

Assessment of the impact of COVID-19 on access of HIV care and Antiretroviral Therapy at selected health facilities in Bushenyi District, Uganda.

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ABSTRACT

There is a great concern about the impact of COVID-19 among the nearly 40 million people living with HIV worldwide. Therefore, purpose of this study was to assess the impact of COVID-19 on access of HIV care and antiretroviral therapy at the selected health facilities in Bushenyi district, Uganda. A retrospective cross-sectional study involving HIV medical records of 377 participants from selected health facilities in Bushenyi district including KIU-TH, Bushenyi HCIV and IAH. Files were selected using simple random sampling from the corresponding health facility. Data was analyzed using SPSS V.23.0. It was found that majority 311(82.5%) of the participants were old patients who were tested and initiated on ART whereas 66(17.5%) were new patients who were tested and initiated on ART. Of the participants who were newly tested and initiated on ART (n=66), majority 40(60.6%) of them were before Covid-19 lockdown while 26(39.4%) of the participants were tested for HIV and initiated on ART during lockdown (P=0.003). Ninety one (24.1%) of the respondents had missed return date scheduled for ART refill (n=377). Of the participants who missed return date for drug refill, more than a half 47(51.6%) missed during lockdown whereas 44(48.4%) missed before lockdown. There was a significant association Covid-19 lockdown and missed return date for ART refill (p<0.001). The researcher concluded that Covid-19 especially lockdown had a significant impact on access to HIV care and antiretroviral therapy uptake by reducing the number of new people who were tested and initiated on ART and missed visits for ARVs refill and recommended government should consider special programs for HIV delivery services like contact tracing for delivery of ARVs to the patients' homes in case of another pandemic requiring lockdown.

Keywords: ART, HIV, Covid-19, Covid-19 lockdown.

INTRODUCTION

The COVID-19 pandemic has posed a great threat to the health of populations worldwide [1,2,3]. Approximately 37.9 million people living with HIV2 are at risk of infection with severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), which causes COVID-19 [4,5,6]. The pandemic of COVID-19 is viewed as a worldwide threat and test for all nations worldwide to contain its spread [7,8]. Efforts and campaigns of prevention, early diagnosis, and medical management are being led by the World Health Organization (WHO) and numerous research teams and clinical experts worldwide [9,10,11]. In addition to the direct health impact of the COVID-19 pandemic itself, there may also be a

detrimental impact on service provision for other health conditions due to increasing demands on overall health service capacity, interruptions to supply of medicines, or funding shortages [12,13]. This may be particularly detrimental for countries in sub-Saharan Africa that suffer from high burdens of other diseases, including HIV, tuberculosis, and malaria [14]. While no pandemic like COVID-19 has occurred in modern history, the Ebola epidemic in Guinea, for example, ultimately led to more deaths from malaria than those directly caused by Ebola, due to a lack of malaria treatment provision [15]. Many have raised the alarm that COVID-19 will undermine global advances towards

HIV epidemic control through disrupting the cascade of care [16]. Indeed, studies show that this pandemic impedes uptake of HIV testing, the critical entry point into HIV treatment and care [17]. Although some international institutions, in collaboration with governments and community partners, are working to sustain HIV service provision for people living with HIV, the COVID-19 pandemic presents several barriers and challenges to the HIV care continuum [18,19]. First, implementation of quarantine, social distancing, and community containment measures have reduced access to routine HIV testing, which challenges completion of UNAIDS' first 90-90-90 target globally, that 90% of all people living with HIV will know their HIV status. HIV testing is the vital first step towards initiation into the HIV care continuum [20].

Even with availability of HIV self-testing kits in some areas, testing remains a big challenge in settings with scarce access to these kits and therefore, increased efforts are needed to augment access and to facilitate testing [21]. Second, timely linkage to HIV care could be hindered during the COVID-19 pandemic [20]. People living with HIV who should have initiated antiretroviral therapy (ART) in hospital might be deterred or delayed because hospitals are busy treating patients with COVID-19 [22]. Furthermore, because many public health authorities globally are focused on COVID-19 control, allocation of resources for HIV care could be diminished, and circumstances surrounding the HIV care continuum could worsen [23]. Third, the COVID-19 pandemic might also hinder ART continuation since hospital visits were

Problem statement

While the world struggles to contain the COVID-19 pandemic, millions of people are living with chronic conditions, such as HIV, that require continuous care [8]. Studies have determined several factors rendering HIV clinic access more difficult, such as significant reductions in mobility

