology has been discussed in detail, delineating the rationale behind the selected methods and the stages taken to ensure the accuracy and veracity of the research process. By delving into the details of the research design, the identification of the target population, the sampling techniques, and the vigilant preparation of data collection instruments, this chapter aims to give readers a perfect understanding of the vigorous framework that strengthens this study. Additionally, the unit on data collection procedures and methods of data analysis will shed light on how the study's objectives were translated into actionable steps and how the acquired data was processed and interpreted.

3.2 Research Design

3.2.1 Introduction

The study design was a cluster randomized control trial (RCT), a design that randomly assigns participants into experimental and control groups (Singh & Masuku, 2013). According to Singh and Masuku (2013), cluster randomized controlled trials are designed to evaluate interventions at the group level, with statistical analysis accounting for the clustering structure of the data. This approach is particularly useful when individual randomization is not practicable. The selected study design was

grounded on its capacity to provide robust evidence regarding the hypothesized efficiency of scaling up CDSD in improving access to HIV services. Furthermore, it minimizes the likelihood that the observed association between scaling up CDSD and improved access to HIV services is due to confounding factors. As noted by Heyi et al. (2023) the advantages of using RCTs lie in the clear peculiarity of study participants, the capability to dissect results with firm statistical tools, and the eradication of population bias. However, downsides include the expenditure in terms of time and money, prospective loss to follow-up accredited to treatment biases, and volunteer biases where the study participants may not be fully representative of the entire population (Singh & Masuku, 2013)

The cluster RCT was conducted in two facilities, Butere Sub County Hospital (intervention) and Kakamega County Referral Hospital in Kakamega County (control). The selection of these facilities was done in consultation with the County AIDS and STI Control Officer (CASCO). To prevent contamination eligible facilities were required to be public, have a high volume of PLHIV receiving care, and be at least 20 kilometers apart to minimize contact between study participants. High-volume facilities served as units of randomization, either enrolling clients in CDSD or providing standard care at the facility. A high-volume facility was selected for the control trial to evaluate the effects of CDSD on improved access to healthcare. The trials were executed simultaneously in two arms: the control group, where participants received standard care at the facility with three-monthly clinic visits, and the intervention group, where participants received ART three-monthly at the community and clinical consultation every six months at the health facility.

3.2.2 Randomization and masking

Masking, also known as blinding, was employed to maximize internal validity and prevent bias arising from awareness of treatment assignments. The cluster consisted of public health facilities, which were randomized in a 1:1 ratio to either have clients enroll for CDSD (intervention) or receive standard care (control). Disparities between the groups were alleviated by matching selected facilities based on the number of PLHIV accessing care in those facilities, both of which were high-volume.

Single-blind masking was applied, where participants were unaware of the care model they were receiving, while the researchers were informed. The CDSD model was assigned a unique code, and study participants were randomized to these codes, ensuring concealment of the randomization process. To prevent selection bias, the random allocation sequence was concealed using sealed envelopes with codes. The Lay health workers had exclusive access to the password-protected randomization file.

A randomization meeting took place on September 16th, 2021, attended by researchers and Lay health workers. During the meeting, the allocation of codes to participants was discussed, and it was agreed that Lay health workers, supporting activities within the CDSD models, would assign the codes. Regardless of efforts, it was not possible to conceal the intervention position from Lay health workers who manages the models of care due to the nature of their roles.

Laboratory staff conducting viral load testing remained unaware, as they collected samples from both CDSD model and standard care clients without knowledge of each client's study participation. Pharmacy staff and clinicians performing clinical consultations at six months were also unaware of the intervention status, as they served clients following the routine of the national program.

Upholding masking, customary comprehensive clinic numbers (CCC) were used on all laboratory forms, making it challenging to identify study participants among the clients

accessing care. Having discussed research design and how contamination was minimized we now move to target population.

3.3 Target Population

The study targeted 20,000 adults PLHIV clients who are stable on ART and attending high-volume facilities in Kakamega County. Clients were considered stable if they had been on ART for more than one year and were virally suppressed at the time of the intervention. This criterion was chosen because they were eligible for the DSD model. Choose of health facilities was based on the fact that high-volume facilities need to be decongested to reduce the burden on already overworked healthcare workers. Additionally, high-volume facilities often have a large number of stable patients who can form groups.

Kakamega County is located in Western Kenya, covering an area of 3,224.9 km², with a population of 1,660,651 and 398,709 households with an attitude range of 1,240 meters to 2,000 meters above sea level. Kakamega lies on Latitude: 0.2857° S to 0.9577° N and Longitude: 34.3616° E to 35.0873° E). As of December 2017, there were a total of 321 health facilities offering HIV services, serving 57,952 PLHIV, with 38,248 on treatment and a total of 20,000 stable patients (KCASP, 2022). The county was chosen due to its high number of PLHIV, and it had previously started implementing CDSD model although the number had dropped to two Community ART groups and no community ART drug distribution points. The facilities included in the study were those within the county providing ART and having a total number of clients currently on care above 1000. The inclusion and exclusion criteria for study participants are presented in Table 3.1

Table 3.1*Inclusions and Exclusion Criteria*

Inclusion	Exclusion
PLHIV	Other chronic diseases
Those on ART in the chosen facility	Those not on ART from the specified facility
those above 18 years	Children and adolescents living with HIV
More than one year on treatment	Less than one year on treatment
Un detectable viral load	Viral load above 400 copies
leaves within the community	Patients from other areas far from the facility

3.4 Sampling Procedure

The previous section discussed target population, we now discuss the sampling strategy that was used. Purposive sampling for health facilities and stratified random sampling for PLHIV was used in this study. Purposive sampling was used to select high volume health facilities which had a high number of PLHIV accessing care and stable on ART. According to Ganganpreet (2017) Purposive sampling allows you to target precise characteristics that are applicable to your research objectives. By selecting high-volume facilities, we ensured that we capture a significant percentage of the population. After identifying the high-volume facilities, we further stratified our sample by considering the stability of clients on ART by looking at the age, duration on treatment and viral load suppression. Stratified random sampling involves dividing the population into subgroups (strata) based on certain characteristics (in this case, stability on ART) and then randomly sampling from each stratum (Creswell, 2009). This ensured that we obtained a representative sample from each subgroup.

Sample size Determination

To ensure a robust and reliable dataset, the study initially targeted a sample size of 340 individuals. This was determined using fisher statistical formula for calculating sample size as described by Singh and Masuku (2014). where; n= is the desired sample size (when the target population is more than 10,000), z= the standard normal deviate at the required confidence level of 95%(1.96), p = the proportion in the target population with characteristics of interest and q=1-p, d= level of statistical significance set which is 0,05. According to Cochran this method can be used for large sample whom we do not know the proportion that was enroll in CDS. The population of stable PLHIV is 20,000 which makes it more than 10,000.

$$n = \frac{Z^2pq}{d^2} \qquad n = \frac{(1.96)^2 (0.50) (0.50)}{(0.05)^2} = 384$$

To account for potential non-responses and ensure that the final sample would meet the study's requirements, we interviewed 402 individuals. This proactive approach was intended to safeguard against possible participant loss and ensure the reliability and validity of the data collected. Ultimately, the sample of 402 participants provided a comprehensive dataset, allowing for a more accurate and dependable analysis. The decision to interview additional participants was instrumental in achieving the study's objectives and enhancing the robustness of our findings.

Recruitment process

We initially approached 420 participants, out of this 408 agreed to participate and after accounting for any non-responses and ensuring all interviews were complete we finalized our sample at 402 participants.

3.5 Instrumentation

3.5.1 Research Instruments used

The instruments employed in this study included an interview guide, a document review checklist, and a questionnaire. These tools were utilized to collect views and information regarding the scaling up of the CDSD model to improve access among PLHIV in Kakamega County. The interview guide enabled an in-depth exploration aligned with the study's aims and objectives. The questionnaire, recognized for its simplicity of analysis, and the checklist, which ensured the comprehensive collection of appropriate data, played integral roles in the research process.

Drawing from the literature reviewed and aligning with the study objectives, we crafted suitable open-ended questions to guide the semi-structured interview. According to Creswell (2009), employing an interview guide with open-ended questions allows for a comprehensive exploration of the topic, leading to refined analysis of the research problem.

In terms of time allocation, the semi-structured interview took approximately 45-30 minutes per participant, while the questionnaire and checklist required 20-30 minutes each to review patients' files and gather data on the model's effects.

The chosen instruments were considerately selected to address the study's objectives, and their application was guided by a strategic approach, as recommended by Creswell (2000)

3.5.2 Reliability and validity

To ensure the consistency and accuracy of this research study, measures were taken to assess and improve reliability. Dudovski (2022) defines reliability as the ability of a research instrument to produce stable and consistent results. In this study, a four-step measure of reliability was implemented.

Firstly, the study adopted items that had been tested for reliability by other researchers. Subsequently, the interview guide and questionnaire underwent pretesting using a test-retest approach on ten PLHIV who met the inclusion criteria at Mumias Sub County Hospital. The pretest evaluated whether each question measured its intended aspect, ensured uniform interpretation among respondents, and assessed the relevance of response choices. Furthermore, it explored potential issues like disparity, significance, struggle, and participants' interest and attention. A statistical analysis of the pilot study was conducted, leading to slight changes in the questionnaire. It's important to note that data from the pretest were omitted from the study analysis, maintaining the integrity of the final dataset (Appendix 8).

The third step involved a measure of scale reliability using Cronbach's alpha. According to Price et al. (2020), Cronbach's alpha measures the degree of agreement on a standardized 0 to 1 scale, with higher values indicating higher agreement between items. A value of 0.7 and above signifies satisfactory consistency. In this study, the internal consistency, measured by Cronbach's alpha, ranged from good to excellent (0.803 for community readiness to 0.9 for package of services within CDSD, exceeding the 0.7 threshold. This indicates that the items were consistently measuring the study variable. Details on internal consistency can be found in Appendix 7.

To measure reliability, the study employed a rigorous four-step reliability measure, incorporating item adoption, pretesting, statistical analysis, and the use of Cronbach's alpha. These efforts ensured the reliability of the research instruments and, consequently, the validity of the study findings.

3.5.3 Validity

This study assessed various dimensions of validity mainly internal, external, construct, content, and statistical validity. Dudovski (2022) defines validity as the extent to

which a concept is accurately measured in a quantitative study. This scrutiny was crucial as inaccurate research findings can have significant consequences for patients and health interventions.

Internal validity was evaluated to ascertain the extent to which the study established a causal relationship between community readiness, demand, support mechanisms, and the package of services versus improved access to health services.

External validity aimed to determine the generalizability of the study results to other populations, ensuring that the findings are not confined to People Living with HIV (PLHIV) within Kakamega County.

Construct validity ensured alignment between the study measures and the theoretical concept under investigation. It measured the extent to which the study accurately evaluated the proposed theoretical construct.

The last aspect examined was statistical validity, which assessed the accuracy of the statistical tests used in data analysis. This step was taken to instill confidence in the accuracy and reliability of the conclusions drawn from the research study data.

In summary, this study meticulously scrutinized internal, external, construct, content, and statistical validity to ensure the accuracy and applicability of the research findings, recognizing the potential impact on patient centered care and health interventions.

3.6 Methods of Data Collection

Data collection involved multiple methods, comprising of participant interviews, laboratory tests, and the review of clients' medical records and was collected between September 2021 through December 2021. An open data kit (ODK) app, designed with an interview guide (see Appendix 4), facilitated the collection of responses, which were electronically transmitted to an Excel sheet and later exported to SPSS for analysis. Data was collected from the sampled health facility one of the conference rooms that

ensured there is privacy. This was done by both the researcher and research assistants who were lay health workers that received training on the tool.

Baseline data, essential for the study, was gathered through in-depth interviews and questionnaires developed based on a literature review. The researcher did semi-structured face-to-face interviews took 45-90 minutes with 10 key informants, including peer educators, mentor mothers, support group leaders, and clients, identified from the PLHIV database. These interviews, although costly and time-consuming, were invaluable for encouraging participants to share their personal stories, stimulating deep discussions, and overcoming social and cultural limitations.

Structured face-to-face questionnaires, lasting 20-30 minutes, were administered to PLHIV, covering five components with a total of 51 questions. Sections ranged from background information to community readiness, demand for CDSD, packages of services, and support mechanisms. The questionnaire format was chosen for its simplicity in administration and quick analysis, especially beneficial for large sample sizes (Green & Thorogood, 2013).

Secondary data, focusing on the impact of CDSD on access to health care, was collected through document and record review using a checklist comprising 21 questions. This method, drawing from patients' files and community registers, proved resourceful and economical.

Ethical considerations were paramount, with data collection initiated only after obtaining clearance from the Kenya Methodist University Ethical Review Committee, the National Council for Science and Technology (NASCOST), and the County Chief of Health. This trial is registered with National Council of Science and Technology clinical trial registry, number Nascosti/P/21/12623. Participants provided informed consent, stressing their right to withdraw from the study if uncomfortable. Participant

safety was monitored throughout, and any deviations from the initial study design were duly recorded, reported, and addressed as required. Data collected was securely stored on a password-protected computer.

3.6.1 Procedures

Enrollment:

The study flawlessly assimilated into routine healthcare services without disrupting health facility activities. Stable clients with a recent viral load of less than 400 cell/ml were identified from the daily activity register for enrollment in both intervention and control groups. Baseline data, collected through interviews using an ODK app with a 51-question questionnaire, included socio-demographic information and assessments of community readiness, demand, the package of services, and support mechanisms.

Intervention:

Baseline data guided the structuring of the intervention, which involved creating demand and training Lay health workers. Lay health workers were responsible for the operations of CDSD models in the community they stay. Their role included forming groups, conducting meetings, providing health education, distributing ART, and screening for danger signs. Participants in the intervention group chose CDSD models, including Community ART groups, Community ART drug distribution points, or a family model. Services were provided as guided through the DSD manual (MoHKe, 2018), with periodic visits to the facility at six months for clinical review and twelve for viral load monitoring and clinical review.

Study participants in the control group received convectional care at the primary facility, including ART refills, clinical reviews, adherence counseling, and viral load monitoring.

Follow-up: Viral load monitoring followed routine annual testing for adults above 25 years and after every six months for those below 25 years, with assessments at baseline

and 12 months. Retention in care (RIC), discontinued ART, missed appointments, and lost-to-follow-up was evaluated according to national guidelines. Retention in HIV care was, defined as having pursued care at least once per quarter in the 12 months prior to the study and monthly meetings plus three monthly drug pick at the community level. Participants were considered to have discontinued if they failed to turn up for the meeting or drug pick and after following up through phone and they never honored the appointment or reported to have discontinued. Missed appointment was defined as failure to attend clinic after 24 hours and lost to follow up as failure to attend the clinic of meetings after 28 days. Patients with low-level viremia (VL=400copies-999 copies) or suspected treatment failure (VL=above 1000 copies) required intensive follow up and were referred back to facilities for management and considered to have dropped from the study.

Morbidity and Mortality: The assessment of morbidity involved the attentive monitoring of opportunistic infections, while mortality data were accurately recorded for participants who unfortunately passed away during the study. To identify opportunistic infections, participants underwent an initial screening using a standardized tool at the community by Lay health workers, followed by referral to the primary healthcare facility. Subsequently, diagnostic evaluations were conducted in the laboratory by skilled healthcare professionals and a final diagnosis made. Participants diagnosed to have an opportunistic infection were considered unstable and needed frequent encounters with the health care workers at the facility and considered to have dropped from the study.

Process Evaluation: Process evaluation involved document reviews at six months, assessing client eligibility to continue in the CDSD model and retention in care. Quarterly support supervision by principal researcher and a health care professional

from the primary health facility ensured adherence to the study's intervention protocol and national guidelines.

Outcomes:

We evaluated the effects of CDSD model on access to HIV care. The primary outcome assessed at end line (at the 12-month mark) consisted of access to health services, determined through reductions in waiting time, facility visits, and associated costs.

Reduced waiting time reflects timely access to health care services. For waiting time, a time frame of less than 15 minutes for clinical consultation or ART refill was considered satisfactory. This was measured as the proportion of clients who took an average a waiting time of less than fifteen minutes for ART refill and 30 minutes for clinical consultation. Moreover, reduced facility visits were defined as a maximum of two clinical visits within a twelve-month period at the health facility. This was the proportion of clients who attended two clinical visits in twelve months with no unscheduled clinic visit.

