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Implementation of multi-month dispensing among people living with HIV in Tanzania

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The global efforts to end the HIV pandemic are currently geared towards achieving ideal viral suppression among People Living with HIV (PLHIV) on ART. Tanzania adopted a number of strategies including Multi-Months Dispensing (MMD) allowing stable clients to attend the clinic twice or three times a year. This study examined the implementation of MMD in Tanzania. This was a cross-sectional study that employed quantitative methods. A total of 44 high-volume health facilities i.e. those contributing 80% of PLHIV in the six regions were involved in this evaluation. All electronic client files in the HIV Care and Treatment Clinics for review on MMD eligibility and implementation status. Open Data Kit (ODK) was used to collect data on facility-level factors that influenced implementation of MMD. Out of 51,478 stable clients, 82.1% were put on MMD while 17.9% did not receive MMD. On the other hand, 33.7% of unstable clients were provided with 3 months or more ARV drugs. The overall compliance to MMD policy was found to be 76% and was unevenly distributed across health facilities. This was contributed by different factors including the type of facility, geographical location and availability of quality CTC services. MMD has proved to be an important strategy for delivering HIV services, if well executed it will facilitate improvement of the health outcome of HIV clients. Implementation of MMD is influenced by several factors such as type of facility, rural-urban dichotomies, quality of service and distance to health facility.

Key words: Multi-month dispensing, HIV/AIDS, antiretroviral, HIV care and treatment, DSDM.

INTRODUCTION

The HIV pandemic is a public health concern with a global impact, requiring global efforts to achieve epidemic

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control and end the HIV scourge. To achieve this goal, in 2014, the Joint United Nations Programme on HIV and AIDS (UNAIDS) and partners set the '90-90-90 targets'; aiming to diagnose 90% of all HIV positive people, provide antiretroviral therapy (ART) for 90% of those diagnosed, and achieve viral suppression for 90% of those treated by 2020 (UNAIDS, 2017). Currently, the global effort has adopted the “fast track” approach to attain 95-95-95 by 2030, by implementing focused, high-impact prevention; accelerated HIV testing; treatment and retention in care (UNAIDS, 2020). Retention and adherence to antiretroviral (ARV medication) among People Living with HIV (PLHIV) remain critical to achieve the last 90%, which is viral suppression for 90% of PLHIV on treatment, which in turn will curb the spread of the disease. However, a large number of clients receiving ART at health facilities in Tanzania and other African countries do not take their medication as prescribed (MoHCDGEC, 2017). Furthermore, the shortage of healthcare workers in developing countries represents one of the greatest obstacles to achieving the 90-90-90 targets (Julien et al., 2021; Songo et al., 2021). Many health facilities are already overwhelmed with clients, which calls for innovative HIV service delivery models to enable the health system to accommodate the current and expected increasing number of people demanding HIV care and treatment (PEPFAR, 2017). Tanzania, among other African countries has developed strategies that include multi-months dispensing (MMD) to stable clients to combat this challenge (MoHCDGEC, 2017).

In Tanzania, for persons living with HIV to be categorized as stable, hence eligible for MMD, they should have been on ART for at least six months, should be above five years of age, have no adverse drug reactions that require regular monitoring, have no current illness, have observed ART adherence of 95% and maintained clinic appointments for the past six months, be receiving first- or second-line ART with undetectable viral load of less than 50 copies/ml in the absence of HIV viral load monitoring, and should have rising CD4 counts above 350 cells/cubic millimeter (MoHCDGEC, 2019, UNAIDS, 2020).

