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A Case of TASO Tororo Surge Strategy: Using Double Layered Screening to Increase the Rate of Identification of New HIV Positive Clients in the Community

Ronald Opito[1, *], Mastula Nanfuka[1], Levicatus Mugenyi[1], Michael Bernard Etukoit[1], Kenneth Mugisha[1], Lynette Opendi[1, 2], Betty Nabukonde[1], David Kagimu[1], Godfrey Muzaaya[1, 2], Caroline Karutu[2]

[1]Directorate of Program Management and Capacity Development, the Aids Support Organization, Kampala, Uganda

[2]USAID Regional Health Integration to Enhance Services in Eastern Uganda, IntraHealth International, Mbale, Uganda

Email address:

dropitoroni@gmail.com (R. Opito)

[*]Corresponding author

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Abstract: Introduction: HIV testing services is the entry point to HIV prevention, care, treatment, and support services. According to Uganda Population HIV impact assessment preliminary report released in 2018, 72.5% of people living with HIV in Uganda knew their status, which is below the UNAIDS target of 90%. We proposed a double layered screening of the population using the Ministry of Health HIV Testing Services (HTS) screening tool to identify more HIV positives and start them on treatment. The objective of this study was to assess the impact of the double layered screening approach on HIV test yield. Methods: A double layered screening approach involved using community and technical teams from TASO Tororo HIV clinic through the surge strategy. The community team (first layer) comprised of expert clients, local council 1, market and church leaders who were trained on how to screen the people in the community using the HTS screening tool. The technical team (second layer) comprised of medical personnel and counselors who subjected all people mobilized and screened by the community team to a second layered screening before offering an HIV test. We compared proportions of HIV test yields before and after the implementation of the double layered HTS strategy using proportions test and we assessed the impact of the double layered screening using a difference in difference (DID) evaluation method. Results; There was a general increase in HIV test yield from 4.75% with single screening (period: January-March 2018) to 12.25% with double screening (period: April – June 2018) (P<0.001). The increase was more in males (from 3.51% to 11.06%) than in females (from 6.36% to 13.31%) and this difference was significant (P=0.035). The increase in HIV test yield did not differ by age (P=0.060), by marital status (P=0.606) or by first time tester (P=0.167), Conclusion: The double layered screening before HIV test could be an effective strategy to maximize HIV test yield in the general population, which if scaled up can save huge resources, time and help focus on actual targets for HIV testing services, leading to early attainment of the UNAIDS 1st target of 90-90-90.

Keywords: Uganda, Mass Screening, AIDS, Marital Status, Ambulatory Care Facility, Health Personnel

1. Introduction

HIV testing is the entry point to HIV prevention, care, treatment, and support services. The aim of HIV testing services (HTS) is to diagnose HIV early and correctly to ensure early access to prevention, treatment and support services. To improve access and efficiency, HTS should be made available to all persons at risk of HIV infection using cost-effective and high-impact approaches [1]. Globally it's estimated that 36.7 million people are living and only 60% (55% in sub-Saharan Africa) know their HIV status [2]. This proportion of 55% reported by United Nationss Joint AIDS

program (UNAIDS) concurs with that of Staveteig S et al in 2017 who analyzed cross-sectional population-based data from the Demographic and Health Surveys (DHS) and AIDS Indicator Surveys (AIS) fielded since 2010 in 16 sub-Saharan African countries and estimated that 54% of PLHIV in the average country were aware of their status [3]. Uganda shows similar trends, though slightly better than other sub-Saharan African countries with 74% of people living with HIV knew their status in 2016 [2]. This report concurs with findings of the Uganda Population and HIV Impact assessment conducted between 2016-2017 who found 72.5% of PLHIV knew their HIV status [4]. In both reports, the key message is there is still gap in HIV testing, thus need to scale up HTS in order to identify those who are HIV positive and link them into care. It is upon this that led the country in 2017 to introduce differentiated HTS to tailor HTS to individual, community, subpopulation needs and preferences. The aim of this differentiated HTS is to facilitate early diagnosis of HIV positive while maximizing the yield, efficiency and cost effectiveness of the country's HTS program. The focus of the differentiated HTS is to assess the HIV risk/exposure and eligibility for testing using the HTS screening tool, target to maximize the yield with focus on high risk and vulnerable sub populations and focusing attention on those in need, based on the available data [5].