Financial aspects were considered with a focus on reduced costs, signifying instances where clients reported no expenditures on transport or medicines/services. Furthermore, this category included cases where clients did not take days off from work to attend health services.

Secondary outcomes comprised improved retention in care, viral load suppression, the absence of opportunistic infections, and minimized mortality. Viral load was measured as the proportion of clients who achieved viral load suppression (viral load > than 400 copies/ml) at the time of study this were considered low detectable limits (>400 copies/ml however, this has been changed as the Kenya HIV prevention and treatment guidelines 2022 which considers lower detectable limits as viral load >50 copies.

3.7 Operational definition of variables

In this study, the operationalization of the five variables involved the identification of specific indicators to encapsulate the concepts under examination. Operationalization, as elucidated by Green and Thorogood (2013), is the careful process of specifying how these concepts were accurately measured. It involves clearly defining and measuring the variables in a manner that permits researchers to gather and analyze quantifiable data. It typically involves selecting indicators to measure the variable and determining how the data will be understood. Operationalization aids researchers' measure variables with more precision and consistency, improving the reliability and validity of their research.

The independent variable for operationalization encompassed community readiness, demand for CDS, the package of services, and support mechanisms. The measurement of these indicators was executed through the utilization of both a five and four-point Likert scale, as detailed in Table 3.0.2 for clarity and consistency.

Table 3.2*Operationalization of Variables*

	Nature	Indicator used	Measure used	Questionnaire
Community readiness	Independent	Community Knowledge: awareness of the model Community leaders: engagement Climate: Attitudes toward the CDSD Resources: Resources allocated	5-point Likert scale Interview guide	Q:section II
Demand	Independent variable	Awareness: Sensitized on CDSD model Acceptability: Perception that CDSD model improves access Availability: Presence of all services Affordability: Cost of services	5-point Likert scale Direct measure Direct measure	Q section III Checklist Q 7-10 Checklist Q 4-6
Package of services	Independent variable	Service package: Types of services offered at community level Client literacy :Health education Competence of provider: Ability to offer stipulated CDSD service	5-point Likert scale Direct measure Direct measure	Q section IV Checklist Q 12 Check list Q 15a
Support mechanisms	Independent variable	Policy : Availability of guidelines Monitoring and evaluation: Existence of indicator for monitoring CDSD Resources :Availability of adequate resources PLHIV networks: Involvement in demand creation, monitoring quality of services and resources	4-point Likert scale 4-point Likert scale 4-point Likert scale 4-point Likert scale	Q section V Q section V Q section V Q section V
Improved access to Health services	Dependent variable	Reduced waiting times: length of time taken to be provided with health services Reduced hospital visits: Number of visits to the hospital	Direct measure	Q section VI Q section Vi

3.8 Data Analysis

Data on excel sheet was transferred to SPSS version 25 for analysis. The first stage included data preparation following the four steps of first validating data to infer that each respondent was interviewed, screen data to ensure that each respondent was chosen according to the method, examine if data collection procedure was duly followed and confirm that interviewer asked study participants all the question. Validation was followed by data editing and finally data coding.

To facilitate analysis and presentation, Likert scale responses were transformed into two categories: agree and disagree to enhance statistical power by making it easy to identify any statistical difference and address skewness (Spencer, 2023).

Descriptive statistics and Logistic regression results were generated. Descriptive statistics included the use of frequencies, percentages, cross tabulations, and Macnemar test. The Macnemar test was conducted to evaluate variations in community readiness, demand, package of services, and support mechanisms for scaling up differentiated HIV service delivery. This non-parametric test measures paired data, making it appropriate for comparing before-and-after measures within the same community. Results provide understandings into the effectiveness of community differentiated service delivery model and the community's preparedness for expanded HIV services tailored to individual needs. The Macnemar test analyzed data from before and after implementing community differentiated service delivery in the community. By comparing paired observations, it assesses changes in readiness, demand, services, and support mechanisms.

Logistic regression was used to determine the effect of independent variables on the dependent variable. Logistic regression is used for binary dependent variable. In this study,

dependent variable was access to health care among people living with HIV in Kakamega County. Logistic regression is mathematically defined as:

$$P(Y_i) = \frac{1}{1 + e^{-(b_0 + b_1X_{1i} + b_2X_{2i} + \dots + b_kX_{ki})}} \dots \dots \dots \text{Eqn 2}$$

Where:

- $P(Y_i)$ is the projected odds that Y is true for case i
- e is a mathematical constant approximated as 2.72
- b_0 is a constant estimate from the data
- $b_1, b_2, \dots, b_k$ is a b-coefficient estimated from the predictor 1, 2, 3, ..., k .
- $X_{1i}, X_{2i}, \dots, X_{ki}$ is the observed score on predictors $X_1, X_2, \dots, X_k$ for case i

Equation 2 was applied on both baseline and end line data to establish the predictors of access to healthcare among PLWHIV in Kakamega County as well as determine the influence of intervention in accelerating access to health care among people living with HIV in Kakamega County. To carry out the test, all the independent variables in each data set desegregated by the arm of study were input into SPSS version 25 and regressed against the dependent variable.

The steps involved first computing the variables using the compute function. The Likert scaled items corresponding to each variable were condensed into the binary responses to yield the respective variables. The second step was inputting the data into binary logistic regression model followed by specifying the reference categories and lastly generating the output.

The output from the logistic regression relevant in this study included Hosmer and Lemeshow statistic, Nagel Kerke R- Square, -2loglikelihood statistics and Odds ratios. The variations in odds ratios helped to determine whether the intervention was effective.

Additionally, thematic content analysis was used to analyses qualitative questions based on based on the predetermined themes of the research variables. This involved transcribing he recorded qualitative data before coding and merging similar codes under the related theme. To uphold confidentiality, participants were issued pseudo names according to when they were interviewed. These pseudo names were utilized to recognize diverse voices by the interviewer and used when transliterating and referencing quotations. Every key informant had an exceptional identifying number on the forms, in notes taken, audio files and transcript documents. Audio recordings were transcribed into Word, and stored on a password protected laptop. The transcription was proof-read against the audio file by all the transcriber to assess for accuracy, detect any missed or misunderstood words and simplify any parts of misunderstanding or unclear abbreviations. Transcripts were translated into English from Swahili where required.

Indexed coding was used by the authors to analyze data from the key informants. After transcription of key informants and acquaintance with the transcriptions, transcripts were coded line by line independently by the researcher. There was no substantial clash with codes and minor changes were resolved by the researcher. Numerous themes arose under standard care and Community differentiated service delivery models from the codes. The themes were established, confirmed and analyzed as the unit for analysis. This was followed by further analysis of emerging sub-themes. In the standard model of care, the subtheme descriptors included opportunity to be seen by clinicians, presence of different cadres of the health team, the long waiting times, day offs taken to be seen at the facility, challenges associated with distance to clinics, transport costs, and increased number of clinic visits. In community differentiated service delivery model, the subtheme descriptors included the convenience of services within the

community, no waiting times, no transport cost, ample time to attend to other works at home, fear accidental disclosure of HIV status to other people, self-management, use of lay health workers who do not have professional background and peer to peer adherence support. The qualitative results were triangulated to emerge the findings with the quantitative and have been presented and discussed in the results section.

3.9 Chapter summary

In summary, this chapter has described the research methodology, primarily focusing on a randomized control trial with two arms. The study was conducted in Kakamega County, targeting PLHIV who were stable on ART. The sampling procedure involved purposive sampling of high-volume facilities and stratified random sampling of study participants.

The discussion protracted to clarifying data sources, collection methods (interview guide and document review, questionnaire design, and the pre-testing process. Operationalization of research variables, reliability and validity tests, and the data analysis methods employed were also detailed. Additionally, the chapter provided insights into the procedures used in the randomized control trial. The next chapter will delve into the findings and their interpretation, building upon the robust methodology outlined in this chapter.

Table 3.3*Research Objectives, Hypothesis and Methods of Analysis*

Objective s	Hypothesis	Analysis method	Interpretation
Objective 1 To assess community readiness for CDSd to improve access to Health services	H0-1: There is no significant difference in community readiness for scaling up the community differentiated service delivery model to improve access to health services among PLHIV in Kakamega County.	CRM protocol and Macnemar Wilcoxon Binary regression	Odds ratio p-value
Objective 2 To determine demand for CDSd to improve access to Health services among PLHIV in Kakamega county	H0-2: There is significant demand for CDSd and improved access to Health services	Macnemar Wilcoxon Binary regression	Odds ratio The p-value
Objective 3 To evaluate the package of services offered in CDSd to improve access to Health services among PLHIV in Kakamega county	H0-3: There is no significant difference in package of service offered in CDSd and improved access to Health services	Macnemar Binary regression	Odds ratio The p-value
Objective 4 To determine support mechanisms for CDSd to improve access to Health services among PLHIV in Kakamega county	H0-4: There is no significant support CDSd and improved access to Health services.	Macnemar Binary regression	Odds ratio The p-value
Objective 5 To evaluate effects of CDSd on access to Health services among PLHIV in Kakamega county	H0-5: There is no significant effects of CDSd on improved access to Health services	Macnemar test	p- values

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter reveals the outcomes of the study, aligning with the predefined objectives and hypotheses. It begins with a synopsis of the response rate and the test of normality, launching a foundation for the succeeding sections. The central focus rests on the findings consistent to the study objectives, offering insights into the empirical data derived from the research. The chapter systematically digs into the testing of hypotheses, expounding the statistical analyses and their implications.

The narrative extends to a complete presentation of the background characteristics, providing a contextual understanding of the individuals' key to the study. Relationships between the study variables are meticulously examined, unveiling the intricate connections and interdependencies inherent in the research domain. At the end of this chapter is a summary of the hypotheses, encapsulating the core of the statistical inferences drawn.

4.2 Response rate

The study collected data from 402 participants which generated a response rate of above 100% to take care of participants who dropped off during the study period. This represents more than 100% response rate. This was made possible by support from CASCO, facility in charge and Lay health workers who organized client as they come for their clinical visits.

4.3 Test for Normality

The non-parametric goodness-of-fit test, Kolmogorov-Smirnov (K-S) one-sample test, was used to assess normality, specifically for continuous scaled data. This test compares the collective distribution function for variables within a stated distribution, evaluating whether the observations could practically have originated from the specified distribution (Mishra et al., 2019).

The K-S tests were applied to study variables, mainly community readiness, demand, package of services, support mechanisms, and improved access to health services. The results indicated non-normal distribution of the data (see Appendix 9).

4.3.2 Linearity

To test for linearity, ANOVA and Linearity test were used. Community readiness, demand, package of services and support mechanisms were tested for linearity together with their indicators. The test yielded a significance value of 0.001 for community readiness while the others were 0.000. These test results were smaller than 0.05, indicating that there is a linear relationship between community readiness, demand, and improved access to health care as well as package of services.

4.3.3 Homogeneity of variance

The dependent variables underwent testing for homogeneity of variance, an assumption that dissimilar samples have the identical variance even if they originated from different populations. One-way ANOVA was employed to assess homogeneity of variance for the most of improved access indicators (dependent variables). The test results were 0.001 indicating equal variances across the samples.

The study also examined multicollinearity using the Variance Inflation Factor (VIF) calculated through the SPSS version 25 regression procedure, along with an analysis of correlation coefficients among variables. Multicollinearity, defined as the linear correlation among variables (Mishra et al., 2019), was assessed. The VIF test results for all independent and dependent variables were found to be less than 3 ($VIF \leq 3$), suggesting the absence of multicollinearity issues. This implies that independent variables were not highly correlated, while the correlation between independent and dependent variables was deemed acceptable (see Appendix 9 for details)

4.4 Background data

The background data collected from the study participants included age of study participants in years, educational level, and duration on treatment in years for all study participants and type of client.

Table 4.1

Background Information of the Study Participants

Characteristic	Sub set	Frequency(n)	Percentage(%)
Age in years	< 35	288	72
	< 35	114	28
Gender	Male	116	29
	Female	286	71
Educational level	Primary	168	42
	Secondary	110	27
	college	124	31
Duration of treatment in years	1-3	76	19
	4-6	178	44
	7-9	92	23
	>10	56	14
Category of study participants	Peer educator	18	5
	Support group leader	18	5
	Mentor Mother	14	4
	Client	352	88

The findings in Table 4.1 on age distribution indicate that 72% (288) of participants were aged below 35 years. This suggests that the study population is largely composed of younger individuals. This age distribution corresponds with the (KNBS & ICF., 2023) that indicates that HIV prevalence among youth aged 15-34 years stands at 5.9% (Approximately 1,517,707 people living with HIV). While this study targeted clients who are established on treatment this finding contradicts with the eligibility criteria for DSD as guided by MoHKe, (2018) which show that most of the youth are not virally suppressed hence not established on treatment.

Regarding gender distribution 71% (286) were of female gender. This gender imbalance may indicate that women attend clinic and men rely on either sending treatment supporter who might be the wife, daughter or sister. This baseline finding had implications for understanding

the impact of the treatment or intervention on different genders. Considerations were put in place during implementation for tailor made awareness creation because this was likely to have an influence the outcomes of the study.

In terms of education, majority 42% (168) had completed primary level education. This information was crucial for understanding the educational background of the study population and its likely influence on health literacy, adherence to treatment, and overall health outcomes.

Concerning duration of treatment majority were those who had been on ART for 4-6 years, this finding indicates clients who have been on treatment for a long duration are virally suppressed and established on treatment. The ultimate goal of ART is to achieve undetectable levels of virus in the blood enabling clients lead a normal life.

The overwhelming majority of participants, 88% (352), were identified as clients. This suggests that the peer educators, group leaders and mentor mothers comprise of a small percentage, and this is in line with the operation of comprehensive care clinics

Table 4.2

Cross tabulation of gender and level of education

Gender	Level of education			
	Primary	Secondary	College	Total
Male	8 (32)	7 (26)	14 (58)	29 (116)
Female	34 (136)	21 (84)	16 (66)	71 (286)
Total	42 (168)	27 (110)	31 (124)	100 (402)

The results in Table 4.2 indicates that a higher percentage of females (16%) had college-level education compared to males (14%). Females also had a higher percentage at the secondary level (21%) compared to males (7%). A higher percentage of males (8%) had primary education compared to females (34%). In both gender number of participants with college level education had a slight difference 14% in male and 16% females. This implies that there was a substantial

gender difference at the primary level, with a significantly higher percentage of females having primary education compared to males. This difference could be credited to several aspects, including past educational themes, cultural standards, or specific initiatives promoting female education.

The difference in the percentage of study participants with college-level education is relatively small between males and females. This finding suggests a more balanced distribution at the college level, indicating progress towards gender parity in higher education. However, it's important to note that even minor differences might have effects on scale up of CDSD model and may determine its utilization. On the other hand, it might indicate the highest educational level has no influence on the model of care that clients prefer to utilize. This suggest that clients both highly educated still struggle with stigma and discrimination and awareness need to be created to both regardless of education level and gender. When creating awareness, the scope of sensitizing clients should be comprehensive regardless of the level of education and gender.

Table 4.3

Cross tabulation of Age versus level of education

Age in years	Level of education			
	Primary % (n)	Secondary % (n)	College %(n)	Total % (n)
<35	30 (119)	21 (83)	21 (86)	72 (288)
>35	12 (49)	7 (27)	10 (38)	28 (114)
Total	42 (168)	27 (110)	31 (124)	100 (402)

The results in Table 4.3 show that a significant number of the study participants (42%) had primary level education, indicating that a considerable part of the sample has education at the foundational level. The finding that 30% of those with primary education are aged less than 35 years suggests a relatively younger demographic has not managed to attain higher levels of education but only have basic. This might have implications for understanding of the CDSD

model and how to tailor the interactive education communication (IEC) material. The concentration of primary education might suggest historical or systemic patterns in education, emphasizing the need for more sensitization and awareness creation at the time of scaling up CDSD model.