Though HIV is not curable, however, it is now managed as a chronic illness and now PLHIV on ARV can live a normal healthy life. With good adherence to ARV medication, clients become virally suppressed/ undetectable and un-transmissible; this is the central treatment strategy for epidemic control. To achieve this strategy, optimum adherence to ARV medication is required, and this entails regular medication refill (Havlir et al., 2020). Many clients and health facility factors might create a barrier to adherence and ultimately viral suppression. Some of the patient factors include travel time and distance to the health facility, transportation availability, and time out of work. Furthermore, health facility-related barriers include long waiting time, clinic congestion, work overload and associated reduced patient-provider interaction time that potentially lead to low quality of service (Ragea et al., 2021). With the ongoing efforts to test and start treatment with life-saving ARV for all identified HIV-positive clients, the patient load is rapidly increasing thus necessitating the introduction of Multi-Month Dispensing (MMD).

Patient interruption of ART is one of the factors that resistricts the progress towards epidemic control. MMD that lasts about three months and more have shown better retention on ART in Nigeria (Tomescu et al., 2021) and Haiti (Parrish et al., 2021).

The recent COVID-19 epidemic has further signified the importance of MMD with a large number of HIV-positive clients reported to have been enrolled to MMD across sub-Saharan Africa (Bailey et al., 2021; Hong et al., 2020). The pandemic has highlighted the importance of scaling up differentiated service delivery model such as MMD (Hoover et al., 2021; Grimsrud and Wilkinson, 2021). Little is known about the implementation of MMD in Tanzania, and to the best of the authors understanding, no evaluation study has been conducted regarding its implementation. Therefore, this study intended to assess fidelity of implementation of MMD intervention and factors affecting its implementation in Tanzania.

METHODS

Study design

The study was a descriptive cross-sectional design employing quantitative methods to investigate the implementation of the MMD strategy.

Study area

Tanzania is a lower middle-income country located in East Africa, with a population of 57,637,628 and estimated area of 945,087 km^2. Administratively, Tanzania mainland has 26 regions (Tanzania National Bureau of Statistics, 2022). The study was carried out at CTC facilities in Mtwara, Lindi, Morogoro, Iringa, Njombe, and Ruvuma regions. These regions are under USAID Boresha Afya program support; a PEPFAR supported program through USAID, under Deloitte Consulting Limited with its technical partners, Family Health International (FHI360), Engender Health, and Management and Development for Health (MDH). The study area was chosenbased on the convenience of access to data, due to existing monitoring and evaluation collaboration between Muhimbili University of Health and Allied Sciences (MUHAS) and Delloite Consulting Limited.

Sampling procedures and sample size

The study involved 146 high-volume health facilities providing care and treatment services in the Southern regions of Tanzania. The rationale for picking high-volume facilities is the fact that these facilities serve about eighty percent (80%) of all clients; hence, the likelihood of finding stable clients who are eligible for MMD. Stratified random sampling was used to obtain the list of 44 facilities from 146 high-volume health facilities. To ensure representation of different facility levels that is, hospitals, health centres, and

dispensaries depending on the proportion of PLHIV served by the strata, at hospital level the proportion of clients served was 48%, health center 36%, and Dispensary 17%. Simple random sampling using an online randomizer (https://www.random.org/lists/) was used within each stratum to obtain a total of 44 facilities involved in this evaluation. The sampling of 44 health facilities was based on UN organization joint publication that recommends studying at least thirty percent of the facilities in studies involving more than 100 public and private health facilities ((UN, 2009). Up to June 2020, all active (100%) patient files from 44 facilities with at least one visit recorded in the previous six months were analyzed.

Study variables

The study variables were identified based on the Tanzania guideline on management of HIV/AIDS (MoHCDGEC, 2019). Criteria for stable clients eligible for MMD, includes, age, duration on ART, viral load count, pregnancy status, opportunistic infections, and side effects. The facility level factors were selected based on the importance of the factors to MMD implementation. This included type of facility, ownership, location, quality of services, distance from health facility, trained staff, and lab services to support MMD.