Aim of the Study

To assess the impact of COVID-19 on access of HIV care and antiretroviral

also restricted because of implementation of city lockdowns or traffic controls [24]. Beyond their increased risk for complications resulting from COVID-19, HIV patients are affected by the COVID-19 crisis in a myriad of other ways. For example, HIV patients are likely to experience treatment interruptions due to restrictions on non-emergency medical appointments related to physical distancing requirements [25,26]. As healthcare facilities re-open and resume normal daily operations, HIV patients face the risk of exposure to COVID-19 when attending medical appointments [27]. Given the high rates of mental health issues (e.g., anxiety and depression) that exist among this population, HIV patients are particularly vulnerable to the effects of isolation resulting from restricted mobility associated with the pandemic [27,28].

Uganda has made notable gains towards UNAIDS Fast Track targets, but the COVID-19 pandemic threatens to undermine Uganda's progress by exacerbating existing barriers to HIV testing [29,30]. Interruptions to supply chains for antiretroviral therapy (ART) for people living with HIV remains an additional possibility, which may have had a substantial effect on health outcomes for HIV patients in sub-Saharan Africa [31,32]. Interruptions to different elements of the HIV treatment and prevention cascades are likely to have differential impacts on the resulting loss of health and it will be useful for decision-makers to understand the relative impact of different reductions in service to inform planning for service continuity during the COVID-19 pandemic [33,34].

due to Uganda's COVID-19 lockdown and curfew [12]. There have been mixed responses regarding perceived increased exposure to COVID-19 at HIV clinics, with some clients fearing potential infection on the way to the clinic or while waiting to receive HIV care [35].

therapy at the selected health facilities in Bushenyi district, Uganda.

METHODOLOGY

Study design

A retrospective study approach with utilization of qualitative and quantitative data was conducted to assess the impact of COVID 19 on HIV care and

antiretroviral therapy uptake as per patients' medical records at selected ART clinics in Bushenyi District.

Study Site

This study was conducted in Bushenyi District at 3 selected health facilities i.e Bushenyi Health Centre IV ART clinic, Kampala International University Teaching Hospital ART clinic and Ishaka Adventist hospital. Bushenyi District which is found in South Western Uganda bordered by Rubirizi District to the northwest, Buhweju District to the northeast, Sheema District to the East, Mitooma District to the south and Rukungiri District to the west. Bushenyi Health Centre IV located 64 miles alongside Mbarara-kasese road in Bushenyi town. Bushenyi Health Centre IV is a government health facility offering general medical care on in-patient and out-patient levels, Maternal- Child Health Care services and Family planning services, Dental health clinic and HIV/AIDS care services. It has administration offices, Out-patient department, Accident and emergency ward, Surgical ward, Medical ward, Laboratory, Pediatrics ward, Dental department, ART Clinic, etc. The study area was chosen by the researcher because of easy geographical accessibility and accessibility coupled with turnover of patient services offered include, Antenatal care, Pediatric services, Accident and emergency care, Nutrition, ART clinic. Kampala International

University Teaching Hospital is Uganda's first and largest private teaching hospital with a laboratory that includes serology, pathology, microbiology, histology, and hematology sub-departments. It has wards/departments for children, surgery, medicine, obstetrics and gynecology, and psychiatry. It also houses an A&E department, an Intensive Care Unit, dentistry, orthopedic, ENT, Radiology and HIV/CHAI clinic. It is located along Mbarara - Kasese road in Ishaka division, Bushenyi- Ishaka municipality Bushenyi district. Ishaka Adventist hospital is a mission hospital located in Ishaka town and operated by the Seventh-day Adventist Church. It has the following departments and wards; Male ward, female ward, maternity ward, maternal and child health department, radiology department, dental care department, laboratory department, lifestyle and wellness centre and HIV clinic.

The study area was chosen by the researcher because of easy geographical accessibility and accessibility coupled with turnover of patient services offered include, Antenatal care, Pediatric services, Accident and emergency care, Nutrition, ART clinic at the same time as the facilities offering Covid-19 testing and treatment services which is being comparable in the case.