The findings further indicate that 31% had college level education and 21% of those with college education are aged less than 35 years. This age group might represent a younger component with access to or quest of higher education. The presence of a substantial number of individuals with college-level education, especially among those aged less than 35 years, may indicate positive inclinations in higher education access or the closeness study site to institutions of higher learning. This suggests that age does not affect the client utilization of the CDSD model and that the educational level has no relationship with utilization of model. These findings suggest clients aged below are privy to information on CDSD and this might be related to information seeking behavior among the youth. These findings are related to Agyemang-Duah et al. (2020) who established low health information seeking behavior among older and low income participants. This study results implied that there is need to be strategic while sensitizing older population by allocating more time and being friendly to them in order for them to grasp what is being taught.

4.5 Community readiness to scale up community differentiated service delivery

Objective 1: To assess community readiness to scale up community differentiated service delivery for improved access to health care among PLHIV, the study had set the following hypothesis.

H01 There is no significant relationship between community readiness and the improvement of access to health services among PLHIV in Kakamega County following the scale-up of the differentiated service delivery model.

This assessed the degree to which the community was ready to take action in scaling up CDSD model. Community readiness was measured using CRM protocol for qualitative data and non-

parametric tests for quantitative data by testing the six dimensions of community readiness mainly community efforts, knowledge of the efforts, leadership, community climate, knowledge of the issue and resources. The study findings have been presented in table 8 and 9. The qualitative data has been presented narratively according to identified themes.

Table 4.4

Dimensions of community readiness to scale up community differentiated service delivery model among people living with HIV

Characteristics	Agree n (%)	Disagree n (%)	X ² (p-value)
CDSD models are easily available	133 (33)	269 (67)	46.010 (0.001)
Clients are aware of how CDSD can improve access to health services	245 (61)	157 (39)	19.264 (0.001)
Community leaders have been involved as champions for scaling up of CDSD	113 (28)	289 (72)	77.055 (0.001)
Community has a positive attitude towards scaling up CDSD model	286 (67)	134 (33)	44.667 (0.001)
Community has adequate resources to support scale up	234 (58)	168 (42)	10.836 (0.001)
Community is aware about challenges in accessing health services	266 (56)	176 (44)	6.219 (0.013)

Note. CDSD refers to community differentiated service delivery, X² chi-square. The df was 1 for all parameters.

The results in Table 4.4 above demonstrated that One-third of the study participants (33%) expressed agreement that the CDSD model was easily available. This indicates a substantial portion of the respondents acknowledging the accessibility of the CDSD model for supporting the scale-up efforts. The p-value of 0.001 supports the reliability of the finding that 33% of

participants agreed on the availability of the CDSD model. A majority (61%) of the respondents indicated that they were aware that CDSD would improve access.

Respondent 9: *” you see when we started this program people used to meet in houses four or three people and so it was difficult for people to know if such programs exist. It was as if we were hiding but people need to know that community models exist in the community and if they want to enroll who can you conduct it will be better.....”*

The qualitative and quantitative results suggest an agreement of CDSD model accessibility and a positive perception of the potential benefits of scaling up CDSD programs. Participants may have varying perceptions or experiences regarding the availability of CDSD, leading to the observed differences in their responses. The 33% who had positive assertion of CDSD model provided an opportunity to leverage on while scaling up. The availability of CDSD could be influenced by external factors, and participants' responses may have mirrored these real-world variations.

This further shows that few of the community members are aware of the CDSD model but its availability does not match the knowledge. Overall, according to the community readiness model protocol the community may be rated at vague awareness stage of community readiness. This points to the idea that although part of the community is have received information on CDSD the knowledge is not sufficient to inspire them to make the necessary changes that will see them utilize the CDSD model. These finding are similar to those of Ervin and Berry (2006), Liu et al. (2020) and Nanyonjo et al. (2020) who established in their study that awareness on the availability of health services alone may not increase its utilization if the services to be used resources are not available.

Pertaining community leadership, a relatively lower percentage (28%) reported that leaders were actively involved as champions in scaling up CDSD.

Respondent 12:”OK it is we know them it hard that they do not support and are less concerned most of them are able to afford care in high end hospitals but maybe we need to talk to them to see if they can assist us even in getting a venue and mobilizing more people to join community differentiated service delivery.....”

Low levels of community leadership support might indicate a possible area for improvement, as having leadership support is often crucial for the effective implementation and sustainability of any program. Community leaders are believed to be gatekeepers who play a significant role in mobilizing and coordinating the community to implement changes. Minimal leadership support is highly associated with underutilization of health service because leaders are seen as role models within the community and exert a lot of influence. This study established minimal leadership support for scaling the CDS model similar to the results by Maskew et al. (2022); Muhumuza et al. (2015) Nigusie et al. (2021; Suwannawong et al. (2023) and Sharer et al. (2019) who identified that community leaders believed underutilization of community models existed, but they did not show signs of motivating community members to enroll. However, these findings contradict findings by Islam et al. (2019), Ervin and Berry (2006) and Solomon et al. (2021) who found out high mean score for leadership of (4±1.16) meaning the communities were at preplanning stage reflecting how leaders provided support with information and resources for scaling up community differentiated service delivery.

When the results on community knowledge of the issue (56%) are linked to leadership support it may suggest that leaders may fail to support and initiate an intervention if the community they represent does not recognize it as a local problem, most local leaders respond to local needs that are consistent with the community because they form part of the community.

Respondent 5: “Huhuuu.... everybody supports such a noble idea the program will save us a lot time. in fact, you can agree to have group meetings even at night for 1 hour after you completed your house work.

A significant majority (67%) expressed positive attitudes towards the scaling up of CDSD model. This is an encouraging result, as positive attitudes can contribute to the successful implementation and acceptance of CDSD initiatives within communities. This mean that majority of the community strongly support scaling up of the community model which is needed for success implementation of any community project. These findings agree with Al-Mahroos et al. (2020), Brian et al. (2022), Gansefort et al. (2018) and Liu et al. (2020); who established that a positive attitude towards the community model had led to the success of starting up community ART groups.

A remarkable percentage (58%) identified resources as a significant obstacle to scaling up the model. The P-value was 0.001 significant level indicating a statistically significant relationship between availability of local resources and community readiness in scaling up CDSD and improved access to health services.

Respondent 1: *“when we started implementing community differentiated service delivery, we had 17 but people stopped coming in the group but instead went directly to the clinic to receive services from there. This made us get bored since people are not utilizing them although using them helps to reduce waiting time and the cost of travelling to the clinic.”*

The finding may suggest that addressing resource constraints could be a key factor before effective implementation and sustainability of CDSD programs. This implies that the resources within the community are not adequate for implementing the CDSD model. These results are consistent with the study findings by Bygrave et al. (2020) and Ervin and Berry (2006) which found that inadequate resources had affected implementation of community based intervention. This might be because the community relied heavily on donor funding and with diminishing donor funding they have not identified on how to mobilize for resources.

A substantial portion (56%) acknowledged that access was a challenge that needed to be addressed. This acknowledgement is central for developing targeted strategies to improve access to CDSD services.

The findings on community readiness indicate a generally positive awareness and attitude towards CDSD, but there are challenges to address, especially getting the support of community leadership, resource allocation, and overcoming access barriers. This indicates low levels of community readiness to scale up CDSD model that might be attributed to low levels of leadership support and inadequate resources. To enhance the success of scaling up CDSD model, there may be a need for increased leadership support, resource mobilization, and targeted local interventions to improve access.

Table 4.5

Level of Community Readiness to Scale Up Community Differentiated Service

Variable	Frequency		Mean/SD
		Percentage	
Community readiness	Not Ready	270 67	1.82 ±.389
	Ready	132 33	1.49 ±0.494

Note; SD mean standard deviation

The findings presented in Table 4.5 reveal that 67% of clients demonstrated unpreparedness to scale up the CDSD model. This implies that a significant number of the clients under consideration lack readiness or the necessary resources for expanding the CDSD model. The mean (1.82) and standard deviation (0.389) offer supplementary insights into the extent and variability of this unpreparedness within the client population.

This information proved crucial for digging further into the identification of barriers and their mitigation, as well as facilitating the improvement and utilization of existing community strengths during the implementation process. Anchoring on these findings is needed for ensuring a smoother and more effective implementation of the CDSD model.

Previous studies conducted by Ehrenkranz et al. (2019) have also identified low levels of readiness among community members. Many members expressed skepticism, primarily fueled by the fear of potential stigma within the community. This underscores the importance of

addressing and overcoming such concerns to foster a more supportive environment for the successful implementation of the service delivery model.

4.6 Determining demand for community differentiated services delivery

Objective 2: To assess demand for community differentiated service delivery to improve access to health care among people living with HIV in Kakamega County.

H02 There may be no significant demand for the community differentiated service delivery model, and even if demand exists, it may not lead to a significant improvement in access to health services among PLHIV in Kakamega County.

The non-parametric test was used to assess determinants of demand for community differentiated service delivery. The main variables assessed were if participants had received information on CDSD model, if they accepted the model, if the model was available within their community and if it was affordable.

Table 4.6

Demand factors for Community Differentiated Service Delivery

Variable	Agree n(%)	Disagree n (%)	X ² (p-value)
Information on community differentiated service delivery was given	237 (59)	165 (41)	113.140 (0.001)
Community differentiated service delivery is acceptable by clients	137 (34)	265 (66)	5.988 (0.014)
Getting community differentiated service delivery care is less expensive	123 (31)	279 (69)	128.501 (0.001)
Community differentiated service delivery is available within the places where clients stay	180 (45)	222 (55)	130.776 (0.001)

Note: CDSD refers to community differentiated service delivery, X² is chi-square

Table 4.6 indicate that majority of respondents (59%) agreed that they received information about the CDSD model.

Respondent 12:”OK it is we were taught and given some books to read and that using community models is less expensive and saves time but we do not have a doctor at the community and this is the reason we prefer to go to the hospital. Even if you spend a whole day but you will be seen by the doctor. Also you can only have your blood taken at the hospital because at community there is no one who can take our blood and measure if we are doing well.....”

The findings suggest that a significant portion of the client population has been given information about CDS model. This could positively influence awareness and understanding of the services provided within the CDS model. Awareness is a key determinant of demand for health care services; it highlights the importance of communication and information diffusion about the CDS model. Awareness of any intended intervention by the end users leads to greater willingness to accept and utilize it. Awareness is generated through sensitization meetings, health education, media and interactive education communication (IEC) material. These findings are resonating with the study findings established by Larson et al. (2020), Martinez et al. (2012), Okere et al. (2022), and Zhou et al. (2021), which found out that awareness about health services being provided was able to raise the demand for health services leading to utilization and improved access to health service delivery. They established increased demand for health services was related to increased knowledge among community members compared to those who had limited knowledge of where they could find the services. Burger and Christian (2020), Grossman (2017) and Mukumbang et al. (2021) also identified that increasing the knowledge of people about dental services increased the likelihood of utilizing and improved access to the services.

On acceptability, a lower percentage (34%) was in agreement on the CDS model being acceptable. While this shows a positive response, it's worth noting that there is a gap between those who received information (59%) and those who find CDS acceptable (34%). The response from informant below also supports this;

Respondent 10: *“I don’t accept the community thing; I fear that people who know will know that I have HIV. You know everybody will be curious to know why we come together and they may end up knowing that I have HIV. No I don’t.....”*

This might imply that a gap between information about CDS and acceptance which calls for a consideration of the reasons behind this gap and the addressing any possible concerns or misconceptions. This will be helpful in coming up with approaches to bridge the gap amongst information receipt and acceptance to augment scale up. The fear of accidental disclosure of their HIV status which might result in stigma and discrimination might be affecting acceptability. Evidence demonstrates that acceptability of health intervention is mostly affected by the attitudes and perceived effectiveness (Sekhon et al., 2017). According to the Andersen–Newman behavioral model, an individual's perception of a health intervention or service before receiving it can influence their predisposition to accept this service and utilize it (Lerdel et al., 2021). These study findings indicate low acceptability of the model which may be associated with lack of confidence in providers of the services within the community who are expert patients. These findings align to those reported by Adjete et al. (2019), Hirsch et al. (2011), Jobarteh et al. (2017) and Mukumbang et al. (2020) that established low acceptability level for community based models due to fear of low quality of services at community level, fear of stigma and discrimination. However, findings from studies by Kong et al. (2019) and Mashungu et al. (2018) contradict these findings revealing a high acceptability among obstetric clients. Fruitful execution of community differentiated service delivery depends on acceptability of the model by both the clients and the health care providers. Kong et al. (2019) and Tshuma et al. (2017) recommended that acceptability should be deliberated when planning any health care intervention at the community level. If an intervention is considered acceptable, the patients are more likely to utilize it and benefit from improved access to health services.

Regarding whether participants agreed if services were available a moderate percentage (45%) agreed that services within the CDS model were available with a p-value (0.001) indicates a

statistically significant relationship between availability of services and demand. This was supported by the statement by key informant found below;

Respondent 6: *“I prefer to get services near the place I stay for me all the services I need I can get them and not worried at all”*

This may imply that there is a positive perception of the availability of CDSD services by clients. However, it would be valuable to explore the exact aspects of availability (comprehensiveness of the package and competence of the provider) that could be the reason behind 55% disagreement to recognize prospective areas for improvement. Appreciating the factors causative to the perceived availability of services can enlighten strategies to increase access and utilization to bring the 55% on board while scaling up the model. This might point out that there was a high probability of demanding for CDSD if the services were available. These results corroborate with those of preceding studies by Matsuoka et al. (2017) and Msafiri et al. (2023). (2019) who established that non availability of obstetric health service significantly affected demand for the services. In a similar study Zhou et al. (2021) identified a disparity between demand of services and its supply. They established the non-availability of health services had negatively affected the demand.

Concerning affordability as a determinant of demand a relatively smaller percentage (31%) agreed that CDSD services were not costly and p-value of .000 indicating a statistically significant relationship with demand for CDSD.

Respondent 2: *“The good thing I like about services within the community is that it is free, yes all HIV services are free but going to the facility you have to use money to get there. In fact, the cost of transportation has doubled.....”*

The findings could suggest that a significant portion of the respondents perceives CDSD services as costly. Exploring the specific aspects of cost perception can be crucial in tailoring communication or intervention strategies because HIV services are offered at Zero value and at community level both direct and indirect cost does not apply. Addressing perceived cost issues

and communicating this during scale up might be crucial to improve the acceptability and utilization of CDSD services. These findings are similar to those by Mhlanga (2021) who identified that demand for health care was negatively affected by lower income and high price for health services. However, these results are not supported by Grossman (2017) who identified that low salaries and wages had no significant relationship with demand of health services they argued that recipients of care will demand for services they perceive are of high quality services at whatever cost it is offered.

Table 4.7

Level of demand for community differentiated service delivery among respondents

Variable		Frequency	Percentage	Mean/SD
Demand for CDSD model	Low	279	69	1.73±0.384
	High	123	31	1.39±0.490

Note: CDSD means community differentiated service delivery; SD mean standard deviation

Table 4.0.7 demonstrates that 69% of clients had low demand for CDSD model. This implies that a considerable majority of the clients under attention were not utilizing the model. The mean (1.73±0.384) suggests extra understandings into the extent and variability of this low demand up within the client population.

This information was resourceful for strategizing demand creation before and during the intervention period to increase uptake of the model. Focus on demand factors was key during the whole period. Our study findings corroborate with findings from studies by Zhou et al. (2021) who identified low uptake of DSD model related to fear that providers at the community level were not well trained to provide all services recommended in CDSD model. They preferred to be seen at the clinic where they were sure of being seen by a clinician.

4.7 Evaluating the package of services in community differentiated service delivery

Objective 3: To evaluate package of services in community differentiated service delivery for improved access to health care among people living with HIV in Kakamega County.

H03 There may be no significant difference in the access to health services among PLHIV in Kakamega County based on the specific package of services offered during the scale-up of community differentiated service delivery models.