Data collection

Health workers compliance to the policy guidance

Electronic patient files from CTC2 database were pooled using Data Analysis Companion (DAC) tool for review on MMD eligibility and compliance to the guideline. DAC is a tool developed by University of Maryland School of Medicine under the support of President's Emergency Plan for AIDS Relief (PEPFAR) focusing on analytics and data retrieval from the patient level Care and Treatment Centre (CTC2). Indicators reviewed included age, duration on ART, viral load count, pregnancy status, opportunistic infections, and side effects. The data were uploaded in STATA software version 15 for analysis.

Facility level factors

To describe facility level factors that influenced implementation of MMD intervention, the Open Data Kit (ODK) was used to collect information from the health facilities and Care and Treatment (CTC) in charge. The information included general facility information, staffing levels, and laboratory services. The data were imported to STATA for analysis.

Data management and analysis

Frequency distributions and cross-tabulations of variables were done to check for inconsistencies and the extent of MMD implementation. All inconsistencies were corrected by referring to facility information questionnaires and electronic client files in CTC2 database. Descriptive statistics was done to analyse the distribution of characteristics of PLHIV and MMD status. The continuous variable was summarized into frequency, mean, and standard deviation. A Chi-square test was performed to test differences in MMD compliance for non-eligible clients by health facility levels, that is, hospitals, health centres, and dispensaries. The magnitude of the association between variables and compliance to the MMD guideline was estimated using bivariate and multivariate logistic regression analysis. P values <0.05 were considered statistically significant.

RESULTS

The study involved 22 hospitals, 15 Health Centers (HC), and 7 dispensaries. The government owned 30 facilities, while 14 were under private ownership. The Iringa and Njombe regions had the most study facilities, with 11 each. Lindi region had the fewest facilities (Table 1). About 24 facilities were located in urban areas while 20 facilities were located in rural areas.

Characteristics of HIV clients

A total of 83,142 electronic clients' files were retrieved from CTC2 database of all 44 sampled health facilities. The majority of client, 54,404 (64.4%) were females, while 28,738 (34.6%) were males. The average age of clients was 39.94, ranging from 0 to 110 years (Std = 13.56). The majority of study participants, 66,139 (72.3%), were between the ages of 15 and 49. The clients' ART duration was evaluated; 51.6% had been on medication for more than 5 years, while 48.4% had been on medication for less than 5 years. About 80% of the clients were from three regions, Iringa, Njombe, and Morogoro. Lindi region had the least clients (4.5%). Table 2 summarizes these findings. A total of 51,478 clients were stable, however only 82.1% were placed on MMD while 17.9% did not receive MMD (Table 3). On the other hand, 10,685 (33.7%) ineligible clients were placed on MMD (Table 3).

The facility capacity to support compliance with MMD

Service quality was evaluated by asking the health care provider to rank the facility's service quality on five dimensions: excellent, good, fair, poor, and very poor. Health facilities with a score of excellent, good, or fair were rated as providing good service, while poor and very poor were rated as providing poor service. The health care provider estimated the distance traveled by patients to the facility based on five responses: less than 1 km, 1 to 2 km, 3 to 4 km (less than 5 km), and 5 or more kilometers. Staff training on MMD was requested from the health facility in charge, who was asked if any of the facility staff had received MMD training.

Majority of the facilities accounting for 93.2% were ranked to have good quality services provision. More than half of clients (59.2%) were located within a radius of 5 km compared to 40.8% of clients who travelled more than 5 km to access HIV care and treatment. The findings showed that 95.4% of all facilities included in the study had training to provide MMD services. The capacity of the facilities to undertake laboratory tests at the facilities was measured based on the ability to collect and test the sample within the facility. Only about 68.2% of facilities could collect samples and test CD4 counts, while only 11.4% could collect samples and test HVL at the facility

Table 1. Distribution of sampled health facilities by level and regions.

Region	Facility Level			
	Hospital	Health Centre	Dispensary	Total
Iringa	5	4	2	11
Lindi	3			3
Morogoro	4	5		9
Mtwara	3	1	1	5
Njombe	5	3	3	11
Ruvuma	2	2	1	5
Total	22	15	7	44

Table 2. Characteristics of HIV clients.