The overall goal for HIV testing services is to provide diagnosis that facilitates linkage to either prevention services or care and treatment services that eventually leads into reduced morbidity and mortality. In Uganda, the number of people tested is high with a low yield this indicates that the small proportion of the high risk populations has not yet been reached. These populations include children below 5 years, sex workers, men who have sex with men, prisoners, orphaned and vulnerable children, truck drivers, and people with disabilities, fisher folks and uniformed personnel. Still to note is that the number of repeat testers accounts for 40% of the total number of people being tested. Programmatic data indicates a low prevalence among the general population of about 3.5% compared to the key populations of 10% yet the key populations are the least targeted. This approach of testing seems to be expensive yet not very effective in reaching out to those who are HIV positive. Because of the above, there is need to strengthen community and facility testing approaches [6].

As a way of targeting the priority populations and increasing yield among those tested, the ministry of health has introduced a screening tool to be used by health care providers to screen all people prior to testing them. The major objective for this is to identify those at risk and prioritize them for HTS services. The at risk categories include all people who are sexually active but have never received an HIV test within 12 months, people with sexually transmitted infections (STIs), Hepatitis B, Tuberculosis and other chronic ill health that have not been tested in the last 3 months, men aged 35 - 49years, girls aged 20 - 24years, and clients in a discordant relationship among others [4].

Although the tool has been introduced, many of the service providers have not put it into use resulting into low yield as indicated by many HIV testing program reports. Our study center had a target of testing 5628 people in the community and identify and initiate 1686 new HIV positives on treatment from Oct 2017 to Sept 2018 with a target of 29.8% yield. However by Mar 31st 2018, we had already tested more than 4000 people with a yield of only 4.7% which was far below the set target. With this low yield, we opted for a double layered screening strategy to improve it in the general population.

2. Methods

2.1. Site Setting

Tororo district is located about 220km East of Uganda's Capital city, Kampala. It boarders the districts of Mbale, Manafwa, Busia, Butaleja and Western Kenya and has an estimated population of 517,082 people [7] spread throughout the 22 sub-counties. There are 59 operational health units of various levels including both public and private (5 Hospitals, 3 HCIV, 19 HCIIIs and 32 HCIIs), and TASO Tororo is one of them.

TASO Tororo is one of the 11 TASO Centers of Excellence (CoEs), founded in 1991 in Tororo district, and currently located in the Western Division, COX road of Tororo Municipality Tororo district. It provides care to 7124 people living with HIV with a catchment area of Tororo district and a 75KM radius.

Besides HIV/AIDS, TB/HIV prevention and treatment services, TASO Tororo provides a comprehensive package such as screening and treatment of Opportunistic Infections (OIs), sexual reproductive Health services (SRHs), Gender based Violence (GBV), and Family Health services such as Nutrition Assessment and Counseling services (NACS), screening and treatment for malaria, Maternal Neonatal and Child Health (MNCH) to the HIV positive clients and their exposed children. In addition, TASO is also providing voluntary medical male circumcision (VMMC).

2.2. Intervention Description

A double layered screening approach was designed and adopted by the team at TASO Tororo as a way of targeting people at risk of HIV and increasing the HIV test yield. The approach involved using a community team and a technical team from TASO Tororo HIV clinic. The community team comprised of 60 expert clients, 60 local councils (LC1s), some market leaders and church leaders mapped and assigned to the communities where they live. They were trained on how to screen the people in the community using the HTS screening tool shown in figure 1 below.

