

The Chronic Diseases Clinic of Ifakara (CDCI) and the Kilombero and Ulanga Antiretroviral Cohort Study (KIULARCO) at the St. Francis Referral Hospital

Annual Report 2022

A collaboration between

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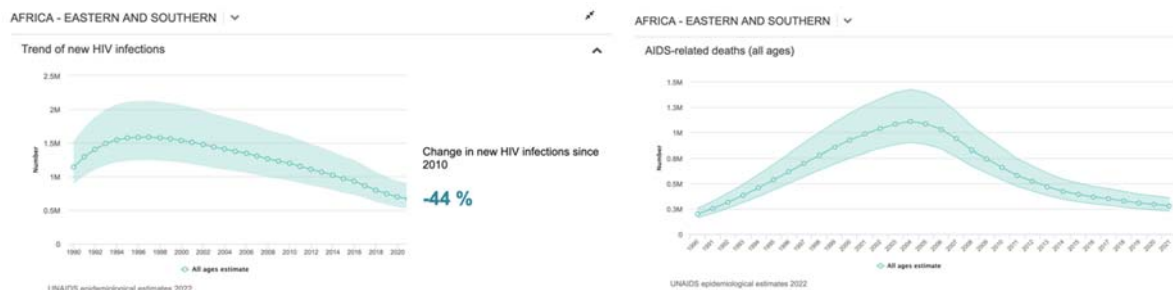
INDEX

I SUMMARY	2
HIGHLIGHTS AND ACHIEVEMENTS OF 2022AT CDCI	3
II PATIENT NUMBERS	5
HIV TESTING AT SFRH 2022	5
PATIENT ENROLMENT AT THE CDCI	6
<i>Numbers from the National AIDS Control Database (NACP) 1.1. - 31.12.2022</i>	6
<i>Numbers from KIULARCO (openMRS) until December 31st, 2022</i>	6
III STAFF OF THE CDCI	8
IV INFRASTRUCTURE	8
IV ORGANIZATION OF THE CLINIC	9
CLINICAL ACTIVITIES	9
<i>HIV testing & counselling services</i>	9
<i>Medical care</i>	9
<i>Pharmacy</i>	10
<i>Reducing attrition and improving Retention in care</i>	10
<i>CDCI activities within SFRH Wards</i>	11
<i>Integration of HIV and Tuberculosis Activities</i>	11
<i>Integration of the CDCI with the antenatal and under-five clinic of SFRH</i>	11
<i>Integration of Malnutrition Services</i>	11
<i>Cervical Cancer Screening</i>	12
<i>Community Activities</i>	12
<i>Care for HIV infected children and adolescent with care givers within the Kilombero District</i>	12
LABORATORY ACTIVITIES	13
<i>Monitoring of HIV-Therapy and Screening and Diagnosis of Opportunistic Infections</i>	13
<i>Hub for Viral load Testing</i>	13
<i>Early Infant Diagnosis</i>	13
<i>Quality management system</i>	13
<i>Bacterial cultures</i>	13
V RESEARCH ACTIVITIES	14
RESEARCH AREAS	14
DATA MANAGEMENT AND STATISTICAL ANALYSES	14
RUNNING TRIALS	14
PUBLICATIONS	15
CONFERENCES	15
VI TRAINING ACTIVITIES	16
VII COLLABORATIONS/IMPORTANT VISITS	16
VII FUNDING SITUATION/BUDGET	17
YEARLY BUDGET	17
VIII CONCLUSIONS	18

I Summary

Despite huge successes of global HIV programs Eastern and Southern Africa continue to have the highest burden

of new HIV infections worldwide - 670,000 out of 1.5 millions globally in 2020 (UNAIDS report 2022). Treatment coverage rates reaches 87%, leading to a persistent high mortality accounting for almost half of all HIV-associated deaths worldwide (280,000 deaths in 2021).



According to the UNAIDS report 2022, in Tanzania, the HIV/AIDS incidence has further decreased to 0.96/1,000 (54,000 new infections in 2021). The number of AIDS-related deaths has halved since 2010, but remains unacceptably high with 29,000 people who died of AIDS. The treatment cascade according to the 95%-95%-95% targets of the UNAIDS currently is: 88% of people know their HIV status (1st 95); 97% are in care (2nd 95) and 97% are virally suppressed (3rd 95).

Since 2005 the Chronic Diseases Clinic of Ifakara (CDCI) is uninterruptedly delivering services to patients as the Care and Treatment Center (CTC) of the St. Francis Referral Hospital (SFRH) in Ifakara, Morogoro. Established as joint project of the Swiss Tropical and Public Health Institute, the Ifakara Health Institute, the SFRH and the University Hospital Basel, the CDCI focuses on HIV testing, enrolment into care and same day start of antiretroviral treatment ('test and treat'). CDCI provides care for in-and outpatients with an HIV- and or tuberculosis infection according to the Tanzanian guidelines, collaborating closely with local implementing partners of national HIV programs, district and national governmental authorities. The current viral suppression rate at the CDCI is 88% in adults (*D. Mnzava, BM ID 2022 in press*). The IHI laboratory functions as a referral hub in viral load and early infant PCR testing for the 4 surrounding districts in the Kilombero valley.