Criteria	Characteristic	N	%
Age (Years)	< 5	633	0.8
	≥5	82,509	99.2
Sex	Female	54,404	65.4
	Male	28,738	34.6
Days on ART	< 180	6,838	8.2
	180+	76,304	91.8
Region	Iringa	24,115	29.0
	Lindi	3,741	4.5
	Morogoro	21,943	26.4
	Mtwara	6,392	7.7
	Njombe	20,868	25.1
	Ruvuma	6,083	7.3
Now pregnant	Yes	753	1.4
	No	53,651	98.6

Table 3. Clients provided with MMD per eligibility categorizations.

MMD eligibility	On MMD		
	Yes	No	Total
Eligible	42,259 (82.1)	9,219 (17.9**)	51,478 (100)
Not eligible	10,685(33.7) **	20,979 (66.3)	31,664(100)
Total	52,944	30,198	83,142

(Table 4).

Compliance with MMD criteria

Analyzing the client's age revealed that, 13.7% of paediatric clients with less than 5 years were put on MMD despite not being eligible. Out of 6,838 clients who had less than 180 days on ART, 9.5% of clients were put on MMD. About 27.8% of clients were not virally suppressed and 5.7% of pregnant women were put on MMD. 40.3% of clients who were receiving IPT were put on MMD. Similarly, 63.4% of clients reported with Opportunistic Infection (OI) or Adverse Drug Reaction (ADR) were put on MMD and 30.8% of clients poor with adherence on ART were also put on MMD contrary to the guideline

Table 4. Facility's Capacity to Provide MMD Services.

Parameter	Characteristic	n= 44	(%)
Service quality	Good	41	93.2
	Poor	3	6.8
Distance from facility	<5 km	26	59.2
	5 or more km	18	40.8
Trained staff on MMD	Yes	42	95.4
	No	2	4.6
CD4 sample collected and tested at the facility	Yes	30	68.2
	No	14	31.8
HVL sample collected and tested at the facility	Yes	5	11.4
	No	39	88.6

(Table 5).

Based on the findings presented in Table 6, above, overall compliance with MMD implementation was 76%. The results revealed that, out of 52,944 clients who were eligible for MMD across 44 facilities, only 42,259 were prescribed ARV drugs for more than 3 months. Furthermore, the results show that hospitals have an87.5% compliance rate, health centers have an 86.0% compliance rate, and dispensary facilities have an 88.7% compliance rate (Figure 1).

Facility level factors that influence implementation of MMD

The facility-level factors that influence the implementation of MMD intervention were analyzed using multivariate and bivariate to examine the relationship between the facility-level factors and implementation of the MMD service delivery model across the 44 study facilities providing HIV care and treatment. Dispensaries were in a better position to implement MMD (86.3%) compared to other facility types like the hospital and health center. In relation to the rural-urban dichotomy, it seemed that facilities located in urban areas had a high rate of MMD compliance (76.5%), compared to their counterparts with a compliance rate of 75.0%. Facilities, which were rated with good service quality, were likely to comply to MMD (76.5%) compared to health facilities with poor service quality that had MMD compliance rate of 58.4%. The difference between clients' travel distance to HFs for ARV pickups was also tested to see whether it influences the implementation of MMD. The computed results revealed a slight difference between clients located within a 5-kilometer radius of HF with a compliance rate of 78.4 percent and those located outside the 5-kilometer radius with a compliance rate of 72.6 percent. More contradictory findings are also seen in terms of the availability of CD4 and HVL testing machines. The study discovered that facilities with CD4 and HVL testing equipment have a poor implementation of MMD (Table 6).