Study population

The study was conducted as a review of HIV patients' medical records of one year before COVID-19 outbreak (March 2019 to February, 2020) and one year during COVID-19 pandemic lockdown (April 2020 to March 2021) at Bushenyi HCIV, KIU-Teaching Hospital, Ishaka Adventist Hospital in Bushenyi District. The three

facilities have a total of 18342 HIV patients on ART with IAH having majority of the patients (14480), followed by Bushenyi HCIV (2913) and KIU-TH having the least number (949) (unpublished medical records from IAH, Bushenyi HCIV and KIU-TH, 2022).

Inclusion criteria

It included HIV patients' medical records of one year before Covid-19 pandemic (2019) and one year into the pandemic

(2020) at selected health facilities, in Bushenyi District that were available at the time of collecting data.

Exclusion criteria

Medical records of patients without updated information were excluded.

Sample size determination

Since this population, was defined and pre-determined (finite), the process of determining the sample size was simplified by using the table and formula developed by [14] seen in the appendices.

According to Krejcie & Morgan, a

Ishaka Adventist Hospital: $(14480/18342)*100=78.9\%$

Participants recruited = $(78.9/100)*377=297.453\approx 297$

Bushenyi HCIV: $(2913/18342)*100=15.9\%$

Participants recruited = $(15.9/100)*377=59.943\approx 60$

population of 18342 requires a representative sample of 377 participants. A sample size of 377 health workers was therefore adequate for this study.

The sample size as distributed amongst the three health facilities as follows;

Kampala International University-Teaching Hospital: $(949/18342)*100=5.2\%$

Krejcie and Morgan

$$n = \frac{\chi^2 Np(1-p)}{e^2 (N-1) + \chi^2 p(1-p)}$$

- n = sample size
- N = population size
- e = acceptable sampling error
- χ^2 = chi-square of degree of freedom 1 and confidence 95% = 3.841
- p = proportion of population (if unknown, 0.5)

Participants recruited = $(5.2/100)*377= 19.604\approx 20$

Sampling procedure

Simple random sampling technique assessed in the study, from where data was used to select the files to be was collected.

Dependent variables.

HIV care and ART uptake.

Independent variable.

COVID-19 pandemic.

Data Management

Data collection method and tools

Data was collected from medical records using a data collection Pro-forma as adopted as per WHO Patient monitoring

guidelines for HIV care and antiretroviral therapy (ART) as attached.

Data entry and cleaning

The data in the data collection Pro-forma was checked for completeness, cleaned and sorted to eliminate obvious

inaccuracies and omissions. The data was then coded and entered into a computer.

Data analysis

The qualitative data collected was statistically analyzed and documented

using Microsoft Excel and Word version 2019 which was then be analyzed using

SPSS v.23. The analyzed data was presented in form of tables that were a basis for discussion and conclusion among others. Descriptive analysis was used to obtain percentages and

frequencies of independent and dependent variables while a chi square was run to obtain association between independent and dependent variables.

Ethical considerations

Consent

Approval from the institutional ethics and research committee of KIU-WC was obtained before conducting the study.

Permission from the selected health facility administration was also obtained before conducting this study.

Privacy protection

The participants' names were not included while collecting of data to

maintain privacy from medical records.

Confidentiality

It was clearly communicated that the information obtained from medical

records would be kept under lock and key to only be used for research purposes.

RESULTS

Table 1: Socio-demographic characteristics of the participants (n=377)

Variable	Category	Frequency	Percentage	Mean	SD
Gender	Male	175	46.4	1.54	±0.50
	Female	202	53.6		
Age	≤12 years	29	7.7	2.99	±0.97
	13-19 years	89	23.6		
	20-30 yeas	114	30.2		
	>30 year	145	38.5		
Marital status	Married	278	73.7	1.26	±0.44
	Single	99	26.3		
Occupation	Peasant	173	45.9	2.32	±1.63
	Bar attendant	80	21.2		
	Bodaboda	44	11.7		
	Business	26	6.9		
	Civil servant	20	5.3		
	Others	34	9.0		

In this study, the majority 202(53.6%) of the participants were females whereas 175(46.4%) of the participants were males. Similarly, majority 145(38.5%) of the participants were over 30 years while 29(7.7%) of the participants were ≤12 years and the mean was 2.99±0.97. Nearly three quarters 278(73.7%) of the

participants were married whereas 99(26.3%) of the participants were married. Nearly a half of the respondents were peasants whereas only 20(5.3%) of the respondents were business persons and as shown in table 1 above.