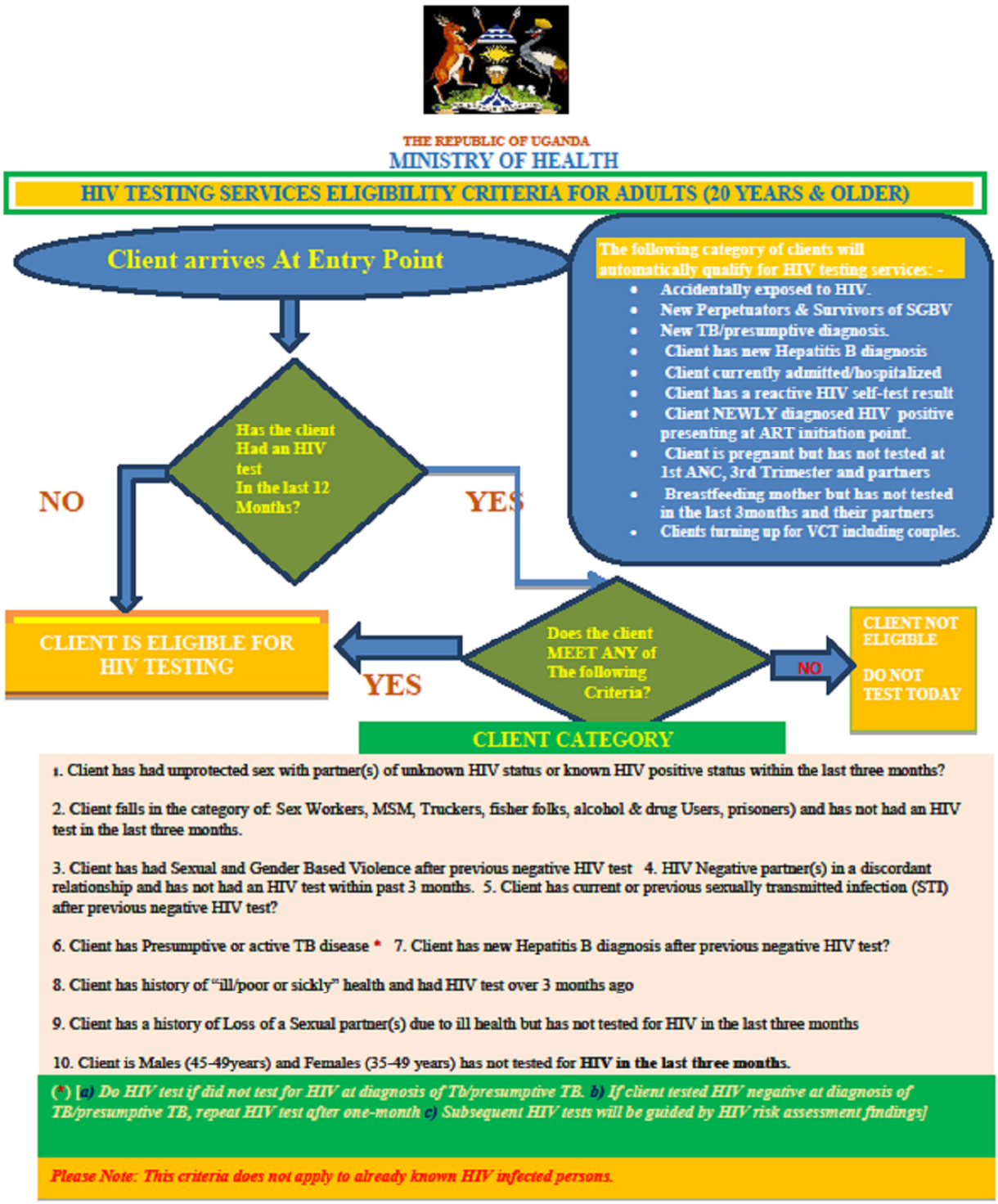

Figure 1. *Screening tool designed by Ministry of Health of the Republic of Uganda.*

This team mobilized the community members for HTS and performed the first layer screening to assess risks of HIV infections among them.