Non parametric tests were used to package of services offered during the baseline assessment. The sub components included component that make up a comprehensive package of services, client literacy and competence of the provider. The findings are as follows:

Table 4.8

Components of Services within Community Differentiated Service Delivery

Characteristic	Agree n (%)	Disagree n (%)	X ² (p-value)
Health education	213 (53)	189 (47)	1.433 (0.231)
ART refill	270 (67)	132 (33)	47.373 (0.001)
Symptom screening	148 (37)	254 (63)	27.950 (0.001)
Reporting	66 (16)	336 (84)	181.343 (0.001)
Psychosocial & Adherence support	352 (88)	50 (12)	226.876 (0.001)
Referral	346 (86)	56 (14)	209.204 (0.001)
Viral Load sample Collection	63 (16)	339 (84)	189.493 (0.001)

Note. CDSD refers to community differentiated service delivery, X² is chi-square

Table 4.8 indicate that over half of the participants (53%) acknowledged the presence of health education as one of the services offered in the CDSD model. The p-value was 0.001, indicating a significant relationship between ART refill and the package of services. This suggests a rational level of awareness and acknowledgement of the value of health education in promoting utilization of community level health interventions. These study findings align with study findings by Mohammad and Mohammad (2022) and Zakamumpa et al. (2019), who established the client ranged the package of services based on information received. Quality of services in CDSD cannot be achieved without empowering PLHIV about the model and its benefits. Client

literacy increases the assertiveness of PLHIV utilizing community differentiated service delivery model.

The highest agreement (67%) is related to the ART refill services in CDS. On ART refill the findings could suggest strong support and positive perceptions regarding the accessibility and efficiency of ART refill services within the community. Clients receiving ART are supposed to take them on daily without missing in order to stay healthy; this explains why booth groups agreed that ART refill was available. The findings are in line with the recommendation in WHO guidelines and MoHKE, (2022) recommendations that guides that patient on ART should not miss any dosage.

Adherence counseling and psychological support has a very high agreement rate (88%). This suggests strong recognition of the importance of adherence counseling in achieving the treatment goal that requires 95% of PLHIV on treatment to be virally suppressed. Adherence counseling and psychosocial support is the main component of ART treatment because it leads to viral suppression which the main goal of ART and one of the UNAIDS global target. This study finding is similar to Doward et al. (2020) and Fox et al. (2019) who identified that adherence and psychosocial support one of the services that was being offered in Community ART groups and had resulted in better patient outcomes.

On symptoms screening to identify signs of opportunistic infections and refer appropriately the finding in this study shows that Symptom screening received a moderate agreement rate (37%).

Respondent 1: *“when we started implementing community differentiated service delivery we only received ART refills only we could not get other services like someone examining us to see if we do not have any illness due to this we decided to go back to the facility. At the facility there is a clinician who will examine us. You see.....”*

The results suggest that this may suggest that there is room for improvement as an effort to identify or prevent advanced HIV diseases on time. Lack of symptom screening lack of skills by the provider to screen hence need to Consider providing additional training and capacity building for Lay health workers to ensure the effective delivery of all components of the CDS

model. Symptom screening is highly recommended at every encounter with clients to help identify clients with advanced disease on time. The competence of the lay provider may be the reason why symptom screening is not done. The Kenya HIV prevention and treatment guidelines 2022 have outlined and provided form with symptoms to be screened at every visit before ART refill when the clients visit the health facility or the community. The five cardinal signs are referred to as red flags and provide a quick way of screening clients (MoHKe, 2022). The findings in these contradict finds by Tran et al. (2021) who established that symptoms screening in community models had led to early identification of PHIV who had developed tuberculosis (TB). This led to initiation of TB treatment on time.

Table 4.8 indicates that Sample collection has a relatively low agreement rate (16%).

Respondent 6: *“At the community there is no lab to measure our blood and see if the virus is sleeping, we have in other countries there is someone who collects the blood from patients in the community level and takes to the facility for investigation but not here”*

This suggests that the national program is still working on strategies that can facilitate sample collection in a convenient and effective manner. The findings on viral load sample collection is a true picture of what is happening although we have instance where during outreach clinics clients in hard to reach areas have someone who collects samples and takes to the facility laboratory for investigation. Lack of viral load sample collection at the community level is attributed to lack of functional sample referral system and stock out of viral load reagents that was witnessed in the national program for a prolonged period. The p-value of .000. indicating a significant relationship between symptom screening and package of services. This is agreement with Ford et al. (2020) established that ART initiation, adherence counseling testing and laboratory testing at community level improved access to treatment for people who was experiencing problems with health services. Patient will always utilize services whose package is comprehensive, and they might not be required to visit elsewhere seeking services that are not found in their area.

Referral services received a high agreement rate (86%). The p-value of .000 indicating a statistically significant relationship with scaling of CDSD. This highlights the perceived effectiveness of the referral system within CDSD, indicating that participants believe it contributes positively to their health outcomes. There is a lot of emphasis that has been put on referral of clients for further care and those services that cannot be offered at community. There is community level referral booklet that is used while referring. The study findings are in line with the emphasis that has been put on referring client.

Reporting services have a lower agreement rate (16%). This could indicate challenges that LHW may be having in reporting that may need to be addressed. It could also imply that there is a gap in monitoring and evaluation one of the key services in any program. Studies by Reidy et al. (2018) established that monitoring implementation of DSD is challenging and necessitate improving on the competence of the provider to equip them with skills that ensures that enough data is collected to inform management of patients. The findings highlight services that need to be included in the package of services offered in CDSD to make it comprehensive. Addressing the identified areas for improvement can contribute to the overall success and acceptance of CDSD initiatives within the community.

Competence of the provider

The study participants perceived that the Lay health workers did not have required knowledge and skills to offer services as indicated by the statement below;

Respondent 5: *I would rather spend my time on line in the hospital being sure that I will be seen by the doctor. Those people offering services at the community level calling themselves doctor are the same people who take drugs as us. I fear they might give me wrong drugs.*

These results suggest that study participants perceive Lay health workers as incompetent and would rather spend most of their time in the health facility. Lay health workers are treatment experienced client who are selected and trained to offer services but may not gain trust from their counter parts since they are patient. These findings are similar to Dudhia and Kagee

(2015), Fox et al. (2019), Naslund et al. (2014) and Rasschaert et al. (2018) who established that most of clients reported that in CDSD they did not receive all services especially screening for opportunistic infection making them prefer being attended to at the facility where a clinician was offering services. In a related study by Holmes and Sanne (2015), Onyango et al. (2021) and Rasaq-Kayode (2021) identified poor quality of services offered was related to inappropriate services, they established that the package of services was inappropriate because Lay health workers could not provide all services recommended in manual due to limited skills but referred clients.

Table 4.9

Package of services offered in community differentiated service delivery among people living with HIV

Variable		Frequency		Mean
			Percentage	
Package of service	Non-comprehensive	213	53	1.92 ±0.271
	Comprehensive	189	47	1.12 ±0.334

Note: SD means standard deviation

The findings presented in Table 4.9 demonstrate that the service package for scaling up the CDSD model lacked comprehensiveness during the baseline assessment. This suggests the absence of certain services in the provided package, indicating that the needs of the clients are not fully addressed. The mean (SD) value of 1.92± 0.271 offers additional insights into the extent and inconsistency of the package of services.

These perceptions guided the initiative to enhance the client-centered approach of the CDSD. This involved providing necessary training to the Lay health workers during period of the intervention. This adjustment aimed to better align the CDSD model with the objectives and needs of the community.

These findings are consistent with earlier studies conducted by Barnabas et al. (2020) and Decroo et al. (2014), which underscored that a majority of clients preferred the conventional

service delivery model due to the absence of essential services in the CDSD model. Specifically, these studies reported that crucial activities such as health checks and viral load monitoring sample collection were not being conducted at the community level. The current assessment emphasizes the significance of addressing these gaps to improve the general effectiveness and acceptance of the CDSD model.

4.8 Assessing Mechanisms that support community differentiated service delivery

Objective 4: To assess the mechanisms that support scale up of community differentiated service delivery among people living with HIV in Kakamega County.

H04 The support mechanisms provided may not significantly impact the success of scaling up community differentiated service delivery in improving access to health services among PLHIV.

The variables that were tested using non parametric tests included effectiveness of community networks, resources, policies, leadership and monitoring and evaluation. The results are as follows:

Table 4.10

Mechanisms that Support Scale Up of Community Differentiated Service Delivery

Characteristics	Effective n (%)	Ineffective n (%)	X² (p-value)
How effective are Community networks promoting scale up of CDSD models	145 (36)	257 (64)	31.204 (0.001)
How effective are adequate stock levels of drugs and other resources used in community differentiated service delivery	220 (55)	182 (45)	3.592 (0.058)
How effective are policies on community differentiated service delivery	166 (41)	236 (59)	12.189 (0.001)
How effective are community leaders in supporting scale of CDSD	161(40)	241 (60)	15.920 (0.001)
How effective is the data flow from the community to patient's HIV medical records	130(32)	272 (68)	50.159 (0.001)

Note. CDSD refers to community differentiated service delivery, X² is chi-square

Table 4.10 indicate that 36% (p-value 0.001) agreed that community networks were effective in supporting the scaling up of CDSD.

Respondents 3: *“Those people you call network are not effective at all, we thought they should be the ones teaching us and encouraging us on this community model but most of them are silent”*

This suggests that there is a portion of participants who recognizes that the community networks play a role in the success and extension of CDSD initiatives but a greater percentage are of different opinion. These results could imply that the PLHIV net have not been fully involved in the implementation of CDSD model. This finding contradicts those of Mukumbang et al. (2021) and Pellecchia et al. (2017) who identified that the PLHIV networks played a key role in implementation of CDSD through their adherence clubs. The PLHIV network not only supported enrollment but also supported clients by coming up with income generating activities within their groups.

On resource 55% perceived that there were adequate resources to the support the activities carried in CDSD model, the p-value of .001 indicating a statistically significant relationship between resources and support offered. This was affirmed by the response from one of key informant;

Respondent 5: *“ The good thing is that we have never missed drugs even they are not enough to take as three months we are given for one month and next time you get a three months’ supply.*

This could imply although there is still a gap in resource allocation, the needs of clients are being met. Having adequate resources to clients means that the drugs are available, clients hardly recognize the importance of other resources like infrastructure and other commodities that are used hand in hand with ARVs. This study's findings contradict those of Belay et al. (2022), who identified stock outs of antiretroviral therapy (ART) and inconsistencies in the supply chain system as the primary barriers to implementing CDSD model. Considering the

extensive emphasis put on the significance of resources, organizations, and stakeholders should prioritize resource allocation to ensure the success of CDSD activities.

On the policy, 41% of participants indicated agreement that policies were effective in supporting the scaling up of CDSD, with a p-value of 0.001. This finding was supported by the response below;

Respondent 10: *“We have never seen policy at community level if you want to know something you just go to the facility and ask the doctor, they are the ones who store them”*

This could suggest that there is some acknowledgement among participants that supportive policies are crucial for the efficacious execution and growth of CDSD models. Further to this, it could suggest that policies are available in certain setting and in others there are no policies to guide the scaling up process. Guidelines provide roadmap on how to implement the DSD models and ensure standard service provision across the country. This contradicts the findings of Sharer et al. (2019), Grimsrud et al. (2023), and Bemelmans et al. (2014), who, in their studies, established that policies were effective in the implementation process. In order to ensure continuity and ownership of an intervention, the community should be involved in both policy formulation and implementation. Given the significance of policies, efforts should be made to ensure that Lay health workers have access to guidelines that guide the implementation of CDSD model

The leadership demonstrated a 40% agreement rate in supporting the scale-up of CDSD, with a p-value of .001

Respondent 10: *“I have never seen what the so called leaders are doing I even do not know who they are. If we have leaders, then I expect everything to be smooth and we should not lack drugs at any given time.”*

While leadership is recognized as a significant factor, it may suggest that there is room for improvement or that participants have varying opinions on the effectiveness of leadership in this context. These results suggest the leadership support is minimal and might be reason

behind underutilization of the model. Leaders help the community members exchange ideas and develop a sense of accountability toward implementation of the CDSD model. Studies by Root and Whitesides (2013) reported similar findings; they demonstrated that good leadership support in terms of providing support supervision and mobilizing for resources to implement DSD models. Recognizing the slightly lower agreement on leadership suggests the potential need for leadership to be fully involved in scaling up CDSD model.

Results in table 4.10 show that the lowest agreement percentage (32%) is related to monitoring and evaluation supporting the scale-up of CDSD. The response by respondent 8 could point in the same direction.

Respondent 8: “Talk of being able to know what happens in the community where services are given by community members. I tell its difficult we have always asked for community led monitoring and evaluation to be able to track events in community differentiated service delivery but no one has come to assist us”.

This could indicate a potential area for upgrading in terms of how monitoring and evaluation practices are perceived or implemented in the framework of CDSD model. These findings suggest that there is no effective monitoring and evaluation of CDSD at the community. This makes it difficult to recognize gaps in service delivery and come up with ways of addressing them. Community led monitoring and evaluation increases the rate of responsibility in implementation of CDSD and nurtures community involvement in decision making. These findings align with findings of previous studies by Ehrekrenza et al. (2019), Futuriyele et al. (2018), and Reidy et al. (2018) who identified that the models within the community lacked structures for monitoring and this made it difficult to identify if there is a client who had been lost to follow up. Forming community led monitoring and evaluation can enhance the scalability and sustainability of CDSD models.

The findings accentuate the significance of adopting an assimilated approach, where community networks, resources, policies, leadership, and monitoring and evaluation are collectively addressed to maximize the impact of CDSD.

Table 4.11

Support for scaling up community differentiated service delivery among people living with HIV

		Frequency		Mean /SD
Variable		Percentage		
Support mechanisms	Poor	236	59	1.73 ±0.444
	Good	166	41	1.45 ± 0.499

Table 4.11 demonstrates reveals that a significant majority of participants, 236 individuals (59%), perceived a lack of satisfactory support favorable to the scale-up of the CDSD model. The mean score of 1.73, together with a standard deviation of 0.444, provides further validation for this perception. These numbers propose an unanimity among participants that there was deficient support for the successful implementation of the CDSD model.

This finding supports the results of earlier study conducted by Karuga et al. (2023). Their research similarly identified deficits in policies, resources, and monitoring systems during the scale-up of DSD models. According to their findings, clients frequently experienced drug stock outs and a lack of standardized policies to guide them on proper procedures. The absence of support mechanisms poses a limitation to the creditable initiative of enhancing accessibility through decentralized service delivery models.

4.9 End line results on scaling up community differentiated service delivery

Introduction

The end- line data, collected between October and November 2022 after twelve months following scaling of CDSD model among PLHIV, involved a thorough examination of primary outcomes. This process included document reviews and interviews aimed at comparing

baseline and endpoint data related to community readiness, demand, package of services, and support mechanisms. The outcomes of this analysis are presented in Tables 4.12- 4.17 and figure 4.1-4.2

Table 4.12

Demographics characteristics of study participants at end line

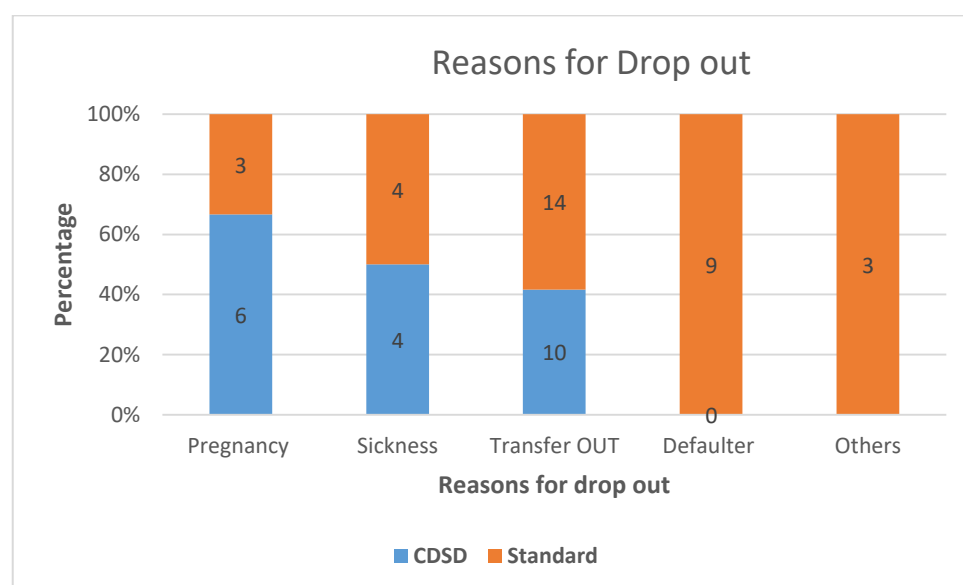
Characteristic	Sub set	Intervention Group n (%)	Control group n(%)
Age in years	< 35	125 (61)	121 (74)
	> 35	56 (39)	36 (26)
Gender	Male	51 (28)	46 (28)
	Female	130 (72)	114 (72)
Educational level	Primary level	72 (40)	64 (39)
	Secondary Level	53 (29)	45 (27)
	college	56 (31)	55 (34)
Duration of treatment in years	1-3	33 (18)	32 (20)
	4-6	84 (46)	75 (46)
	7-9	39 (22)	36 (22)
	>10	25 (14)	21 (13)
Type of client	Peer educator	9 (5)	8 (5)
	Support group leader	9 (5)	8 (5)
	Mentor Mother	5 (3)	5 (3)
	Client	158 (87)	143 (87)

Note: intervention group's n=181 and control group n=167

Table 4.12 indicates that at end line (12 months) the number of participants who were evaluated were 181 in the intervention group and 167 in the control group. This suggest that 20 (10%) participants from intervention group and 37 (18%) from control dropped off. The cumulative drop of from 402 participants was at 14%.