Table 2: Association between socio-demographic characteristics of the participants with old and newly tested patients and initiated on ART (n=377)

Variable	Category	Persons tested for HIV and initiated on ART		Mean	SD	OR	P-value
		Old	New				
Gender	Male	150(48.2%)	25(37.9%)	1.29	±0.46	2.37	0.124
	Female	161(51.8%)	41(62.1%)	1.20	±0.40		
Age	≤12 years	23(7.4%)	6(9.1%)	1.07	±0.26	0.30	0.961
	13-19 years	74(23.8%)	15(22.7%)	1.24	±0.43		
	20-30 years	95(30.5%)	19(28.8%)	1.32	±0.47		
	>30 year	119(38.3%)	26(39.4%)	1.23	±0.42		
Marital status	Married	231(74.3%)	47(71.2%)	1.26	±0.44	0.26	0.610
	Single	80(25.7%)	19(28.8%)	1.20	±0.40		
Occupation	Peasant	151(48.6%)	22(33.3%)	1.18	±0.39	11.38	0.044
	Bar attendant	57(18.3%)	23(34.8%)	1.23	±0.42		
	Bod boda	39(12.5%)	5(7.6%)	1.50	±0.51		
	Business	22(7.1%)	4(6.1%)	1.31	±0.47		
	Civil servant	15(4.8%)	5(7.6%)	1.55	±0.51		
	Others	27(8.7%)	7(10.6%)	1.06	±0.24		

It was found a significant association between occupation and persons tested HIV patients and initiated on ART (p=0.044). It was found that majority 23(34.8%) of the new HIV patients

enrolled on ART were Bar attendants whereas the minority 4(6.1%) were business persons (n=66) as indicated in table 2 above.

Table 3: Association between socio-demographic characteristics of the participants with missed visits for ART refill

Variable	Category	Missed visits for ART refill		Mean	SD	OR	p-value
		Yes	No				
Gender	Male	23(25.3%)	152(53.1%)	1.87	±0.34	22.46	<0.001
	Female	68(74.7%)	134(46.9%)	1.66	±0.47		
Age	≤12 years	14(15.4%)	15(5.2%)	1.52	±0.51	14.82	0.002
	13-19 years	22(24.2%)	67(23.4%)	1.75	±0.43		
	20-30 years	32(35.2%)	82(28.7%)	1.72	±0.45		
	>30 year	23(25.2%)	122(42.7%)	1.84	±0.37		
Marital status	Married	62(68.1%)	216(75.5%)	1.78	0.42	1.90	0.169
	Single	29(31.9%)	70(24.5%)	1.71	0.46		
Occupation	Peasant	26(28.6%)	147(51.4%)	1.85	±0.36	23.37	<0.001
	Bar attendant	29(31.9%)	51(17.8%)	1.64	±0.48		
	Bodaboda	10(10.9%)	34(11.9%)	1.77	±0.42		
	Business	5(5.5%)	21(7.3%)	1.81	±0.40		
	Civil servant	5(5.5%)	15(5.2%)	1.75	±0.44		
	Others	16(17.6%)	18(6.4%)	1.53	±0.51		

It was revealed that gender (p<0.001), age (p=0.002) and occupation were significantly associated with missed visits for ART refill. It was found that majority 68(74.7%) of the participants who missed visits for ART refill were females compared to 23(25.3%) who were men. Similarly, majority 32(35.2%) of the

participants who missed visits for ART refill were aged 20-30 years compared to 14(15.4%) who were ≤12 years. Also majority of the participants who missed visits for ART refill were bar attendants compared 5(5.5%) of the participants who were business men and civil servants respectively as indicated in table 3 above.

Table 4: Number of HIV new and old persons tested and enrolled on ART before and during Covid-19 lockdown

Variable	Category	Time of HIV test and ART initiation		OR	P-value
		Before	During		
Old or newly tested for HIV and initiated on ART during lockdown	Old	245(78.8%)	66(21.2%)	8.98 Ref	0.003*
	New	40(60.6%)	26(39.4%)		

It was found that majority 311(82.5%) of the participants were old patients who were tested and initiated on ART whereas 66(17.5%) were new patients who were tested and initiated on ART. Of the participants who were newly tested and initiated on ART (n=66), majority 40(60.6%) of them were before Covid-19

lockdown while 26(39.4%) of the participants were tested for HIV and initiated on ART during lockdown. There was a significant association between Covid-19 lockdown and new tested and initiated patients on ART (P=0.003) as shown in table 4 above.

Table 5: Number of HIV patients who missed return date for drug refill before and during Covid-19 lockdown.