The technical team of ten groups, each comprising of medical personals and counselors were allocated specific geographical areas and performed the second layer screening before offering an HIV test to all those people who have been mobilized and screened by the community team.

The target categories by the two groups included men aged 30-49 years who would be found mainly in *malwa* (local) drinking joints, women 20-30years who were common in places of worships, community members suffering from chronic ill health who were found at home, partners of newly identified HIV positive clients and those with high viral load were also found at home, adolescent young girls found in market places and the working class found incorporate institutions, sexual partners of expert clients and clients in polygamous or discordant relationships.

Mobilization, screening and testing for HTS was mainly done in the evening when most people were at their homes or in hang out places like the drinking joints, and were differentiated basing on the client category. All people who tested positive were linked into care and those who were negative but at substantial risk of contracting HIV were linked to HIV prevention services at the nearby health facility or facility of choice.

2.3. Data Analysis

Information from clients eligible for HTS were captured and analyzed into details, to include their socio demographic characteristics, their previous HIV testing behaviors and the HIV test yield among others. The proportion for HIV yield was compared between the before (single layer, Jan-Mar 2018) and after (double layer, Apr-Jun 2018) periods using a proportion test. A difference in difference (DID) evaluation method was used to analyze the impact of the double layered screening approach by comparing the HIV yield between two time periods for different levels of the clients' characteristics (e.g., sex, marital status, age and first time testers). To perform the DID, an interaction term between the client's characteristics and time was introduced into a logistic regression. A significant interaction implied a significant DID estimate to determine the significance of the change in HIV yield. In all analyses, a p-value of <0.05 was taken as statistically significant. Stata version 14 (Statcorp, College Station, Texas, USA) was used for all data analyses.

2.4. Ethical Consideration

Prior to analysis of this data, we sought ethical approval from The AIDS Support Organisation (TASO) Research ethics committee. We used unique identifiers instead of the participants names for confidentiality, all the HTS registers are kept in a secure place under lock and key with limited access to only the program staff and all the electronic data is stored on computers that are password locked and all the data is backed up.

3. Results

During the single layered screening period, all the 2675 clients mobilized were offered HIV test of which 56.5% were males and 43.5% females. With the double layered screening in the April-Jun period, 24708 clients were mobilized by the community team for HTS after offering first level screening at the community. They were then subjected to the second layer of screening by the technical team and only 8244 (33.4%) were found to be at risk of HIV infection and thus offered HIV testing. Of the 8244 clients tested in the double layered screening period, 47.2% were males and 52.8% females.

The clients tested during the single layer were on average younger than their counterparts for the double layer (mean age: 27.0 vs 38.5 years). The married clients contributed the largest percentage of the tested clients with 49.2% and 74.9% for single and double layered screening periods, respectively. Repeat testers were the majority at both periods. More details are given in Table 1.

Table 1. *Distribution of socio-demographic characteristics of the clients.*

	Single layer screening (Jan-Mar 2018) N=2675	**Double layer screening (Apr-Jun 2018) N=8244**
Sex, n (%)		
Male	1511 (56.5)	3887 (47.2)
Female	1164 (43.5)	4357 (52.8)
Age in years, mean (SD)	27.0 (14.1)	38.5 (14.1)
Age categories in years, n (%)		
0-9	179 (6.7)	202 (2.5)
10-19	374 (14.0)	433 (5.3)
20-29	910 (34.0)	1503 (18.2)
30-39	582 (21.8)	2098 (25.5)
40-49	384 (14.4)	2243 (27.2)
≥50	246 (9.2)	1765 (21.4)
Marital status, n (%)		
Never married	1006 (37.6)	838 (10.2)
Married/cohabiting	1317 (49.2)	6172 (74.9)
Divorced/separated	258 (9.6)	600 (7.3)
Widowed	94 (3.5)	634 (7.7)
Frequency of testing, n (%)		
Fist time testers	937 (35.0)	3808 (46.2)
Repeat testers, n (%)	1738 (65.0)	4436 (53.8)