Figure 4.1

Reason for drop out from the model



Note. CDSD is the intervention group and means community differentiated service delivery while standard is the control group

Figure 4.1 indicates that "transfer out" was the leading reason for client withdrawal, with 10 instances in the CDSD group and 14 instances in the Control group. Transfer out typically occurs when clients relocate to another healthcare facility or location. The comparable numbers between the CDSD and Control groups suggest that factors unrelated to the study model influenced client mobility.

The figure records that "defaulter" was a reason for withdrawal, but this was specific to the standard care model. Defaulting from treatment is a common challenge in HIV care. The standard care model may have faced specific issues contributing to higher cases of defaulting compared to the intervention group.

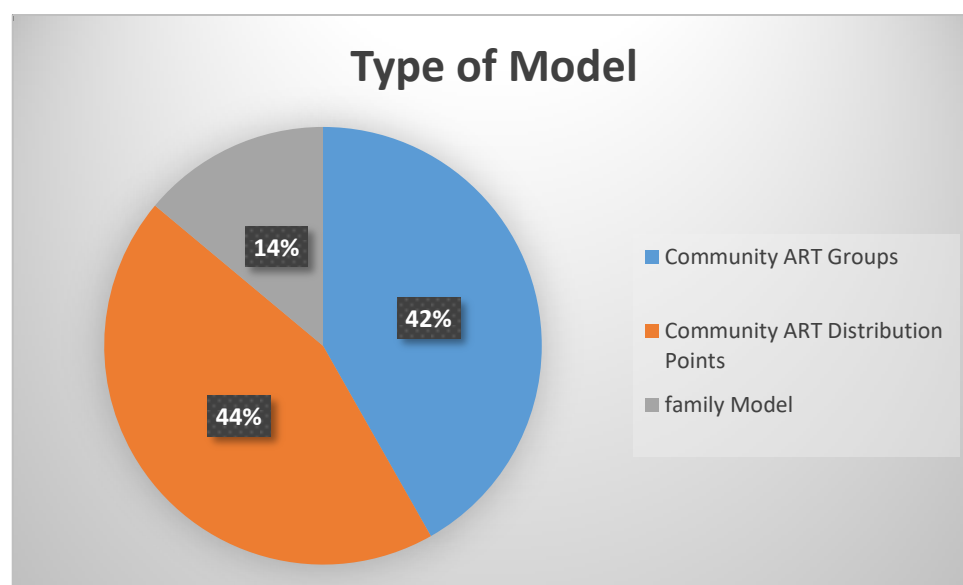
The figure mentions "sickness" and "others" as additional reasons for client withdrawal. Clients who become sick requires increased clinical visit for closing monitoring. The figure notes that "pregnancy" was a reason for client drop-off from the intervention group during the study period. This aligns with the national program guidance that was being used during the study period (September 2021 to August 2022) which allowed clients who become pregnant to go

back to the standard model care for intensive follow up. However, this guidance been changed following revision of the Kenya guidelines on prevention and treatment of HIV 2022. Under other there was reported a case of a study participant who died during the period of the study due to road accident. This was an observation study and so no report was generated.

Figure 4.1 provides valuable understandings into the reasons for client withdrawal from the study, underlining the need for ongoing evaluation and adaptation of service delivery models in response to real-world challenges. Understanding the specific reasons behind client decisions provides crucial information for tailored strategies to enhance patient retention and overall healthcare outcomes.

Figure 4.2

Type of community differentiated service delivery model utilized by people living with HIV



Note: This figure has been produced from primary data and summarizes the model that study participants preferred

Figure 4.2 indicates that Community ART groups and Community ART drug distribution points are the predominant CDSD models, with 42% and 44% of clients enrolled, respectively. The higher percentages in Community ART groups and Community ART drug distribution points suggest that these models are more widely adopted or favored among the study

participants. This dispersal may be influenced by factors such as community inclinations, logistical considerations, or the perceived effectiveness of these models. The family model constituted a proportion of enrolled clients at 14%. The family model might have precise returns or be well-received by participants, possibly indicating its effectiveness in fostering community engagement and support. Community pharmacies still have no enrolled clients due to ongoing guidance development. While community pharmacies remain inactive at this stage, their impending introduction in the future, once guidance is established, offers an opportunity for expanding the CDSD framework and enhancing accessibility to healthcare services.

This suggests distribution of clients across CDSD models reflects variable preferences and challenges. The lack of clients in community pharmacies underscores the importance of ongoing program development and highlights the need for flexibility in adapting CDSD models based on emerging guidelines and community dynamics. The presented findings contradict those of Minas et al. (2021), who observed that the family model of care was the favored choice among clients. They attributed this preference to fears related to privacy, confidentiality, and stigma. Clients who harbor anxieties about unintentional disclosure may be reluctant to associate with others due to the fear of potential aftermaths. This distinction in results underscores the variability in client preferences and perceptions regarding different models of care within the context of CDSD model. It suggests that elements such as privacy, confidentiality, and stigma play fundamental roles in determining individuals' choices and comfort levels with particular healthcare service delivery models.

Table 4.13*Cross tab of model of choice versus level of education*

Level of Education	Type of CDSD model			Total n (%)
	CARGs n(%)	CADDPs n(%)	FM n(%)	
Primary	55 (30)	15 (8)	2 (1)	72 (39)
Secondary	37 (21)	16 (9)	0	53 (29)
College	36 (20)	16 (9)	4 (2)	56 (31)
Total	128 (71)	47 (26)	6 (3)	181 (100)

Note. Community ART groups refer to community ART groups, Community ART drug distribution points refers to community ART drug distribution point and FM is family model

Table 4.13 indicates that the 30% of participants with primary level education enrolled in Community ART groups while 21% and 20% of participants with primary and college level education correspondingly preferred community ART drug distribution points. The Community ART groups model seems to be constantly prevalent across all three education levels, although there is a slight decrease in preference at higher education levels. This could indicate that this community ART group model appeals to most of PLHIV.

The results further indicate that 9% of study participants with chose Community ART drug distribution points had college and secondary level education and 8% had primary level. The Community ART drug distribution point's model upholds a comparatively steady level of preference across education levels, indicating that it has a consistent appeal regardless of the educational background of the respondents.

Family model was the list preferred with 2% for college level, 1% primary level and non for secondary level. The family model appears to be less popular overall, with only a small percentage of respondents choosing it, and its popularity decreases as education levels rise. This might suggest that individuals with higher education levels may have diverse inclinations or primacies.

The results suggest that education has no influence when it comes to the choice of CDSD model. Majority of participants irrespective of level of education are in Community ART groups and CADDP. It could be that those with primary level like Community ART groups due to peer support during group meeting and other support like merry go round or income generating activity. For the college most of them might be employed and would just want to pick drugs and go to work. Although there was variation among different level of education, it is not significant enough to point out that certain level of education prefers a certain model. These findings are similar to Fatti et al. (2021) and Christ et al. (2022) who identified that the level of education had no correlation with the type of model that client would prefer in their study they found out that the number of clients who choose the Community ART groups and CADDP were the same across all levels of education.

Overall, the cross-tabulation highlights patterns in model preferences across different education levels, providing valued information for considering the target audience and possibly informing awareness creation or development strategies for these models as the process of scaling up continue.

4.9.1 Comparison of pre and post intervention observations

This was done to compare paired observations, to assess changes in readiness, demand, services, and support mechanisms. Findings guided efforts to increase access to HIV services and tailor HIV services effectively, optimizing outcomes for people living with HIV. Results have been presented in table 4.14 and table 4.15.

Table 4.14*Pre and post intervention means scores*

Variables	Pre intervention mean (SD)	Post intervention mean (SD)
Community readiness	1.39 (± 0.490)	1.65(0.478)
Demand for CDSD	1.69 (± 0.463)	1.87 (0.340)
Package of services	1.26 (± 0.442)	1.81 (0.392)
Support mechanisms	1.62 (± 0.486)	1.47 (0.500)

Note: pre intervention n=201 and post intervention n=181, SD=standard deviation

Table 4.14 demonstrates the mean readiness score has increased from 1.39 to 1.65, indicating an overall positive shift in readiness. The standard deviations remain relatively consistent, indicating that the variability within the community's readiness scores hasn't changed dramatically. These results point to an increase in levels of community readiness which will likely increase access to health services. The consistency in the standard deviation suggests that, while average levels may have seen some steadiness or improvement, there is still variability in the level of community readiness. This suggests a need to continue creating awareness to ensure that all members of the community support the scale of the CDSD model.

Concerning demand there is shift in the demand for the CDSD model over the intervention period. The mean increased from 1.9 to 1.87, indicating a noteworthy change in the average level. The standard deviation showed a decrease from baseline (0.463) to end line (0.340), suggesting a little more erraticism in the data at the end line assessment. This implies that intervention increased demand for CDSD model. These results point towards an improved utilization of the CDSD model, which is likely to contribute to increased access to health services.

Regarding package of services, the mean for the comprehensive package of services exhibits an increase from baseline (1.26) to end line (1.81), suggesting a significant improvement in the types of services offered. The notable increase in the mean for the package of services suggests a considerable improvement, indicating that CDSD may have positively influenced the

diversity of services provided. The decrease in standard deviations suggest that, while average levels may have shown additional services to the package, there is still inconsistency. This indicates that further improvements in the service package are needed to ensure that clients receive all the required services as recommended in the DSD manual. Our findings corroborate those in previous studies by Bemelmans et al. (2014) who established that lack of adequate services at community hindered utilization of the model leading to congestion at the facility. Lastly, results on support mechanisms reveal a decrease in mean for support mechanisms from 1.62 pre-intervention to 1.47 post-intervention. This suggests there was a decline in perceived support during intervention meaning no adjustment was made to mechanism during the intervention. These findings contradict finding by Bintabara et al. (2021) who identified that adequate resources and leadership support resulted in effective implementation of CDSD model.

Table 4.15

Macnemar test scores

Variable	X^2	p-value
Community readiness	24.010	0.001
Demand for CDSD	13.729	0.001
Package of services	81.675	0.001
Support mechanisms	3.343	0.068

The findings in table 4.15 indicate the effect of scaling up CDSD model across various scopes. On community readiness the findings indicate a significant shift, with a chi-square value of 24.010 and a p-value of 0.001. This suggests a remarkable change in the level of community readiness from the pre-intervention assessment to the post-intervention phase. The observed change implies that the scaling up of CDSD exerted a significant influence on raising the community's readiness level, possibly transitioning from a lower stage to higher stage of

readiness. This positive shift reflects an improvement in the community's perception and attitude toward the CDS model.

Similarly, assessment of demand for CDS services revealed a significant rise from low to high. These effects show that scaling up CDS model corresponds with increased demand indicate a rise in uptake of the model improved access to health services. These results resonate with those of Agranal and Kosgi (2021) that established that demand increases services up take which leads to access to health care. Moreover, the analysis indicates a remarkable influence on the comprehensiveness and availability of services within the CDS package. With a chi-square value of 81.275 and a p-value of 0.001, there is strong evidence to suggest that scaling up the CDS model resulted in the incorporation of additional services into the package, thereby enhancing its overall scope and accessibility. Similar findings were established by Barnabas et al. (2020) who found out that non comprehensive package made patient prefer standard care to CDS model. They affirmed the need of rendering the service package more comprehensive and responsive to the diverse needs of the clients.

However, when examining the mechanisms supporting the scale-up of CDS, the analysis reveals a chi-square value of 3.433 and a p-value of 0.068. While indicating some degree of change in the existing support mechanisms, this result falls short of reaching statistical significance at the conventional level. This suggests that although there may have been some support during intervention period, they were not substantial enough to be deemed statistically significant. This highlights the need for further efforts to ensure that community-level support mechanisms are sufficiently strong to sustain the CDS model effectively. These findings resonate with Adjete et al. (2019) who identified lack of policies and monitoring system to support scale up of CDS model. They recommended an exploration to distinguish the specific characteristics of the mechanisms contributing to the negative perceptions. Recognizing probable areas for improvement can inform targeted interventions aimed at improving the

support and effectiveness of the CDSD model, thereby guaranteeing increased access to healthcare for PLHIV.

4.9.2 Effects of community differentiated service delivery

The primary outcome was reduced waiting time and frequency of visits. The secondary outcomes included viral load suppression and retention into care see table 4.16 and 4.17.

Table 4.16

Primary outcomes

Arm Of Study	Intervention Group		Control Group	
Variables	Frequency	percent	Frequency	Percent
Waiting time in Minutes				
<15 minutes	127	70.2	7	4.3
15-30	33	18.2	12	7.3
30-60	11	6.1	47	28.7
>60	10	5.5	98	59.8
Total	181	100.0	164	100.0
No of facility visits				
1-2	147	81.2	49	29.9
3-4	27	14.9	31	18.9
>4	7	3.9	84	51.2
Total	181	100.0	164	100.0

Table 4.16 highlights a notable effect on the primary outcome for clients in the intervention group compared to that receiving control group, particularly regarding waiting times of less than 15 minutes 33.3% in intervention group and 1.7 in the control group. This suggest that individuals enrolled in the CDSD model are significantly less likely to experience short waiting times (less than 15 minutes) compared to those receiving standard care. This reduction in waiting times signifies an improvement in the efficiency of healthcare service delivery through the CDSD model. The findings suggest that the CDSD model is effective in reducing waiting times, particularly those shorter than 15 minutes. CDSD's ability to decrease waiting times

could lead to improved patient satisfaction, increased efficiency in service delivery, and potentially better adherence to appointments and healthcare engagement. These findings align with Adjetey et al. (2019), who reported that clients in the CDSD model expressed reasonable satisfaction during clinical visits and ART refill appointments, with most clients reporting waiting times of no more than 37 minutes. However, in contrast, Christ et al. (2022) and Tukei et al. (2020) found differing results, indicating that clients reported reduced waiting times for clinical consultations compared to ART refills. They suggested that ART refill processes are strongly influenced by time considerations.

Furthermore, the impact of CDSD on facility visits occurring less than twice a year was evident in the intervention group (81.3 %) compared to control group (29.9%). This suggest that PLHIV enrolled in the CDSD model are less likely to visit healthcare facilities compared to those receiving standard care. This reduction in facility visits could indicate better efficiency in service delivery, reduced burden on healthcare system, and possibly better patient experiences. CDSD's ability to decrease facility visits could lead to resource savings, improved accessibility for patients, and efficient healthcare delivery, aligning with the goal of improving health service utilization.

Notably, these findings align with those of Fatti et al. (2021), who also observed a reduction in facility visits in the CDSD arm. The community model demonstrated a decrease in unscheduled visits compared to the standard model of care.

The study's results underscore the positive impact of CDSD in reducing waiting times and the number of facility visits, aligning with previous research findings. These improvements have important implications for increasing patient satisfaction and augmenting the efficiency of healthcare delivery in the CDSD model.

Table 4.17*Secondary outcomes*

Arm Of Study	Intervention Group		Control Group	
Variables	Frequency	percent	Frequency	Percent
Viral load suppression levels at 12 months				
Low detectable levels	161	89.0	104	62.8
Low Level Viremia	2	1.1	12	9.8
Suspected Treatment Failure	1	0.6	15	9.1
Not done	17	9.4	30	18.3
Total	181	100.0	167	100.0
Retention into care rates at 12 months				
Active	173	95.6	148	88.6
Lost to follow up	2	1.1	8	4.8
Discontinued	6	3.3	11	6.6
Total	181	100	167	100

Table 4.17 demonstrates that there is evidence of intervention impact on secondary outcomes, specifically viral load suppression 89% for low detectable level which is the goal of treatment for all clients on ART. This could imply that clients enrolled in the CDS model are more likely to achieve favorable outcomes in terms of viral load suppression. These findings resonate with studies by Mahvu et al. (2020) and Fox et al. (2019), which demonstrated that adolescents enrolled in CDS model, receiving peer-to-peer adherence counseling and close follow-up, achieved viral load suppression and reported satisfaction.