Variable	Category	Time of HIV test and ART initiation		OR	p-value
		Before	During		
Missed return date	Yes	44(48.4%)	47(51.6%)	44.00 Ref	<0.001*
	No	241(84.3%)	45(15.7%)		

According to the study findings, 91(24.1%) of the respondents had missed return date scheduled for ARTs refill (n=377). Of the participants who missed return date for drug refill, more than a half 47(51.6%) missed during lockdown

whereas 44(48.4%) missed before lockdown. There was a significant association Covid-19 lockdown and missed return date for ART refill (p<0.001) as indicated in table 5 above.

DISCUSSION

Socio-demographic characteristics of the participants

The impact of the COVID-19 pandemic is far reaching, with devastating effects on individuals, communities, and societies across the world [35,36]. There is great concern about the impact of COVID-19 among the nearly 40 million people living with HIV worldwide [37]. Therefore, we conducted this study to assess the impact of Covid-19 lockdown on HIV testing and ART uptake. In this study, the majority 202(53.6%) of the participants were females; majority 145 (38.5%) of the participants were over 30 years while 29(7.7%) of the participants were less aged ≤12 years; nearly three quarters 278(73.7%) of the participants were married; nearly a half of the respondents were peasants whereas only 20(5.3%) of the respondents were business persons. There was a significant association

between occupation and newly tested HIV patients and initiated on ART (p=0.044) whereby majority 23(34.8%) of the new HIV patients enrolled on ART were Bar attendants while the minority 4(6.1%) were business persons [38].

It was revealed that gender (p<0.001), age (p=0.002) and occupation were significantly associated with missed visits for ART refill. Majority 68(74.7%) of the participants who missed visits for ART refill were females compared to 23(25.3%) who were men. Similarly, majority 32(35.2%) of the participants who missed visits for ART refill were aged 20-30 years compared to 14(15.4%) who were <12 years. Also majority of the participants who missed visits for ART refill were bar attendants compared 5(5.5%) of the

participants who were business men and
Number of new HIV persons tested and enrolled on ART before and during Covid-19 lockdown

In order to attain the 90-90-90 target regarding HIV prevention, one of ways put forward was routine HIV testing and immediate initiation of ART in case one is found positive. In this study majority 311(82.5%) of the participants were old patients who were tested and initiated on ART whereas 66(17.5%) were new patients who were tested and initiated on ART. Of the participants who were newly tested and initiated on ART (n=66), majority 40(60.6%) of them were tested before Covid-19 lockdown while 26(39.4%) of the participants were tested for HIV and initiated on ART during lockdown. There was a significant association between Covid-19 lockdown and new tested and initiated patients on ART (P=0.003). This could have been due to the hampered transport means that were imposed during lockdown making accessibility of HIV testing had. This finding was congruent with Pollard et al who found that even with availability of HIV self-testing kits in some areas, testing remains a big challenge in settings with scarce access to these kits and therefore, increased efforts are needed to augment

Number of HIV patients who missed return date for drug refill before and during Covid-19 lockdown

According to the study findings, 91(24.1%) of the respondents had missed return date scheduled for ART refill (n=377). Of the participants who missed return date for drug refill, more than a half 47(51.6%) missed during lockdown whereas 44(48.4%) missed before lockdown. There was a significant association Covid-19 lockdown and missed return date for ART refill (p<0.001). This could have been due to intentional dodging since patients on ART feared contracting Corona virus, hampered transport means or limited availability of drugs since most effort was

Basing on the study findings, the researcher concluded that Covid-19 especially lockdown had a significant impact on access to HIV care and

civil servants respectively.

enrolled on ART before and during Covid-19 lockdown

access and to facilitate testing [38,39]. Second, timely linkage to HIV care could be hindered during the COVID-19 pandemic [40,41,42]. In addition to the direct health impact of the COVID-19 pandemic itself, there may also be a detrimental impact on service provision for other health conditions due to increasing demands on overall health service capacity, interruptions to supply of medicines, or funding shortages [20]. The finding was in agreement with Bond et al whose cross-sectional study of TB and HIV professionals in low and middle-income countries between May 12 and August 6, 2020, noted that over 40% of respondents stated that it was either impossible or much harder for HIV patients to reach healthcare facilities since COVID-19. The most common barriers reported to affect patients were: fear of getting infected with SARS-CoV-2, transport disruptions and movement restrictions. 37% and 28% of responses about HIV stated that healthcare provider access to facilities was also severely impacted [18].

centered on management of the Covid-19 pandemic. This was in line with Lagat et al who argued that the COVID-19 pandemic might also hinder ART continuation since hospital visits were also restricted because of implementation of city lockdowns or traffic control [22]. The finding was in agreement with [23] whose study that explored the impact of disruptions on HIV outcomes in South Africa, Malawi, Zimbabwe, and Uganda determined that the most important determinant of HIV-related mortality is an interruption to antiretroviral treatment (ART) supply.