Of the 2675 individuals tested in the single layer, 127 (4.75%, 95% confidence interval, CI: 4.0% - 5.6%) tested HIV positive (yield) and of 8244 individuals tested in the double layer, 1010 (12.25%, 95% CI: 11.6% - 13.0%) tested HIV positive. The yield significantly differed between the two screening periods (4.75% vs 12.25%, $p<0.001$). Figure 2 below shows the increase in yield comparing males and females. The figure indicates that the yield increased from 3.51% to 11.06% ($p<0.001$) and from 6.36% to 13.31% ($p<0.001$) among the males and females, respectively.

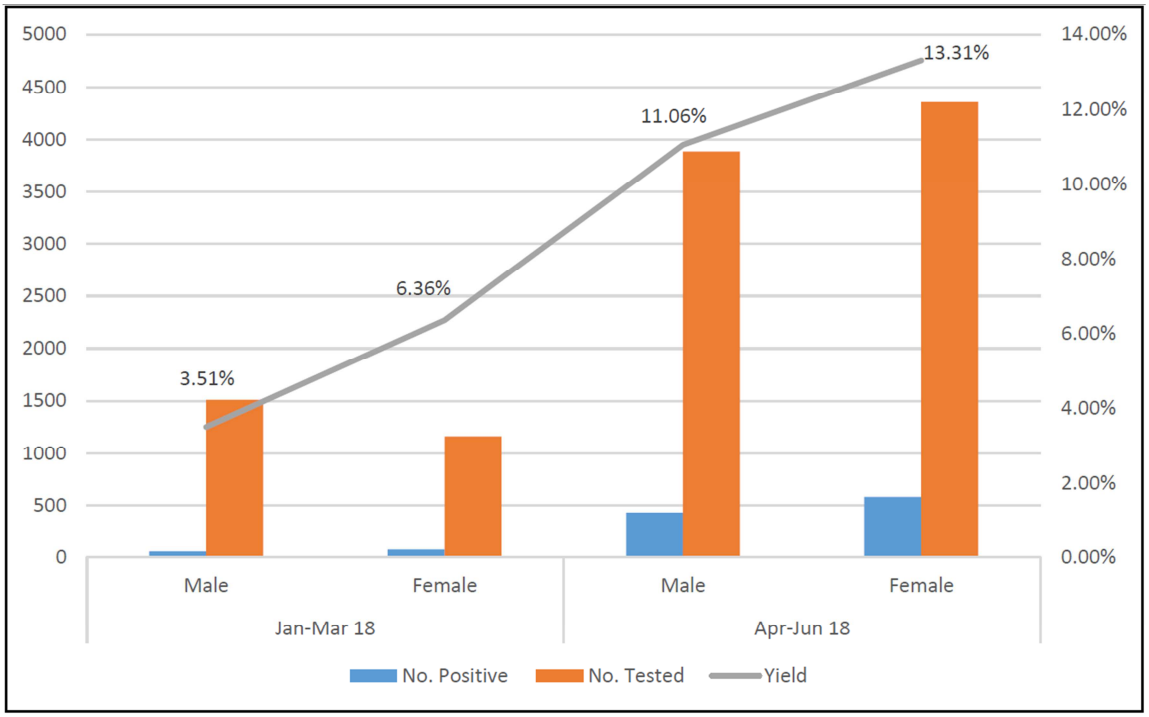

Figure 2. *HIV test yield by sex across the two periods.*

Also, there was a significant increase in yield within each age group: 0-9 years (3.91% to 13.86%, p=0.001); 10-19 years (1.60% to 6.47%, p=0.001); 20-29 years (3.96% to 9.58%, p<0.001); 30-39 years (7.73% to 15.01%, p<0.001); 40-49 years (5.47% to 13.78%, p<0.001) and 50+ years (4.88% to 10.54%, p=0.005). Similarly, the yield significantly increased within each category of marital status: never married (2.78% to 8.71%, p<0.001); married/cohabiting (5.01% to 10.97%, p<0.001); divorced/separated (10.47% to 24.83%, p<0.001); and widowed (6.38% to 17.51%, p=0.006). A significant increase in yield was also noted among the repeat testers (4.66% to 10.60%, p<0.001) and first time testers (4.91% to 14.18%, p<0.001).