DISCUSSION

The findings of this study can be used to support a number of claims. According to the findings, the majority healthcare providers are aware of the key criteria that guide them in identifying stable clients to enroll in MMD. At least 61.9% of the client files examined by the study met the MMD eligibility criteria. It should be noted, however, that some of the healthcare providers did not follow MMD guidelines. For example, some of the unstable clients were put on MMD (12.9%), while 11.1% of clients were eligible but not under MMD. Previous studies have indicated similar findings of failure to comply with MMD guidelines. For instance, a study in Haiti noted that there was poor compliance of MMD based on four categories; appropriate use of MMD; appropriate non-use of MMD; missed opportunities (that is, MMD could have been provided but was not); and inappropriate use of MMD (Roy et al., 2019). Similar findings were observed in Malawi which reported that despite the wide implementation of MMD, some of the facilities were not of providing MMD according to the agreed definition of eligibility (Prust et al., 2017). A study in Uganda reported that poor compliance among providers, who received training, could be due to shortages of health care providers at the facility. The author argued that most of the facilities lack adequate number required to provide quality HIV care services (Obua et al., 2014). It is important to continue providing capacity building to health workers through on-job training and mentorship. A study in Rwanda attested that health facilities are supposed to

Table 5. Criteria for MMD eligibility v/s clients on MMD.

Criteria	Attribute	Receiving MMD	
		No	Yes
Age	< 5 Years	546	87**
	5+ Years	29,652	52,857
Duration on ART	<180 Days	6,188	650**
	180+ Days	24,010	52,294
HVL suppression	Un-suppressed	7,092	2,724**
	Suppressed	12,491	47,943
Pregnant	No	29,488	52,901
	Yes	710	43**
IPT	Not receiving IPT	24,147	48,852
	Receiving IPT	6,051	4,092**
OI Or ADR	No	30,148	52,863
	Yes	48	83**
ART adherence	Good	26,118	50,390
	Poor	369	164**

**Clients do not meet criteria for MMD but are on MMD.

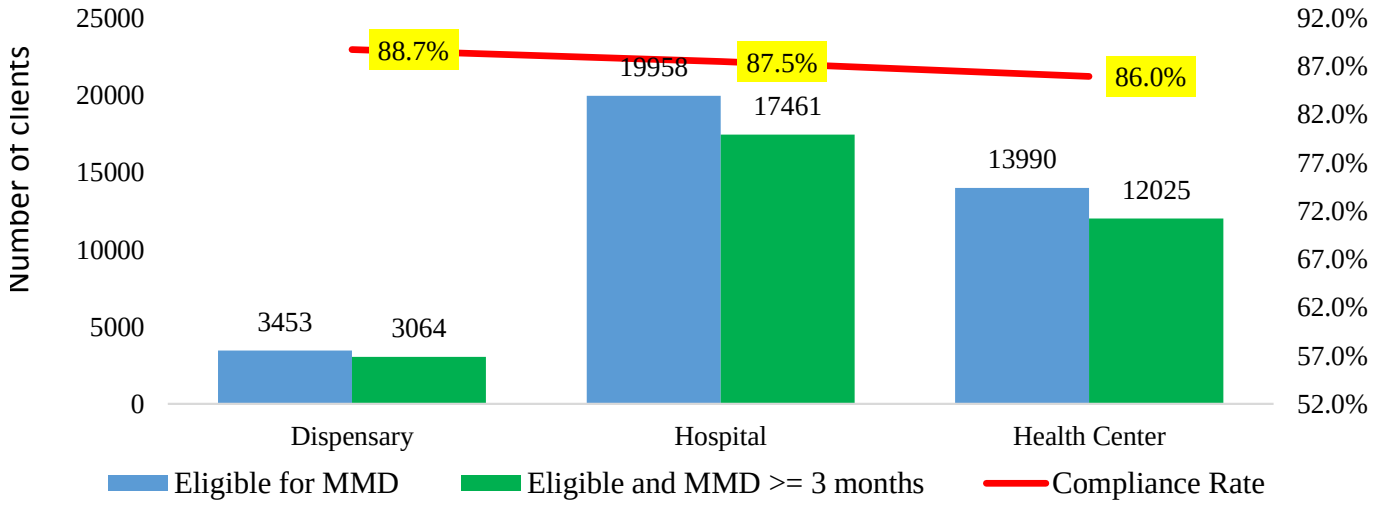

Figure 1. MMD compliance of eligible client across types of facilities.

be supported by clinical mentors to identify stable patients ahead of the implementation of MMD (Nsanzimana et al., 2017).