The Kilombero and Ulanga Antiretroviral Cohort (KIULARCO) including consenting patients attending the CDCI, continues to be an important source of information on treatment outcomes and comorbidities. KIULARCO has become one of the biggest cohorts in rural sub-Saharan Africa with a follow-up of up to 17 years and contains demographic, clinical information and storage of blood samples. Above 12,400 patients have been enrolled - 3'688 are under active care. The third pillar of CDCI remains training and capacity building of young medical doctors, nurses, laboratory scientists and epidemiologists.

Highlights and achievements of 2022at CDCI

Clinic

- Dr. Ezekiel Luoga has taken over the position of head of the CDCI from Dr. Robert Ndege. Dr. Bernard Kivuma is the new deputy and Dr. Lilian Moshi has taken the lead of the One Stop Clinic.
- The CDCI has been piloting the implementation of CD4 visitect point of care testing for the National AIDS Control Program
- Participation to HIV Project ECHO connecting all CTC's in Tanzania with weekly tele mentoring meetings and continuous education (leading center: Bugando Medical Center, Mwanza)
- Close partnership with the newly implemented Heart and Lung Clinic and Intermediate Care Project at the SFRH

Training

- Dr. Robert Ndege has started his PhD program in epidemiology at the University of Basel, Switzerland
- Dr. Ezekiel Luoga is finalizing his online Master program in Public Health with Suffolk University
- Dr. Elizabeth Senkoro is on her second year of the Mark Wainberg Fellowship (IAS) within the "Experts in HIV service delivery" program (Kampala, London)
- Dr. Getrude Mollel is in the 2nd year of specialization in Pediatrics at the Muhimbili University Hospital
- Dr. Herieth Wilson has started a Master in Public Health at the University of Dublin, Dublin, Ireland
- Mrs Olivia Kitau has started a Master in Public Health at Limerick University, Ireland
- Mrs Amina Nyuri is in the 2nd year of her master in public health at the Nelson Mandela African Institution of Science and Technology (NM-AIST)
- Mrs Leila Samson is in the 2nd year of her master in public health at the Nelson Mandela African Institution of Science and Technology (NM-AIST)

Research/Meetings

- EACS summer school, Bordeaux, France: participation of Dr. Bernard Kivuma and Dr. Elizabeth Senkoro
- National HIV Symposium organized by TACAIDS: Dr. Bernard Kivuma presented the Stig2health Study on the World AIDS Day 2022 in Lindi, Tanzania
- Successful completion of the CoArtha trial
- Successful extension of GIVE MOVE trial to other 3 more sites in Tanzania
- Successful start of the TB CAPT EXULTANT trial
- Successful start of the Sauti ya vijana Project in adolescents with HIV
- Successful start of the Heart and Lung Disease Clinic at St Francis Referral Hospital, as a partnering project of CDCI through a grant from the Else Kröner Fresenius Foundation



II Patient Numbers

HIV Testing at SFRH 2022

Table 1 and Figure 1 - 2 show HIV test results at the SFRH from January to December 2022 in routine care. Table 1 shows overall numbers and percentages, Figure 2 shows monthly testing numbers according to sex and total positives per month and Figure 3 shows the total positive according to sex.

	Total	Male	Female
Tested	8977	3816	5161
Positive	252	92	160
Percentage	2.81	2.41	3.1

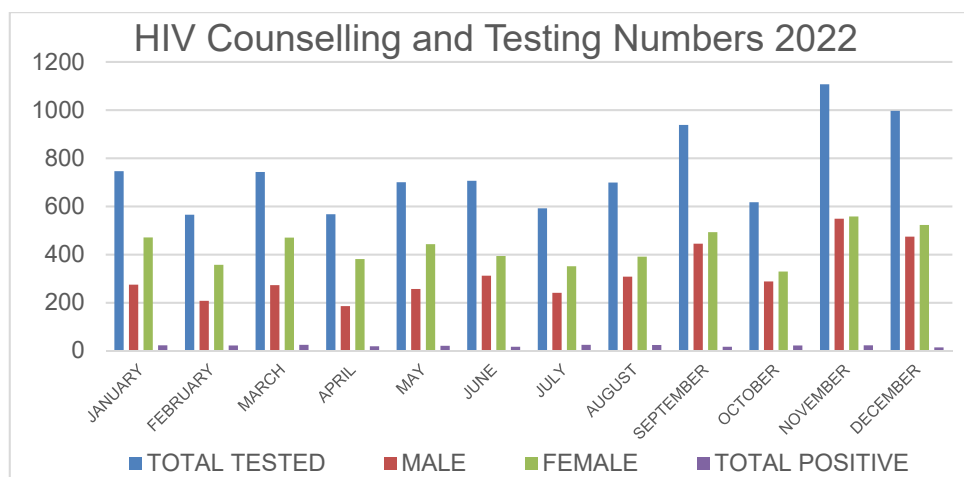


Figure 1 Testing numbers from voluntary counselling and testing (VCT) as well as provider (PITC) initiated testing and counselling services.