Table 4.17 shows that retention in care at 12 months, the intervention group had 95.6% retention rates compared 79.8% in the control group. The control group registered high attrition rates or non-adherence to treatment plan compared to the intervention group. These findings of higher retention rates in the intervention could suggest that the intervention may have been effective in keeping PHIV involved in the treatment package. While CDS appears to contribute to retention in care, this effect is not deemed significant in this study. These results

align with Mavhu et al. (2020), and Suwannawong et al. (2023) indicating that while CDSD had an effect on retention in care, the findings suggested that the effect was not statistically significant. However, preceding studies by Uetela et al., (2023) and Bwire et al. (2023) identified that CDSD had a positive impact on RIC at 12 months and was key in increasing access to health services. In contrast, Fox et al. (2019) and Prust et al. (2017) identified a significant effect of the CDSD model on retention in care compared to the standard model of care.

4.10 Multivariate Analysis

The study aimed at establishing whether scaling up Community differentiated service delivery improved access to health care among people living with HIV in Kakamega county, Kenya. To achieve this, base line and end line data was collected. Binary logistic regression model was fitted to both data sets so as to establish the cause-and-effect relationship existing among the study variables. Binary logistic model is utilised when the response variable is dichotomous in nature. In this study, the dependent variable was access to healthcare among people living with HIV in Kakamega County which was categorised into ‘easily accessible’ and ‘not easily accessible’. Logistic regression also facilitated in ascertaining the influence of each explanatory variable on the response variable. The explanatory variables in this study were four in number, namely: community readiness for CDSD model, demand for CDSD model, and package of services in CDSD model and support mechanism for CDSD model. Client enrolment for CDSD was taken as an intervention. Section 4.8.1 presents the baseline results on influence of the independent variables while controlling for the influence of the intervention. Section 4.8.2 presents the end line results which assesses whether the intervention improved access to health care among people living with HIV in Kakamega County.

4.10.1 Baseline results on determinants of access to Health care among people living with HIV in Kakamega County.

The baseline data aimed at first ascertaining the determinants of access to health care among people living with HIV in Kakamega County. The results are presented in tables 4.18 and 4.19

Table 4.18

Omnibus Test of the model Coefficient

	Chi-square	df	P-value
Step1	43.224	11	0.002
Block	43.224	11	0.002
Model	43.224	11	0.002

The omnibus test of model coefficients denotes the model's predictive ability when all study variables are considered as a block. As shown in Table 4.18 the p – value of the model as a block was $p < 0.01$ which indicates that the model has great predictive ability.

Table 4.19

Summary of the Model

-2 Log likelihood	Cox & Snell's R Square	Nagelkerke's R Square
208.613	0.483	0.571

As shown in Table 4.19 the four independent variables account for about 57.1 percent of the variations in the access to health care among people living with HIV in Kakamega County. As a result of this, about 42.9 percent of the variations in access to healthcare is still not accounted for in this study.

Table 4.20*The Hosmer & Lemeshow Test*

Chi-square	Df	p-value
11.462	8	0.197

The Hosmer and Lemeshow Test is another measure of binary logistic regression model. It helps to establish whether the model is fit for prediction. The null hypothesis tested is that the model is appropriate against the alternative that the model is not fit. As per the results presented in Table 4.20, the chi-square results, were $\chi^2 = 11.462$, $p=0.197$. Thus, we failed to reject the null hypothesis. This implies that the model is fit for this study and possesses significant predictive ability. It was concluded that the model is appropriate for this study.

4.10.2: Multivariate logistic regression results

Multivariate logistic regression was performed on the baseline data first to establish the predictors of access to health care among people living with HIV in Kakamega County. Table 4.0.21 displays the outcomes of the analysis. A reason as to why multivariate logistic was chosen has been earlier discussed.

Table 4.21*Multivariate logistic regression results*

Variables	B	S.E.	p-value	Odds Ratio
Community Readiness for CDSD				
Not Ready (RC)	-	-	-	1.000
Ready	0.309	0.215	0.007	1.362
Demand for CDSD				
Low(RC)	-	-	-	1.000
High	0.164	0.324	0.032	1.178
Package of Services in CDSD model				
Not well packaged (RC)	-	-	-	1.000
Well packaged	0.126	0.226	0.009	1.134
Support for CDSD Model				
Poor Support (RC)	-	-	-	1.000
Good Support	0.113	0.219	0.009	1.120

The results in Table 4.21 indicated that community readiness for CDSD is significantly associated with improved access to healthcare among people living with HIV in Kakamega County. Patients who came from communities which were ready to adopt CDSD were 1.362 times more likely to witness increased access to health care when compared to their counterparts who resided in communities which were not ready for CDSD. The results were significant at 5% level. This could denote that community readiness will lead to utilization of CDSD model and increased access to health services. Our findings regarding community readiness corroborate those of previous studies by Anderson-Carpenter et al. (2017), Islam et al. (2019), Khatun et al. (2016) and Nigusie et al. (2021), communities of children who reported readiness to utilize services and promote social and emotional health in children increased access. Community members that were aware and knowledgeable about available health services understood the importance of accessing these services. Some community members were involved in the planning and decision-making processes fostering a sense of

ownership and responsibility for health services. Of importance was the role of community leaders, engaging local leaders and influencers to help promote health services and encourage community members to utilize available resources. A similar perception by community members that utilizing trained LHW can bridge the gap between formal health services and the community, providing education and support.

Demand for CDSD also turned out to be a significant predictor of access to health care among patients living with HIV in Kakamega County. Patients who came from communities where demand for healthcare services was high were 1.178 times more likely to record improved access to health care services when compared to their counterparts who resided in communities with low demand for health care services. The results were significant at 5%. This could suggest that increased demand for CDSD model is likely to increase uptake of the model and improve access to health care. Studies by Liu et al. (2021), Agranal and Kosgi (2021), Mukumbang (2021), and Kong et al. (2019) reported similar findings in which increased demand for DSD by stable clients so high percentage of clients utilize the model. These findings supported expansion of DSD models beyond HIV service to other chronic diseases. Understanding and accurately predicting demand allows policy makers to allocate resources more efficiently while scaling up CDSD models (Ehrenkranz et al., 2019). The resource required for CDSD model would include LHW, meeting venue and ART. The clients indicated that proper resource allocation ensures that CDSD services are available in the community and when they are needed by PLHIV. Anticipating an increase in demand allows Clinicians at the primary facility to plan for the expansion of more CDSD models to more Community ART groups and Community ART drug distribution points including optimizing their service delivery models. According to Brooke et al. (2021) assessing demand for CDSD model and adapting to changing demand patterns ensure that healthcare systems remain responsive. This iterative process helps in continuously improving access to services based on evolving community needs. Anticipating demand patterns allows clinicians at primary facilities to

implement flexible scheduling and appointment systems. This helps in minimizing wait times for patients and increasing overall accessibility.

Package of services in the CDSD model turned out to be a significant predictor of access to health care among people living with HIV in Kakamega County. Where health services were well packaged, access to health care was 1.134 times more when compared to places where health services were not well packaged. The results were significant at 5% level. This could imply that comprehensive package of service ensures that PLHIV have access to a range of service. Studies by Godfrey et al. (2022), Howell et al. (2018), and John et al. (2023) reported similar findings. It identified well packed service ensured that individuals can access appropriate care at various stages of their health journey, promoting early detection and timely treatment. Such package was designed to provide a continuum of care, from children, adolescents, prevention of mother to child transmission (PMTCT) clients and adults. However, findings by Fox et al. (2019) found considering specific health needs and package services that can respond to it increased utilization. Considering building the capacity of providers to enable them to offer these services is critical. A comprehensive CDSD package consist of ART refills, Health education, peer adherence counseling, symptom screening and referral (WHO,2015). The package should aim at bringing services closer to communities through Community ART groups, Community ART drug distribution points, community pharmacy and family models enhances accessibility. Community-based services are particularly important for reaching underserved or remote populations.

Similarly, evidence by Ibiloye et al. (2022) reported improved access to health services where there were well-trained and sufficient providers who could offer services as guided by the DSD manual. Investing in the education, training, and deployment of Lay health workers and clinicians can improve the availability of healthcare services. CDSD model puts emphasis on patient-centered care involves engaging individuals in their healthcare decisions, respecting their preferences, and providing services in a manner that is convenient and responsive to their

needs. This approach fosters a positive healthcare experience and encourages individuals to seek timely care.

According to Mekolle et al. (2023) to ensure that the services are well packed to avoid clients going back to the primary facility it is important to continuously evaluate the effectiveness of the package of services and making necessary adjustments based on changing health needs, demographics, and community feedback ensures that the healthcare system remains responsive and aligned with the evolving requirements of the population.

A comprehensive package of health services that considers a range of health needs, integrates care delivery, and prioritizes accessibility, affordability, and equity can significantly improve access to healthcare for diverse populations. It requires a holistic and coordinated approach that addresses both individual health concerns and the broader determinants of health.

Finally, support for CDS model turned out to be significantly associated with improved access to health care services among people living with HIV in Kakamega County. Where support for CDS services was good, access to health care services was 1.120 times higher than where support for CDS model was poor. The results were significant at 5% level. This could suggest that effectiveness of CDS model rely heavily of good support structures that collectively contribute to improving access to healthcare services for people living with HIV. Support mechanism includes presence of policies, community engagement, robust monitoring and evaluation and reliable supply of resources. Our findings regarding support mechanisms and improved access correlates with preceding studies by Roots and Whites (2013) and Roy et al. (2019) in which PLHIV reported that strengthening the supply chain to ensure adequate supply of commodities and inclusion of a new cadre of staff mainly the Lay health workers supported implementation of CDS. Faturiyale et al. (2018) reported that well-organized supply chain management is central for ensuring a steady and dependable availability of ART and healthcare commodities. Implementing mechanisms for scale-up includes strengthening

supply chains and logistics to prevent stock outs and ensure that essential medications and supplies reach communities in a timely manner, improving access.

Evidence by Pellecchia et al. (2017) reported similar findings in which effective scale-up involves engaging communities in the planning, implementation, and evaluation of healthcare services was able to increase uptake of the model. Community engagement promotes a sense of ownership and empowerment, encouraging individuals to actively participate in their health. According to Fatti et al. (2021) empowered communities are more likely to seek and utilize available healthcare services, enhancing access. Involvement of PLHIV networks is a key component of scaling up CDSD. The PLHIV echoed their role in advocacy, delivering health education in support groups and mobilizing clients to enroll into the models. Strengthening and expanding the capacity of PLHIV networks contribute to improved access.

Similar studies by Abelman et al. (2020) Belay et al. (2022), and Mutalemwa et al. (2023), reported that Scale-up often requires supportive policies and regulations. Mechanisms for scale-up involve advocating for policy changes that facilitate the expansion of CDSD models, address regulatory barriers, and create an enabling environment for community-based healthcare delivery. Studies by Faturiyele et al. (2018) show that ensuring that guidelines are accessible at community level helps ensure consistency in provision of health services. Consistency in care reduces variability making it easier for patients to receive appropriate and standardized services, enhancing overall access.

Studies by Fatti et al. (2021) has shown that robust monitoring and evaluation systems are essential for tracking the performance and impact of scaled-up CDSD initiatives. Mechanisms for monitoring and evaluation provide valuable feedback, enabling continuous improvement, and ensuring that services are reaching the intended populations effectively.

Scale-up of community-differentiated service delivery good support structures involves a comprehensive approach that addresses robust community led monitoring and evaluation, supply chain management, policy support, and community engagement.

4.10.3 Multivariate logistic regression Results from End line data.

After collecting baseline data, the next task was to collect end line data to establish whether by scaling up CDSD would lead to improved access to health care services among people living with HIV in Kakamega County. To achieve this, Clients in intervention group were enrolled in CDSD either Community ART groups, CADDP or family model by an LHW. Participants in control group received standard care at the primary facility which included ART refill three monthly, clinical review three monthly, adherence counseling at each visit and viral load monitoring at 12 months. The results of the analysis, presented per arm of the study are as presented in the following table 4.22;

Table 4.22*Multivariate logistic Regression Results from End line data*

Arm Of Study	Control Group				Intervention Group			
Variables	B	S.E.	p-value	Odds Ratio	B	S.E.	p-value	Odds Ratio
Community Readiness for CSDS								
Not Ready (RC)	-0.30	0.10	-	1.000	-0.40	0.24	-	1.000
Ready	2	2	0.001	1.353	2	5	1	1.495
Demand for CSDS								
Low(RC)	0.12	0.24	-	1.000	0.18	0.04	-	1.000
High	5	6	0.002	1.133	3	4	4	1.201
Package of Services in CSDS model								
Not well packaged (RC)	0.12	0.20	-	1.000	0.19	0.23	-	1.000
Well packaged	6	6	0.008	1.134	8	1	9	1.219
Support for CSDS Model								
Poor Support (RC)	0.11	0.21	-	1.000	0.17	0.20	-	1.000
Good Support	3	1	0.004	1.120	3	9	3	1.189

Table 4.22 compares the results derived from the end line data. The results indicated that, for both arms of the study, the four independent variables remained to be statistically significant predictors of access to health care among people living with HIV in Kakamega County with $p < 0.05$.

Comparing the odds ratios from both arms of the study, odds ratios in the intervention group were consistently and significantly higher than those in the control group. Higher odds ratios are associated with increased access to healthcare services in this study. Thus, people enrolled

into CDS model recorded increase in the odds of access to health care when compared to those enrolled to the standard care at primary facilities. This implies the CDS model was successful in improving accessibility of health care for PLHIV. Our findings on improved access to health care by scaling up CDS model are similar to previous studies by Benade et al. (2013), Fatti et al. (2021), Faturiyele et al. (2018) Semo et al. (2023), UNAIDs (2022), and Zakamumpa et al. (2021) who established that CDS model provided an opportunity for universal health coverage and increasing the possibility of attaining and sustaining UNAIDs targets of RIC and viral load suppression.

Table 4.23

Effects of the intervention at end line 12 months

Intervention group					Control group			
			p-	Odds			p-	Odds
	B	S.E.	value	ratio	B	S.E.	value	Ratio
Primary outcome								
Reduced clinic visits	0.671	0.149	0.001	2.241	1.946	1.069	0.069	1.080
Secondary outcomes								
Undetectable viral load	5.081	1.003	0.001	2.661	2.994	1.026	0.004	1.236
Retention into care	4.055	0.582	0.001	4.481	0.2881	0.764	0.0142	1.706
Explanatory variables								
Community readiness	0.302	0.102	0.001	1.353	0.402	0.245	0.001	1.495
Demand	0.125	0.246	0.002	1.133	0.183	0.044	0.014	1.201
Package of services	0.126	0.206	0.008	1.134	0.198	0.231	0.009	1.219
Support mechanisms	0.113	0.211	0.004	1.120	0.173	0.209	0.003	1.189

Table 4.23 demonstrates that the intervention had impact on primary outcomes (OR 2.241 and p-value 0.001). This result suggests that intervention had an impact on access to health care. This reduction in facility visits could indicate better efficiency in service delivery, reduced burden on healthcare system, and possibly better patient experiences. CDS's ability to

decrease facility visits could lead to resource savings, improved accessibility for patients, and efficient healthcare delivery, aligning with the goal of improving health service utilization. Notably, these findings align with those of Fatty et al. (2021), who also observed a reduction in facility visits in the CDSD arm. The community model demonstrated a decrease in unscheduled visits compared to the standard model of care.