Healthcare providers' knowledge on the enrollment criteria is crucial to ensure smooth enrollment of clients on MMD. The health care providers should rely on the available records such as client records forms that is, CTC2 cards or information from CTC2 database. This study noted that the poor compliance of MMD among healthcare providers as per eligibility criteria such as age, HVL suppression, pregnancy, IPT, and ART adherence, could easily be tracked on CTC2 cards or CTC2 database. Successful compliance of MMD requires adherence to clinical criteria. It was observed from the

Table 6. Predictors of MMD implementation.

Covariate	Categories	Comply MMD		(cOR, 95% CI)	(aOR, 95% CI)	P-Value
		No	Yes			
Facility type	Dispensary	813 (13.7)	5,110 (86.3)	1	1	
	Health centre	9,069 (30.2)	20,964 (69.8)	0.37 (0.34-0.40)	0.4 (0.36-0.43)	0.000
	Hospital	9,248 (20.5)	35,876 (75.9)	0.62 (0.57-0.67)	1.3 (1.14-1.37)	0.000
	HIV treatment center	808 (39.2)	1,254 (60.8)	0.25 (0.22-0.28)	0.9 (0.78-1.01)	0.072
Ownership	GoT	13,425 (23.1)	44,825 (76.9)	1	1	
	Non-GoT	6,513 (26.2)	18,379 (73.8)	0.8 (0.82-0.87)	1.0(0.94-1.03)	0.408
Location	Rural	6,586 (25.0)	19,741 (75.0)	1	1	
	Urban	13,352 (23.5)	43,463 (76.5)	1.1 (1.05-1.12)	1.3 (1.25-1.38)	0.000
Service quality	Poor	823 (42.6)	1,156 (58.4)	1	1	
	Good	19,115 (23.6)	62,048 (76.5)	2.3 (2.11-2.53)	4.0 (3.61-4.50)	0.000
Distance from facility	< 5 km	10,173 (21.6)	36,938 (78.4)	1	1	
	5+ km	9,512 (27.4)	25,174 (72.6)	0.7 (0.71-0.75)	0.7 (0.63-0.68)	0.000
Trained staff on MMD	No	323 (15.7)	1,740 (84.3)	1	1	
	Yes	19,615 (24.2)	61,464 (75.8)	0.7 (0.62-0.68)	1.0 (0.91-1.18)	0.57
CD4 sample collected and test done at facility	No	3,239 (18.3)	14,510 (81.7)	1	1	
	Yes	16,699 (25.5)	48,694 (74.5)	0.7 (0.62-0.68)	0.3 (0.32-0.36)	0.000
HVL sample collected and test done at facility	No	14,668 (22.1)	51,692 (77.9)	1		
	Yes	5,270 (31.4)	11,512 (68.6)	0.62 (0.60-0.64)	0.3 (0.28-0.32)	0.000

empirical results that, a clear definition of stable clients based on clinical criteria increases the compliance of MMD (Kim et al., 2018).

To further understand the healthcare providers' compliance to MMD guideline; it was necessary for this study to analyze the facility-level factors, which influence the implementation of the MMD. The study found out that, dispensary, facilities located in urban areas, facilities with good quality services, and short distance to facility are more likely to successfully implement MMD. Good compliance of MMD among dispensaries over other types of facilities such as health centers and hospitals could be associated with a low volume number of HIV clients; henceforth this might influence easy tracking and assessment of clients who are eligible for MMD, while facilities with a high-volume of HIV clients and healthcare workers could be overwhelmed with activities. This might lead to poor monitoring of eligible clients which results in inadequate compliance of MMD. In line with these results, a large HIV/AIDS treatment program in Nigeria that examined the performance and trend for quality of service ascribed that, compared to tertiary health facilities, the secondary facilities not only improved favorably but also surpass the highly specialized tertiary sites in almost all indicator domains except on HBV screening and hematocrit measurements (Aliyu et al., 2019).