CONCLUSION

antiretroviral therapy uptake by reducing the number of new people who were tested and initiated on ART and missed visits for ART refill.

RECOMMENDATION

The researcher therefore recommended that the government should consider special programs for HIV delivery services like contact tracing for delivery of ART to

the patients' homes in case of another pandemic requiring lockdown.

REFERENCES

1. Barasa, E., Kazungu, J., Orangi, S., Kabia, E., Ogero, M., & Kasera, K. (2021). Indirect health effects of the COVID-19 pandemic in Kenya: a mixed methods assessment. 4, 1-16.
2. Bond, V., Id, M. S. K., Id, S. R., Fatima, K., Isani, A. K., Sutherland, J., & Kranzer, K. (2021). Mitigating the impact of COVID-19 on tuberculosis and HIV services: A cross-sectional survey of 669 health professionals in 64 low and middle-income countries. 1-12.
3. Bursa, D., Balayan, T., Begovac, J., Matulionyte, R., Mulabdic, V., Nagit, A., Papadopoulos, A., & Stefanovic, M. (2020). International Journal of Infectious Diseases Short Communication HIV care in times of the COVID-19 crisis — Where are we now in Central and Eastern Europe? 96, 311-314.
4. Deng, D. (2021). Psychological Impact of COVID-19 Pandemic on Frontline Health Workers in Low-and Middle-Income Countries.
5. Echoru, I., Ajambo, P. D., Keirania, E., & Bukenya, E. E. M. (2021). Sociodemographic factors associated with acceptance of COVID-19 vaccine and clinical trials in Uganda: a cross-sectional study in western Uganda. 1-8.
6. Fiolet, T., Guihur, A., Rebeaud, M. E., Mulot, M., Peiffer-smadja, N., & Mahamat-saleh, Y. (2020). Effect of hydroxychloroquine with or without azithromycin on the mortality of coronavirus disease 2019 (COVID-19) patients: a systematic review and meta-analysis. *Clinical Microbiology and Infection*, 2019(xxxx).<https://doi.org/10.1016/j.cmi.2020.08.022>
7. Furtado, R. H. M., Berwanger, O., Fonseca, H. A., Ferraz, L. R., Lapa, M. G., Zampieri, F. G., Veiga, V. C., Azevedo, L. C. P., Rosa, R. G., Lopes, R. D., Avezum, A., Manoel, A. L. O., Piza, F. M. T., Martins, P. A., Lisboa, T. C., Pereira, A. J., Olivato, G. B., Dantas, V. C. S., Milan, E. P., ... Cavalcanti, A. B. (2020). Articles Azithromycin in addition to standard of care versus standard of care alone in the treatment of patients admitted to the hospital with severe COVID-19 in Brazil (COALITION II): a randomised clinical trial. *Coalition I*.
8. Namwokoyi D. (2023). Evaluation of Factors that Influence High Morbidity Rate in Pregnant women Attending Antenatal Care at Kampala International University-Teaching Hospital (KIUTH), Bushenyi. *INOSR Experimental Sciences* 11 (1), 99-111.
9. Shabohurira A. (2023). Incidence of Intestinal Helminthes among HIV Patients at Kampala International University Teaching Hospital, Uganda. *INOSR Experimental Sciences* 11 (1), 87-98.
10. Nakyazze P.C. (2023). Knowledge, Attitude and Practices about Prevention of Transmission Hepatitis B Virus among Nursing Students on ward placement at KIU? Teaching Hospital. *IAA Journal of Applied Sciences* 9 (1), 1-16
11. Byaruhanga, I., A Tamale, S Asingwire (2022). Intentional Behaviors that Affect Utilization of Family Planning Services among HIV-Positive Women Attending Antiretroviral Therapy Clinics in Bushenyi District- Uganda. *INOSR Experimental Sciences* 10 (1), 61-85
12. Charles, K ., F Yerine, T Leevan, A Ubarnel, O Maxwell, B Asanairi, (2022). Prevalence, Factors Associated and Susceptibility Profile of Group B Streptococcus