There also evidence of intervention impact on secondary outcomes on the viral load suppression (OR 2.661; p-value 0.001) and retention into care (OR 4.481; p-value 0.001). These findings suggest that implementing community-differentiated service delivery model has a substantial positive influence on retention into care, which is an important aspect of improving overall access to care for PLHIV. These results are similar to study findings by Mhvu et al. (2020), Fox et al. (2019) who found that adolescents who were enrolled in community CDSD where they received peer to peer adherence counseling and close follow up were able to achieve viral load suppression. These findings are similar to Mahvu et al. (2020) who identified in their study that although CDSD had an effect on retention into care the findings suggested that the effect was not significant. Contrary to these findings is the results by Fox et al. (2019), Prust et al. (2017) who identified a significant effect of CDSD model on retention into care compared to standard model of care.

On the explanatory outcomes the results suggest that scaling up CDSD was associated with change in the level of community readiness, demand, package of services and support mechanisms. These findings are similar with those of preceding studies by Msafiri et al. (2023), Muhumuza et al. (2015) and Sunnawong et al. (2023) which established that community readiness, demand, comprehensive package and good support structures was associated with improved access to health services.

Table 4.24*Summary of Hypothesis and Study Findings*

Hypothesis	Test criteria	Findings	Conclusion
H01 There is no significant relationship between community readiness and the improvement of access to health services among PLHIV in Kakamega County following the scale-up of the differentiated service delivery model.	Reject hypothesis if p-value $\geq$, otherwise fail to reject	P-value=0.001 $\leq$ α , (0.05)	Reject the null hypothesis
H02 There may be no significant demand for the community differentiated service delivery model, and even if demand exists, it may not lead to a significant improvement in access to health services among PLHIV in Kakamega County.	Reject hypothesis if p-value $\geq$, otherwise fail to reject	P-value=0.014 $\leq$ α , (0.05)	Reject the null hypothesis
H03 There may be no significant difference in the access to health services among PLHIV in Kakamega County based on the specific package of services offered during the scale-up of community differentiated service delivery models.	Reject hypothesis if p-value $\geq$, otherwise fail to reject	P-value=0.009 $\leq$ α , (0.05)	Reject the null hypothesis
H04 The support mechanisms provided may not significantly impact the success of scaling up community differentiated service delivery in improving access to health services among PLHIV.	Reject hypothesis if p-value $\geq$, otherwise fail to reject	P-value=0.003 $\leq$ α , (0.05)	Reject the null hypothesis

Table 4.24 provides a summary of hypotheses results of the study indicating that community readiness, demand for CDSD, package of services and support mechanisms have a statistical significance with improved access to health services

Summary

The statistical analysis yielded a p-value of 0.001, which is below the predetermined significance level (e.g., 0.05). As a result, we reject the null hypothesis, indicating that there is a significant difference in community readiness for scaling up the CDSD model to enhance access to health services among PLHIV in Kakamega County. The findings suggest that factors influencing community readiness vary significantly and are not uniform across the studied population.

The obtained p-value of 0.014 is less than the predetermined significance level (e.g., 0.05), leading to the rejection of the null hypothesis. This indicates that there is a significant demand for the model to improve access to health services among PLHIV in Kakamega County. The findings suggest that factors influencing demand for the CDSD model are noteworthy and have a meaningful impact on the population studied. With a p-value of 0.009, which falls below the predetermined significance level (e.g., 0.05), the null hypothesis is rejected. Consequently, there is a significant difference in the package of services offered while scaling up the CDSD model for improved access to health services among PLHIV in Kakamega County.

The obtained p-value of 0.003, which is below the predetermined significance level (e.g., 0.05), leads to the rejection of the null hypothesis. Therefore, there is a significant level of support for scaling up CDSD for improved access to health services among PLHIV in Kakamega County. The findings suggest that the existence of robust support mechanisms is a crucial factor influencing the successful implementation and scaling of CDSD, contributing to improved access to health services for PLHIV.

With a p-value of 0.000, which is below the commonly used significance level of 0.05, the null hypothesis is rejected. This implies that there is a significant effect CDSD on access to health services among PLHIV in Kakamega County. The findings suggest that the implementation of CDSD has a notable impact on improving access to health services for PLHIV, emphasizing the

effectiveness of this service delivery model in the studied population. Having discussed the research findings, the next chapter will discuss the conclusion and recommendations.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATION

5.1 Introduction

This chapter captures the core of the entire study, offering a concise summary, final conclusions, and strategic recommendations. It begins with a brief yet all-inclusive summary, refining the key insights and outcomes resulting from the study. Subsequent to this, the discussion flawlessly moves into conclusive remarks, offering understandings and interpretations that synthesize the complete research journey.

In addition to drawing conclusions, the chapter extends its scope to provide practical recommendations that emanate from the research findings. These recommendations are constructed to offer actionable insights for health system consultants, policymakers, and stakeholders in the field. The chapter candidly reflects on the study's strengths and limitations, providing a perspective on the research process. Recognizing these aspects augments the transparency and credibility of the study, offering valuable insights for future researchers and practitioners engaged in related areas.

5.2 Summary

Access to quality health services is a crucial component of any country's healthcare system, supporting with the quest of universal health goals. This study aimed to increase access to health services by scaling up the CDSD model. The research started with a baseline assessment, concentrating on community readiness, demand for the CDSD model, the package of services offered, support mechanisms, and the effects of CDSD on access to health services among PLHIV in Kakamega County.

The baseline assessment revealed significant relationships between community readiness, demand, the package of services, support mechanisms, and the scaling up of CDSD. Explicitly, the baseline identified that the community was not well-prepared for scaling up the model, with low demand, a non-comprehensive package of services, and inadequate support structures for

scaling up. The baseline assessment provided insight to areas that need to be put into consideration and how to strategize for efficiency of the model.

This study has demonstrated that the health system can adopt CDS model and allow the inadequate facility based resources concentrate on clients at risk of poor patient outcomes thus providing better access to improved quality of care in a more effective way. An important explanation of the intervention success was the use of lay health workers in providing services within the CDS models. Lay health workers were able to provide health education, promote peer to peer adherence counseling, ensure ART are picked from the facilities and screen clients for opportunistic infections using the danger signs.

The major strength of this study is that CDS was implemented following the national guidelines an example of how such an intervention can be done in resource limited setting. An additional strength was use of lay health workers which gives them opportunity to be utilized in other interventions of HIV care and treatment. Our findings provide justification of using LHW in scaling up of community differentiated service delivery.

The study findings support ongoing efforts by the national program to scale up community differentiated service delivery model highlighting strategies that can be employed to enhance efficiency in health service provision. The involvement of lay health workers in implementation of community differentiated service delivery is added value that will ensure that there is ownership and sustainability of the model.

5.3 Conclusion

The purpose of this study was increase access to health care by scaling community differentiated service delivery among PLHIV. The study has demonstrated how health services can be accessible by utilizing community differentiated service delivery.

Objective1: To assess community readiness to scale up community differentiated service delivery among people living with HIV.

The baseline assessment revealed that the community was not ready to scale up the model. Lack of adequate resources, poor leadership support and lack of policies were the main factors that affected the levels of readiness.

Objective 2: To determine demand for community differentiated service delivery among people living with HIV.

The study identified low demand for the model among the demand factors identified that were affecting utilization of CDSD were acceptability and availability of services.

Objective 3: To assess the package of services offered while scaling up community differentiated service delivery for improved access to health services among PLHIV in Kakamega County.

The study identified a package of service that was not well packaged, some of the services were lacking were symptom screening, adherence and psychological counseling and viral load sample collection.

Objective 4: To assess support mechanisms for scaling community differentiated service delivery for improved access to health services among PLHIV in Kakamega County.

The study also reveals ineffective support mechanisms for CDSD model. The absence of a community-level policy, poor leadership support, and the lack of a monitoring and evaluation system are identified as key barriers

Objective 5: To evaluate the effects of community differentiated service delivery on access to health services among PLHIV in Kakamega County.

Community differentiated service delivery model had an impact on access to health service by reduced waiting times and a decrease in facility visits. Additionally, the study attained secondary outcomes, including viral load suppression, retention in care, and a reduction in opportunistic infections among the participants assessed.

5.4 Recommendation

5.4.1 Recommendations on findings

The study provides several recommendations with implications for health system strengthening.

1. The study proposes ministry of health and the county government to focus on redistribution of resources to develop and implement comprehensive awareness campaigns on CDSD model as the national program scales up the model nationally. It also recommends partnership with local organizations, business people and community health volunteers who can act as advocates for health system strengthening.
2. To boost the scalability of the model, the study suggests the ministry of health to review and update of service package to ensure efficiency. This should start by establishing a client feedback mechanism to identify areas for improvement and ensure that CDSD models meets the client's needs followed by community involvement to ensure the package of services aligns with the needs and preference of the community. This, in turn, aims to maximize benefits and improve access to healthcare by adopting a more patient-centered approach.
3. Additionally, the study recommends the ministry of health to build the capacity of service providers through training and increased technical assistance visits to ensure the delivery of all required services at the community level.
4. The study urges policymakers to formulate a policy supporting the scale-up of the CDSD model. It further suggests strengthening community systems to establish community-led monitoring and evaluation processes.
5. The national program should leverage on the potential of lay health workers and institute a policy change that allows PLHIV to be trained as Lay health workers and actively participate in supporting HIV care and treatment. This policy change is envisioned to enhance community engagement, fostering ownership and empowerment among

community members, and ultimately contributing to the sustainability of the community-differentiated service delivery model.

5.4.2 Recommendations on future research

This study recommends future research to investigate;

1. Optimizing community differentiated service Delivery for ART Initiation among newly diagnosed HIV Clients
2. Maximizing task shifting with lay health workers: streamlining health service delivery without adding layers
3. Enhancing visibility and accessibility of community differentiated service delivery for chronic diseases

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APPENDICES

Appendix A

Research Permit NACOSTI

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 612378	Date of Issue: 26/August/2021
RESEARCH LICENSE	
	
This is to Certify that Ms. Winnie Sarah Owiti of Kenya Methodist University, has been licensed to conduct research in Kakamega on the topic: scaling up community differentiated service delivery to improve access to health care among people living with HIV in kakamega County for the period ending : 26/August/2022.	
License No: NACOSTI/P/21/12623	
612378	
Applicant Identification Number	Director General
	NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
	Verification QR Code
	
NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.	

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is Guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014

CONDITIONS

1. The License is valid for the proposed research, location and specified period
2. The License any rights thereunder are non-transferable
3. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research
4. Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies
5. The License does not give authority to transfer research materials
6. NACOSTI may monitor and evaluate the licensed research project
7. The Licensee shall submit one hard copy and upload a soft copy of their final report (thesis) within one year of completion of the research
8. NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice

National Commission for Science, Technology and Innovation
off Waiyaki Way, Upper Kabete,
P. O. Box 30623, 00100 Nairobi, KENYA
Land line: 020 4007000, 020 2241349, 020 3310571, 020 8001077
Mobile: 0713 788 787 / 0735 404 245
E-mail: dg@nacosti.go.ke / registry@nacosti.go.ke
Website: www.nacosti.go.ke

Appendix B

Approval from county government

REPUBLIC OF KENYA



**COUNTY GOVERNMENT OF KAKAMEGA
MINISTRY OF HEALTH SERVICES**

Telephone: 056-31850/1852/31853
Email: health@kakamega.go.ke
Website: www.kakamega.go.ke

The Director Health Service
P O BOX 36- 50100
KAKAMEGA

Ref.No. CGK/MOH/ OCD/Vol.1/103

Date: 21st September, 2021

**Medical Superintendent
KAKAMEGA GENERAL HOSPITAL**

**REF: APPROVAL OF WINNIE SARAH OWITI TO CONDUCT A STUDY WITHIN
KAKAMEGA COUNTY**

This is to inform you that the above has been granted permission to carry out study on "scaling up community differentiated service delivery to improve access to health services among people living with HIV in Kakamega County" I confirm that she has provided the following documents for scrutiny.

- Permit form NACOSTI
- Ethical clearance for Kenya Methodist University
- Research protocol
- Interview guide

In this regard, we are requesting that you allow and provide her the needed support that will enable her go on with the study.

Thank you.





**DR. John Otieno
DIRECTOR, HEALTH SERVICES**

Appendix C

KEMU SERC



KENYA METHODIST UNIVERSITY

P. O. BOX 267 MERU - 60200, KENYA
TEL: 254-064-30301/31229/30367/31171

FAX: 254-64-30162
EMAIL: serc@kemu.ac.ke

July 19, 2021

KeMU/SERC/HSM/35/2021

Winnie Sarah Owiti
HSM-4-3442-3/2016

Dear Winnie,

SUBJECT: SCALING UP COMMUNITY DIFFERENTIATED DELIVERY TO IMPROVE ACCESS TO HEALTH CARE AMONG PEOPLE LIVING WITH HIV IN KAKAMEGA COUNTY, KENYA

This is to inform you that Kenya Methodist University Scientific Ethics and Review Committee has reviewed and approved your above research proposal. Your application approval number is KeMU /SERC/HSM/35/2021. The approval period is 19th July 2021 – 19th July 2022.

This approval is subject to compliance with the following requirements

- I. Only approved documents including (informed consents, study instruments, MTA) will be used.
- II. All changes including (amendments, deviations, and violations) are submitted for review and approval by Kenya Methodist University Scientific Ethics and Review committee.
- III. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KeMU SERC within 72 hours of notification.
- IV. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KeMU SERC within 72 hours.
- V. Clearance for export of biological specimens must be obtained from relevant institutions.

VI. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal

VII. Submission of an executive summary report within 90 days upon completion of the study to KeMU SERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and also obtain other clearances needed.





KENYA METHODIST UNIVERSITY

P. O. Box 267 Meru - 60200, Kenya
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DIRECTORATE OF POSTGRADUATE STUDIES

July 19, 2021

Commission Secretary,
National Commission for Science, Technology and Innovations,
P.O. Box 30623-00100,
NAIROBI.

Dear sir/ Madam,

WINNIE SARAH OWITI (HSM-4-3442-3/2016)

This is to confirm that the above named is a bona fide student of Kenya Methodist University, Department of Health Systems Management, undertaking a Degree of Doctor of Philosophy in Health Systems Management. She is conducting research on, '**Scaling up community differentiated delivery to improve access to health care among people living with HIV in Kakamega County, Kenya**'. We confirm that her research proposal has been defended and approved by the University.

In this regard, we are requesting your office to issue a permit to enable her collect data for her research.

Any assistance accorded to her will be appreciated.

Thank you.


19 JUL 2021

Dr. John Muchiri, Ph.D.
Director Postgraduate Studies
Cc: Dean SMHS

COD, Health Systems Management
Postgraduate Co-ordinator
Supervisors

Appendix D

Questionnaire

Questionnaire

Instructions: Please answer all the questions honestly and exhaustively: This information were used strictly for academic purposes only and were treated with utmost confidence.