In conjunction with the capacity of the facility, the presence of testing machines such as CD4 and HVL is of pivotal importance in determining the client's eligibility for MMD. Results of this study has indicated that the availability of healthcare providers trained on MMD, and the presence of CD4 and HVL testing machine at the facility were linked with poor implementation of MMD. However, it is still debatable that, facilities with trained healthcare providers and equipment such as CD4 and HVL testing machines are not in a better position to implement MMD. The observed poor implementation could be associated with a large number of clients to be sorted to detrermine the eligibility for MMD at this level. Previous studies have indicated the consequence of work overload to the quality of HIV care (Julien et al., 2021; Songo et al., 2021).

Transferring some of the stable patient on MMD to lower level facilities such as dispensary could improve quality of service at congested higher level facilities. Another study done in Zimbabwe revealed that high work load could be associated with longer turnaround time for laboratory results such as CD4 count and HVL. This could lead to poor implementation of MMD (Mbiva et al., 2021). The findings was corroborated by another study

on viral load monitoring in eight Sub-Sahara Africa countries, where only three countries had decreasing turnaround time for viral load test (Lecher et al., 2021).

The study also noted that the rural-urban dichotomy influences the implementation of MMD. The observed influence of the rural-urban divide on the implementation of MMD was concurred by a previous study in Tanzania. The study found out that, despite the fact that Tanzania has strengthened laboratory services for HIV services, the capacity is still limited as most of the large laboratory for testing HVL samples or specimens is in hospitals located in urban areas, hence leading to delays between testing and obtaining HVL results for facilities located in rural areas (Ishengoma et al., 2017). This implies that rural located facilities may unintentionally initiate MMD to clients who are unstable due to delays in getting HVL results. Again, a study in Tanzania found that facilities located in urban or semi-urban areas had more chance of timely testing HVL samples (Antelman et al., 2018). This observation was further supported by study which indicated that successful implementation of MMD requires an effective supply chain of HVL tests which are needed in large quantities to cater to the needs of PLHIV who need to be tested for the viral load on a routine basis (Jamieson and Kellerman, 2016).

In interpreting the results of this study, it should be noted that the study was conducted during the COVID-19 outbreak; this might have led to increased number of ineligible clients being placed on MMD to reduce congestion at care and treatment clinics. However, the Ministry of health in Tanzania issued an interim guidance insisting on placing only stable clients on MMD despite COVID-19 outbreak; therefore the compliance to the policy guidance was expected to remain unchanged. Due to resource constrains, the study was conducted in only 6 among 26 regions of Tanzania, and the sampling frame was based on patient volume and health facility levels, this should be noted while generalizing the results of this study. To strengthen the study results, a number statistical test were done to determine the level of significance.

Conclusions

MMD has proven to be an important strategy for delivering HIV services, and if properly implemented, it will aid in the improvement of HIV clients' health outcomes. However, incorrect client categorization, such as placing ineligible clients on MMD, can result in this service being denied to those who are eligible. Implementation of MMD is influenced by several factors such as type of facility, rural-urban dichotomies, quality of service and distance to health facility. This study found that factors such as healthcare provider MMD training and the availability of CD4 and HVL testing machines had no significant impact on MMD implementation. However, these factors are critical in assisting healthcare providers in determining eligibility criteria for MMD implementation. As a result, they should not be overlooked, but rather emphasized.

CONFLICT OF INTERESTS

The authors have not declared any conflicts of interests.

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