- Anogenital Colonization among Third Trimester Antenatal Mothers at Kampala International. *INOSR Experimental Sciences* 9 (1), 33-47.
13. Petrus, B., E Nzabandora, E Agwu (2022). Evaluation of the bacterial agents associated with PID among women of reproductive age at Kampala International University Teaching Hospital. *IDOSR Journal of Biochemistry, Biotechnology and Allied Fields* 7 (1), 64-74.
 14. Hussein, O. A., M Joy, JN Musiime (2022). Factors associated with Immediate Adverse Maternal Outcomes among Referred Women in Labor attending Kampala International University Teaching Hospital. *IAA Journal of Applied Sciences* 8 (1), 117-125.
 15. Gabbidon, K., Hanson, P., & Holyfield, C. (2020). The Impact of COVID-19 on HIV Treatment and Research: A Call to Action.
 16. Gbinigie, K., & Frie, K. (2020). Should azithromycin be used to treat COVID-19? A rapid review. 1-8. <https://doi.org/10.3399/bjgpopen20X101094>
 17. Hogan, A. B., Jewell, B. L., Sherrard-smith, E., Vesga, J. F., Watson, O. J., Whittaker, C., Hamlet, A., Smith, J. A., Cattarino, L., Cooper, L. V, Coupland, H., Cuomo-dannenburg, G., Dighe, A., Djaafara, B. A., Donnelly, C. A., Eaton, J. W., Vollmer, M. A. C., Walters, C. E., Wang, H., ... Hallett, T. B. (2020). Articles Potential impact of the COVID-19 pandemic on HIV, tuberculosis, and malaria in low-income and middle-income countries: a modelling study. *The Lancet Global Health*, 20, 1-10.
 18. Jewell, B. L., Smith, J. A., & Hallett, T. B. (2020). E Clinical Medicine Understanding the impact of interruptions to HIV services during the COVID-19 pandemic: A modelling study. *E Clinical Medicine*, 26, 100483.
 19. Jiang, H., Zhou, Y., & Tang, W. (2020). Maintaining HIV care during the COVID-19 pandemic. *January*, 19-21.
 20. Kamel, F. O. (2021). Beliefs and barriers associated with COVID-19 vaccination among the general population in Saudi Arabia. 1-8.
 21. Keene, C., Mohr-Holland, E., Cassidy, T., Scott, V., Nelson, A., Furin, J., & Triviño-Duran, L. (2020). How COVID-19 could benefit tuberculosis and HIV services in South Africa. *January*.
 22. Lagat, H., Sharma, M., Kariithi, E., Otieno, G., Katz, D., Masyuko, S., Mugambi, M., Wamuti, B., Weiner, B., & Farquhar, C. (2020). Impact of the COVID - 19 Pandemic on HIV Testing and Assisted Partner Notification Services, Western Kenya. *AIDS and Behavior*, 24(11), 3010-3013.
 23. Lesko, C. R., & Bengtson, A. M. (2021). Data-Driven Commentary HIV and COVID-19: Intersecting Epidemics With Many Unknowns. *190(1)*, 10-16.
 24. Lesosky, M., & Myer, L. (2020). Comment Modelling the impact of COVID-19 on HIV. *The Lancet HIV*, 2(20), 19-20.
 25. Linnemayr, S., Jennings, L., Wilson, M., Saya, U., Wagner, Z., Maccarthy, S., Walukaga, S., Nakubulwa, S., & Karamagi, Y. (2021). HIV Care Experiences During the COVID - 19 Pandemic: Mixed - Methods Telephone Interviews with Clinic - Enrolled HIV - Infected Adults in Uganda. *AIDS and Behavior*, 25(1), 28-39.
 26. Machingaidze, S., & Wiysonge, C. S. (2021). Understanding COVID-19 vaccine hesitancy. *Nature Medicine*, 27(August), 1338-1339.
 27. Malik, A. A., Mcfadden, S. M., Elharake, J., & Omer, S. B. (2020). EClinicalMedicine Determinants of COVID-19 vaccine acceptance in the US. *E Clinical Medicine*, 26, 100495.
 28. Mbithi, I., Thekkur, P., Chakaya, J. M., Onyango, E., Owiti, P., Njeri, N. C., Kumar, A. M. V, Satyanarayana, S., Shewade, H. D., Khogali, M.,