The difference in difference (DID) analysis as shown in Table 2 indicated a bigger increase in yield among the males than females (DID=0.60) with an odds ratio (OR) for the interaction between the screening period and sex equal to 1.51 (95% CI: 1.03-2.22, p=0.035). Though, the yield significantly increased within each category of age, marital status and testing experience, the DID analysis by testing for the interaction between the screening period and each of these categories indicated no statistical significance (p>0.05 in each case). Details about the DID analysis are given in Table 2.

Table 2. *DID analysis comparing HIV test yield between single and double layer screening periods by participants demographic characteristics.*

	Single layer yield (%)	**Double layer yield (%)**	**Difference in yield (%)**	**DID**	**Interaction with screening period OR (95% CI)**
Overall	4.75	12.25	7.50		
Sex					
Female	6.36	13.31	6.95	Ref.	Ref.
Male	3.51	11.06	7.55	0.60	1.51 (1.03-2.22)*
Age in years					
0-9	3.91	13.86	9.95	Ref.	Ref.
10-19	1.60	6.47	4.87	-5.08	1.07 (0.31-3.69)
20-29	3.96	9.58	5.62	-4.33	0.65 (0.26-1.65)
30-39	7.73	15.01	7.28	-2.67	0.53 (0.21-1.33)
40-49	5.47	13.78	8.31	-1.64	0.70 (0.27-1.84)
≥50	4.88	10.54	5.66	-4.29	0.58 (0.20-1.65)
Marital status					
Never married	2.78	8.71	5.93	Ref.	Ref.
Married/cohabiting	5.01	10.97	5.96	0.03	0.70 (0.42-1.17)
Divorced/separated	10.47	24.83	14.36	8.43	0.85 (0.45-1.59)
Widowed	6.38	17.51	11.13	5.2	0.93 (0.36-2.44)
Frequency of tests					
Repeat testers	4.66	10.60	5.94	Ref.	Ref.
First time testers	4.91	14.18	9.27	3.33	0.76 (0.51-1.12)

**Significant with p-value=0.035*

4. Discussion

This study shows that double layered screening approach to HIV testing at community level, differentiated based on the sub population needs is able to save huge resources as seen in the April-Jun period when 66.6% of the test kits were saved after the 2nd layer of screening.

We found generally a significant difference in yield between the two screening periods. This observed difference could probably be due to the introduction of the double layered screening, which enabled us to focus on the most at risk individuals in the general population.

We found that the clients screened and tested during the single layer were on average younger than their counterparts for the double layer, this was because the double layered screening focused on adults more at risk of HIV infection with a significant reduction in the proportion of young people tested in the two periods, (table 1). There was an observed increase in HIV yield in each age group with double layered screening, (table 2), with a peak yield at 30-39years, which corresponds to the national trend where HIV prevalence peaked in the age brackets of 30-49years [4]. However, this findings differed from that of Legisso TZ and Erango Ma in Ethiopia where they found highest risk of HIV infection was among clients aged 18-30 years as compared to those aged 30-40 and more than 40 years [8].

When the double layered screening was applied, in the April-Jun period, there was a significant increase in the proportion of those married who received HIV tests as the screening was actively hunting for the clients who are sexually active and at risk of HIV infection. And the HIV test yield significantly increased within each category of marital status, with the highest yield being among the divorced/separated individuals, followed closely by those widowed and maarried (table 2). This finding is similar to that of Legisso TZ and Erango Ma in Ethiopia where they found that divorced and married individuals were 3.033 and 1.031 times respectively, more likely to be HIV positive as compared to single individuals [8], and Kimani J et al in Kenya where they found that those who were divorced/separated/widowed were 4.06times and those married were 1.78 times more likely to be HIV positive than those never married [9]. Similar findings were observed by Adeniyi et al who identified being formerly married (divorced/separated/widowed) as a risk factor to HIV infection compared to being currently married or never married [10] and Adebayo SB et al who showed that HIV prevalence of women that were formerly married (divorced/separated/widowed) were more than double that of those who were currently married/cohabiting with a sexual partner; and more than three times those that were never married [11]. This demonstrates that the divorced/separated individuals and the widowed are a special forgotten category of high risk population who need more attention in order cub the spread of HIV infection in the community.