SECTION A: Demographic Data

1. Age_____
2. Gender_____
3. Level of Education_____
4. Treatment regimen
 - a) First line ART
 - b) Second line ART
 - c) Third line ART
5. Duration on Treatment_____
6. Please tick the Position held
 - a) Peer educator
 - b) Support group leader
 - c) Mentor mother
 - d) client

Section II Community readiness assessment (tick one box for each statement)					
Key: 5- strongly agree 4- Agree 3-Neutral 2-Disagree 1- Strongly disagree					
Description and characteristics	1	2	3	4	5
CDSD has improved access to health services					
Policies for CDSD are normally reviewed after two years					
Community differentiated service delivery polices are in place at community level to improve access to ART services.					
Community leaders have specific concern with poor access to health services.					
Community leaders have been involved as champions for scaling up of CDSD to improve access to health services					
Community leaders have formed committees oversee scaling up of community differentiated service delivery					
leadership support additional efforts to scale up community differentiated service delivery model					
Community has a positive attitude on scaling up of CDSD to improve access to ART in your community?					
Community members support scale up of CDSD to improve access to ART					
People, attitudes, stigma, and resources are obstacles towards scaling CDSD to improve access to health services					
Previous models had a donor who was funding them					
Community volunteer meeting venue, time to attend the meeting.					
Using a scale of 1-10 (with 1 being “not at all” and 10 being “a very great concern”)? Please explain. How much of a concern is poor access to ART services in your community	1_2_3_4_5_6_7_8_9_10_				

Using a scale of 1-10, (with 1 being “no awareness” and 10 being “a very aware”)? How aware is the community of CDSD can improve access to health	1_2_3_4_5_6_7_8_9_10_				
Section III: Demand for community differentiated service delivery (tick one box for each statement)					
Key: 5- strongly agree 4- Agree 3-Neutral 2-Disagree 1- Strongly disagree					
Description	1	2	3	4	5
There is regular use of community differentiated service delivery					
Patients received information on how community differentiated service delivery would improve access to Health services					
Community differentiated service delivery has visibility in the community					
It does not take much time to be served at community level					
It is possible to recommend community differentiated service delivery to other patient facing challenges in accessing health services					
Patients are satisfied with services offered through CDSD					
There is no transport cost incurred while accessing services in the community models					
There is much time to attend to other family activities since number of hospital visits have reduced					
Services at community level as less expensive					
On a scale of 0-10(0 being the most and 10 being the best) How would you rate how community differentiated services are provided by lay health worker	0_1_2_3_4_5_6_ 7_8_9_10_				
Section IV: Package of services in Community Differentiated Service Delivery Please tick the following statement that relate to package of services offered?					
Key: 5=strongly agree 4=Agree 3=Neutral 2=Disagree 1=strongly disagree					
Description and characteristics	1	2	3	4	5
Health education is offered during CDSD meetings has made services accessible among PLHIV					
Symptom screening is done at community differentiated service delivery model					
ART distribution at community level by Lay health workers has improved access to health services					
Psychosocial support offered by peer in CDSD has improved access to Health services					
Referral system at community level for clients has made it possible for patients to access further health services					
Samples for monitoring viral load are collected at community level improving access to ART					
Lay health provider are able to provide all services within CDSD model to ensure patient have access to services					

Section IV: Support Mechanisms for Community Differentiated Service Delivery				
Support mechanisms for community differentiated service delivery(tick only one box for each mechanisms)				
Key: 1=not effective, 2=Not very effective, 3= sometimes effective and 4=very effective				
Description and characteristics	1	2	3	4
How effective are Community networks in demand creation, monitoring drug stock outs and monitoring quality of services in community differentiated service delivery to improve access to Health services.				
How effective are community networks in linking people enrolled in CDSD to other initiatives like income generating activities				
How effective are adequate stock levels of drugs and other resources used in community differentiated service delivery in improving access to Health services				
How effective are policies on community differentiated service delivery in improving access to Health services				
How effective are policies is providing standard care across all facilities				
How effective is the monitoring and evaluation of community differentiated service delivery				
How effective can Indicators for community differentiated service delivery adequately describe uptake and outcomes of diverse community models				

Appendix E

Interview schedule

Interview schedule for key informants

Age_____

Gender_____

Level of Education_____

Treatment regimen

Duration on Treatment_____

Position held_____

Community readiness assessment

Which models are currently available at the community level? Probe; How would you describe its utilization

Do you think you are receiving adequate support from the leaders?

How would describe the attitudes of the community towards the model?

What are the strengths of the model?

What is the weakness of this models?

Demand

Can you talk about the information of the model prior to its implementation?

How would describe acceptability of CDSD model

How do you see availability of services and the cost?

Package of services

Let's talk about the package of services of CDSD model?

How about the services? probe do you get your blood tested at the community

Tell me more about the person who provides services in the model, are they able to provide all services needed

Support mechanisms

Let's talk about PLHIV network and their engagement in CDSD model?

How would you describe resources to provide health services to the patients?

Does the CDSD have strategies to raise fund for the model and ensure sustainability

How would you describe availability of CDSD policies?

How do you monitor activities to capture patient level data at community level?

Can tell us more about leaders and how they have supported the activities of the model?

Appendix F

Document review check list

Document and Record Review Checklist
Instructions Fill all answers in the blank spaces NB: This information will have used strictly for academic purposes only and were treated with utmost confidence. Number of clients enrolled in the following models Community art group__ Community ART distribution points__ Family model__ Community pharmacies__ Demand for community differentiated service delivery model Number and percentage of Community ART groups that was formed__ Number and percentage of Community Drug Distribution Points formed__ Number and percentage of authorized community pharmacies__ Number and percentage of patient eligible for CDSD model__ What is the number of patients who enrolled in any community model__? Number of CDSD group meeting held in 12 months' period__ Number of enrolled patients who continued with attendance to group meetings Package of services offered in community differentiated service delivery model Number of ART packs distributed during each group meeting__ Number of patients referred in 12 months for; viral load monitoring__ Management of opportunistic infections__ Number of health education sessions offered in 12 months' period__ No of reports generated in 12 months' period__ Number of peer counselling session conducted for Adherence__ psychosocial issues__ Effects of CDSD on access to health services Number and percentage of PLHIV virally suppressed in 12-month period of enrolling into community differentiated service delivery model? Number and percentage of PLHIV retained in care in 12-month period of enrolling in community differentiated service deliver. Number and percentage of client of missed drugs during their appointment date? Number and percentage of who withdraw from the model in the 12 months' period of implementing CDSD due to Pregnancy__ Transfer out__ Death__ Referral due to illness__ Lost to follow up__

Appendix G

Cronbach's alpha

Dimension	Pre test		Final study	
	Number of scale items	Cronbach alpha (α)	Number of scale items	Cronbach alpha (α)
Community readiness	10	0.7345	14	0.818
Demand for CDSD	5	0.874	7	0.911
Package of services	6	0.762	7	
Support mechanisms	8	0.8290	10	0.868
Effects	5	0.830	6	0.878
Improved access	7	0.8967	7	0.907

Appendix H

Pre Test Results

Table 1

Background information

Characteristic	Sub set	Frequency(n)	Percentage(%)
Age in years	< 35	8	80
	< 35	2	20
Gender	Male	7	70
	Female	3	30
Educational level	Primary	2	20
	Secondary	3	30
	college	5	50
Duration of treatment in years	1-3	3	30
	4-6	4	40
	7-9	3	30
	>10	0	3
Category of study participants	Peer educator	1	10
	Support group leader	1	10
	Mentor Mother	0	0
	Client	8	80

Pretest Baseline assessment results

Note: 1-strongly disagree, 2-disagree, 3-neutral, 4-agree and 5 strongly agree

Objective 1: To assess community readiness to scale up community differentiated service delivery

for improved access to health care among PLHIV, the study had set the following hypothesis.

Table 2

Community readiness assessment

Characteristics	1	2	3	4	5
CDSD models are easily available	6 (60%)	1 (10)	2 (20%)	1 (10%)	0
Clients are aware of how CDSD can improve access to health services	5 (50%)	4 (40%)	0	1 (10%)	0

Community leaders have been involved as champions for scaling up of CDSD	2 (20%)	2 (20%)	4 (40%)	1 (10%)	1 (10%)
Community have a positive attitude towards scaling up CDSD model	9 (90%)	0	0	1 (10%)	0
Community have adequate resources to support scale up	2 (20%)	2 (20%)	2 (20%)	1 (10%)	1 (10%)
Community are aware about challenges in accessing health services	1 (10%)	1 (10%)	1 (10%)	2 (20%)	5 (50%)

Objective 2. To assess demand for community differentiated service delivery to improve access to health care among people living with HIV in Kakamega county.

Table 3

Demand factors for community differentiated service delivery

Characteristics	1	2	3	4	5
Information on community differentiated service delivery was given	1 (10%)	1 (10)	0	4 (40%)	4 (40%)
Community differentiated service delivery is acceptable by clients	6 (60%)	2 (20%)	0	1 (10%)	1 (10%)
Getting community differentiated service delivery care is less expensive	1 (10%)	2 (10%)	1 (10%)	2 (20%)	5 (50%)
Community differentiated service delivery is available within the places where clients stay	0	1 (10%)	0	8 (80%)	1 (10%)
Information on community differentiated service delivery was given	2 (20%)	2 (20%)	2 (20%)	1 (10%)	1 (10%)

Objective 3. To evaluate package of services in community differentiated service delivery for improved access to health care among people living with HIV in kakamega county.

Table 4

Components of package of services within community differentiated service delivery

Variable	1	2	3	4	5
Health education	0	4 (40%)	1 (10%)	3 (30%)	2 (20%)
ART refill	6 (60%)	3 (30%)	1 (10%)	0	0
Symptom screening	0	2 (20%)	2 (20%)	2 (20%)	4 (40%)
Reporting	6 (60%)	0	1 (10%)	2 (20%)	1 (10%)
Psychosocial and Adherence support	0	0	0	8 (80%)	2 (20%)
Referral	1 (10%)	1 (10%)	1 (10%)	2 (20%)	5 (50%)
Viral load monitoring	1 (10%)	1 (10%)	2 (20%)	3 (30%)	(30%)

Objective 4. To assess support mechanisms for scaling community differentiated service delivery for improved access to health services among PLHIV in Kakamega County.

Table 5

Mechanisms to support scale up community differentiated service delivery

Variable	Not effective	Not very effective	Somehow effective	Very effective
How effective are Community networks promoting scale up of CDSD models	5 (50%)	2 (20%)	2 (20%)	1 (10%)
How effective are adequate stock levels of drugs and other resources used in	2 (20%)	1 (10%)	6 (60%)	1 (10%)

community differentiated service delivery				
How effective are policies on community differentiated service delivery	3 (30%)	5 (50%)	1 (10%)	1 (10%)
How effective is monitoring and evaluation	3 (30%)	5 (50%)	1 (10%)	1 (10%)
How effective are community leaders in supporting scale of CDSD	1 (10%)	6 (60%)	1 (10%)	1 (10%)
How effective is the data flow from the community to patient's HIV medical records	1 (10%)	6 (60%)		1 (10%)

Appendix I

Test for Normality

Dependent Variable	Response	Kolmogorov-Sirona			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Reduced waiting time	Disagree	.472	262	.000	.530	262	.000
	Agree	.445	139	.000	.572	139	.000
Reduced facility visits	Disagree	.431	262	.000	.590	262	.000
	Agree	.540	139	.000	.245	139	.000
Cost containment	Disagree	.435	262	.000	.586	262	.000
	Agree	.539	139	.000	.156	139	.000
Lilliefors Significance Correction							
Data is non normal							

Appendix J

Homogeneity of variance

ANOVA

		Sum of		Mean		
		Squares	df	Square	F	Sig.
Reduced waiting time	Between	2.086	1	2.086	11.108	.001
	Groups					
	Within	74.941	399	.188		
	Groups					
	Total	77.027	400			
Reduced facility visits	Between	10.252	1	10.252	66.859	.000
	Groups					
	Within	61.180	399	.153		
	Groups					
	Total	71.431	400			
Cost containment	Between	11.833	1	11.833	83.876	.000
	Groups					
	Within	56.291	399	.141		
	Groups					
	Total	68.125	400			

Appendix K

Multicollinearity

Variable	Collinearity Statistics	
	Tolerance	VIF
Community efforts	.716	1.397
Knowledge of efforts	.321	3.111
Leadership	.321	3.116
Community climate	.496	2.017
Community resources	.451	2.216
Awareness	.561	1.782
Acceptability	.540	1.853
Availability	.321	3.111
Affordability	.321	3.116
Client literacy	.496	2.017
Package of services	.451	2.216
Competence of the provider	.561	1.782
Involvement of PLHIV network	.321	3.116
Policies	.496	2.017
Adequate resources	.451	2.216
Sound leadership	.561	1.782
Monitoring and evaluation	.540	1.853

Appendix L

Thematic Content Analysis

Participant: 10

Duration of the interview: 30 minutes

Interviewer	Participant	Coding
What kind of community differentiated models are currently available? Probe. How do you describe its utilization	Respondent 9: "you see when we started this program people used to meet in houses four or three people and so it was difficult for people to know if such programs exist. It was as if we were hiding but people need to know that community models exist in the community and if they want to enroll who can you conduct it will be better....."	Visibility and awareness Community involvement Accessibility/enrolment
Do you think you are receiving adequate support from your leaders	Respondent 12: ".....OK it is we know them it hard that they do not support and are less concerned most of them are able to afford care in high end hospitals but maybe we need to talk to them to see if they can assist us even in getting a venue and mobilizing more people to join community differentiated service delivery....."	Lack of support from leaders Teamwork and mobilization
How would describe the attitude of community members towards the model	Respondent 5: "Huhuuu.... everybody supports such a noble idea the program will save us a lot time .in fact you can agree to have group meetings even at night for 1 hour after you completed your house work.	Positive attitude Convenience
What does the community members know about the impact of the community differentiated service delivery on access to health services	Respondent 1: "when we started implementing community differentiated service delivery we had 17 but people stopped coming in the group but instead went directly to the clinic to receive services from there. This made us get bored since people are not utilizing them although using them helps to reduce waiting time and the cost of travelling to the clinic."	Non-functional groups Knowledge about impact of the model on access
Can you talk about information about community	Respondent 12: ".....OK we were taught and given books on the model and know that it is we know that using	Awareness created

differentiated service delivery if you received before the model was implemented	community models is less expensive and saves time but we do not have a doctor at the community and this is the reason we prefer to go to the hospital. Even if you spend a whole day but you will be seen by the doctor. Also you can only have your blood taken at the hospital because at community there is no one who can take our blood and measure if we are doing well.....”	Lack of clinicians Long waiting time Availability of services
How do you view the model acceptability among the community members?	Respondent 10: “I don’t accept the community thing; I fear that people who know will know that I have HIV. You know everybody will be curious to know why we come together and they may end up knowing that I have HIV. No I don’t.....”	Low acceptability Fear of accidental disclosure of the HIV status
Let’s talk of the services within the model, do you get all services you need The cost of services also sometimes affects the demand? how is it related	Respondent 6: “I prefer to get services near the place I stay for me all the services I need I can get them and not worried at all” Respondent 2: “The good thing I like about services within the community is that it is free, yes all HIV services are free but going to the facility you have to use money to get there. In fact the cost of transportation has doubled.....”	Availability of services No cost attached to the services Cost attached to facility visits
Let’s talk about package of services do you think it is comprehensive enough	Respondent 1: “when we started implementing community differentiated service delivery we only received ART refills only we could not get other services like someone examining us to see if we do not have any illness due to this we decided to go back to the facility. At the facility there is a clinician who will examine us. You see.....”	On ART refill services available Professional are found at facility
Laboratory services some times are not available at the community. How is this related to the package of services	Respondent 6: “At the community there is no lab to measure our blood and see if the virus are sleeping, we have in other countries there is someone who collects the blood from patients in the community level and takes to the facility for investigation but not here”	No blood sample collection for viral load monitoring at the community. Other countries take sample in the community
How would describe the competence of the health care workers?	Respondent 5: I would rather spend my time on line in the hospital being sure that I will been by the doctor. Those people offering services at the community level calling themselves	Preference of facility services where there is a doctor Services at community are offered by peers

	doctor are the same people who take drugs as us. I fear they might give me wrong drugs.	
How would describe the support you have received from the network?	Respondents 3: "Those people you call network do not help at all, we thought they should be the ones teaching us and encouraging us on this community model but most of them are silent"	Networks are not involved in the model
Can you talk more about resources and how you have been receiving your drugs and other commodities	Respondent 5: "The good thing is that we have never missed drugs even they are not enough to take as three months we are given for one month and next time you get a three months' supply."	Awareness and advocacy by network is lacking Never missed drugs
How would you describe access to policy at the community level	Respondent 10: "We have never seen policy at community level if you want to know something you just go to the facility and ask the doctor, they are the ones who store them"	Lack of policy in the community Policy available in the facility alone
Can you tell me more about the leadership and how they have supported community differentiated service delivery?	Respondent 10: "I have never seen what the so called leaders are doing I even do not know who they are. If we have leaders, then I expect everything to be smooth and we should not lack drugs at any given time."	Presence of leader's not Lack of leadership support
How do you monitor the activities of the model?	Respondent 8: "Talk of being able to know what happens in the community where services are given by community members. I tell its difficult we have always asked for community led monitoring and evaluation to be able to track events in community differentiated service delivery but no one has come to assist us".	Lack of reporting
Probe: Is there a way of reporting activities		Challenges in monitoring

Appendix M

WORK PLAN

1. Appendix 1: Work Plan

Activities	Sept 2019-feb 2021	March 2021	April 2021	May 2021	July 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021	April 2022	May 2022	June	Jul 2024	Aug 2024
Proposal development.															
Proposal defense.															
Community Readiness assessment															
Sensitization meetings															
Training of the LHWS															
Formation of groups															
Group meetings															
Supervision of the groups															
Evaluation of the model															
Thesis writing															
Thesis defense.															
Thesis publication.															