- Zachariah, R., Rusen, I. D., Berger, S. D., & Harries, A. D. (2021). Assessing the Real-Time Impact of COVID-19 on TB and HIV Services: The Experience and Response from Selected Health Facilities in Nairobi, Kenya.
29. Mhango, M., Chitungo, I., & Dzinamarira, T. (2020). NOTES FROM THE FIELD COVID - 19 Lockdowns: Impact on Facility - Based HIV Testing and the Case for the Scaling Up of Home - Based Testing Services in Sub - Saharan Africa. *AIDS and Behavior*, 24(11), 3014-3016.
30. Nachega, J. B., Kapata, N., Samagudu, N. A., Decloedt, E. H., Katoto, P. D. M. C., Nagu, T., Mwaba, P., Yeboah-manu, D., Chanda-kapata, P., Ntoumi, F., Geng, E. H., & Zumla, A. (2021). International Journal of Infectious Diseases Minimizing the impact of the triple burden of COVID-19, tuberculosis and HIV on health services in sub-Saharan Africa. *International Journal of Infectious Diseases*,
31. Nagendra, G., Carnevale, C., Neu, N., Cohall, A., & Zucker, J. (2020). The Potential Impact and Availability of Sexual Health Services During the COVID-19 Pandemic. 47(7), 434-436.
32. Olum, R., & Bongomin, F. (2020). Coronavirus Disease-2019: Knowledge, Attitude, and Practices of Health Care Workers at Makerere University Teaching Hospitals, .. 8(April), 1-9.
33. Pollard, R., Gopinath, U., Reddy, Y. A., Kumar, B. R., Mugundu, P., Vasudevan, C. K., Srikrishnan, A. K., Singh, A., Mcfall, A. M., Mayer, K. H., Mehta, S. H., & Solomon, S. S. (2021). RESEARCH ARTICLE HIV service delivery in the time of COVID-19: focus group discussions with key populations in India. 24, 59-66.
34. Ponticello, M., Mwanga, J., Patricia, A., Gabriel, T., Rachel, N., & Sundararajan, R. (2020). "Everything is a Mess ": How COVID - 19 is Impacting Engagement with HIV Testing Services in Rural Southwestern Uganda. *AIDS and Behavior*, 24(11), 3006-3009.
35. Prabhu, S., Poongulali, S., & Kumarasamy, N. (2020). Impact of COVID-19 on people with HIV: A Review. *Journal of Virus Eradication*,
36. Saied, S. M., Saied, E. M., & Kabbash, I. A. (2021). Vaccine hesitancy: Beliefs and barriers associated with COVID - 19 vaccination among Egyptian medical students. 19(February), 4280-4291.
37. Shamshirian, A., Hessami, A., Heydari, K., & Alizadeh-navaei, R. (2020). The Role of Hydroxychloroquine in the Age of COVID-19: A Periodic Systematic Review and Meta-Analysis The Role of Hydroxychloroquine in the Age of COVID-19: A Periodic Systematic Review and Meta-Analysis. 0-24.
38. Shekhar, R., Sheikh, A. B., Upadhyay, S., Singh, M., & Kottewar, S. (2021). COVID-19 Vaccine Acceptance among Health Care Workers in the United States. 1-15.
39. Simões, D., Stengaard, A. R., Combs, L., Raben, D., & Eurotest, T. (2020). Impact of the COVID-19 pandemic on testing services for HIV, viral hepatitis and sexually transmitted infections in the WHO European Region, March to August 2020. *Eurosurveillance*, 25(47).
40. Stover, J., Chagoma, N., Taramusi, I., Teng, Y., Glaubius, R., & Mahiane, G. (2020). Estimation of the Potential Impact of COVID-19 Responses on the HIV Epidemic: Analysis using the Goals Model. 1-8.
41. Viswanath, K., Bekalu, M., Dhawan, D., Pinnamaneni, R., Lang, J., & Mcloud, R. (2021). Individual and social determinants of COVID-19 vaccine uptake. 1-10.

<http://www.inosr.net/inosr-scientific-research/>

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INOSR Scientific Research 9(1):1-12, 2023.

42. Wong, L. P., Alias, H., Wong, P., Lee, H. Y., & Abubakar, S. (2020). The use of the health belief model to assess predictors of intent to receive the COVID-19 vaccine and willingness to pay. Human

Vaccines & Immunotherapeutics, 16(9), 2204-2214.