This study shows that with single layered screening in the Jan-Mar period, majority of clients who were offered HTS were repeat testers (ever tested before). These repeat testers are people who already know their HIV status and they just want to confirm whether the first test they conducted was actually true, thus the low yield in that period. This finding was consistent with the findings of Matovu JKB et al in 2017 where they found that 73.7% of the market vendors who turned up for HIV test were those who had ever tested for HIV [12]. Factors associated with repeat HIV testing varies from place to place and dependent on the study method used. Living with an HIV positive family member/friend and self-reported good health [13], need to confirm HIV diagnosis and belief that the previous test results were false [12], being a man having sex with men (MSM) or injection drug user (IDU) or having multiple sexual partners [14] were among the common factors identified as contributing to repeat tests in South Africa, Uganda and Croatia respectively. However, with the application of the double layered screening, there was a reduction in the proportion of repeat testers, with most of the clients who had turned up to repeat the HIV test before their due dates being turned away to wait to repeat the test either after 3 months for those at high risk of infection or after 12months for those at low risks, and only offering HTS to the repeat testers at substantial risk of HIV infection. As a result of this intervention, there was a significant improvement in yield among the repeat testers and first time testers in the two periods (table 2).

When the HIV yield was compared by sex in the two periods, there was a significant increase in yield between both males and females after the application of the double layered screening, with a difference in difference (DID) analysis indicating a bigger increase in yield among the males than females (DID=0.60) with a significant odds ratio (OR) for the interaction between the screening period and sex as shown in table 2 above. In both periods however, females were at high risk of turning HIV positive, than males and this finding was consistent with that of Legisso TZ and Eranga MA in Ethiopia who found females 5.735times more likely to turn HIV positive as compared to males [8]. The observed bigger increase in test yield in males than in females demonstrates the ability of the double layered screening to pick out men at most risk of HIV infection and offer HTS to them at their convenient time and place. These men were reached through a differentiated service delivery approach, adopted from the new implementation guidelines by the ministry of health [5], where men were reached late in the evening hours at the "*malwa"* drinking joints, homes through index clients tracing and testing, garages, and other places of work such as banks, police stations, construction sites and private security group stations. These strategies used to reach men were able to overcome the barriers to HIV testing by men as identified by Monisha Sharma et al, including confidentiality concerns, distance to the facility, inconvenient hours, perceptions that facilities provide women-centered service, stigma, poverty, and feelings of compromised masculinity associated with seeking health care [15].

4.1. Limitations

The result presented here was for program data and as such, there were so many parameters which were left out during the data capture, for example, occupation and educational level of the clients turning up for HTS. There was no detailed sociodemographic data for those clients who were just screened and not tested.

4.2. Recommendations

Studies to be designed to approximate the point of HIV infections among the widowed and divorced/separated individuals so as to guide policy on HTS among these groups.

Improvement on the HTS tool to capture nature of exposure to HIV, and other socio-economic characteristics of clients.

Adoption of the double layered screening by the community mobilizers and technical team as an effective strategy to maximize HIV test yield in the community.

5. Conclusion

The double layered screening is an effective strategy to maximize HIV test yield in the general population, which if scaled up can save huge resources, time and help focus on actual targets for HIV testing services, leading to early attainment of the UNAIDS 1st target of 90-90-90 by 2020.

Contribution of Authors

All authors listed above have made substantial, direct and intellectual contributions to the work and approved it for publication.

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