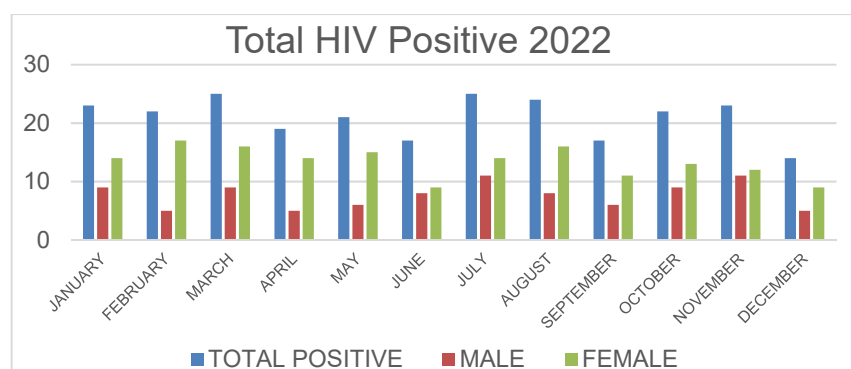


Figure 2 Total number of patients that tested HIV Positive according to sex

Patient enrolment at the CDCI

Numbers from the National AIDS Control Database (NACP) 1.1. - 31.12.2022

Table 2 shows overall patient numbers with a documented HIV infection seen at SFRH

	Adult (≥15-year-old)		Children (<15-year-old)		Total
	Female	Male	Female	Male	
Cumulative number of persons enrolled, n	6968	3767	542	555	
Total, n	10737		1,097		11833
Cumulative number of persons on ART, n	6331	3188	488	517	
Total, n	9519		1005		10525

Numbers from KIULARCO (openMRS) until December 31st, 2022

Figure 4 shows the number of patients enrolled yearly into KIULARCO 2022

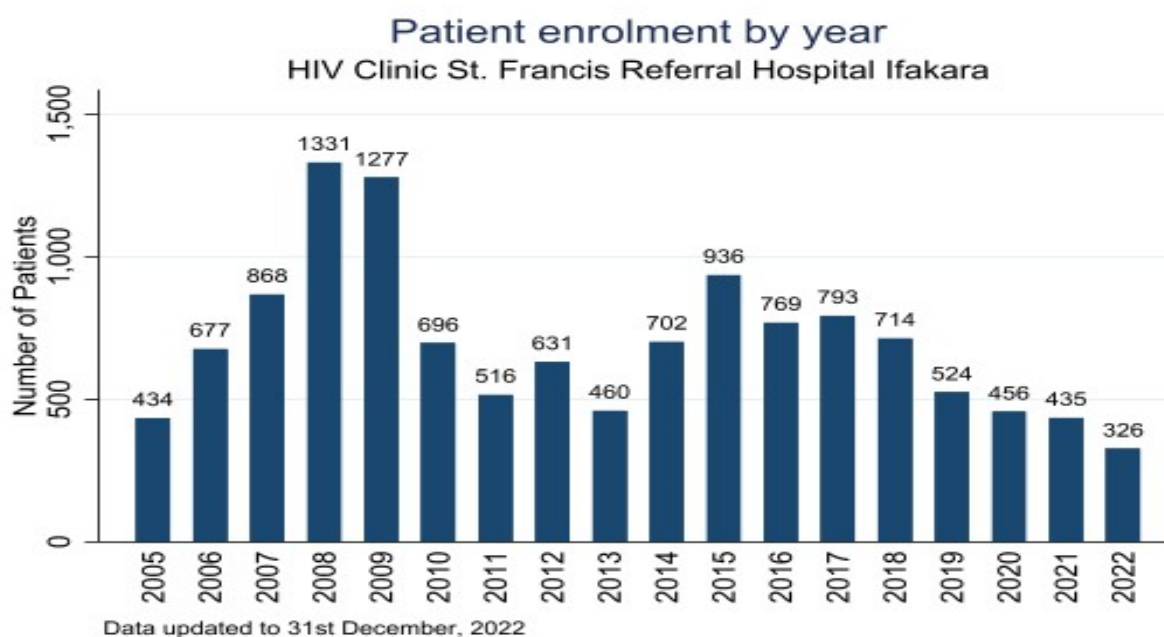


Table 3 Details of patients enrolled according to the KIULARCO (OpenMRS) database (until 31.12.2022)

KIULARCO monthly report for January- December, 2022 for database updated upto 12/31/2022																			
Characteristics	Cumulative 2005-2022	January, 2022			February, 2022			March, 2022			April, 2022			May, 2022			June, 2022		
		All	Female	Male	All	Female	Male	All	Female	Male	All	Female	Male	All	Female	Male	All	Female	Male
Newly enrolled patients*	326	25	13	12	23	16	7	22	12	10	26	16	10	26	17	9	20	11	9
Total enrolled patients	12411																		
On active follow-up	3688	25	13	12	22	15	7	21	12	9	24	16	10	25	17	8	20	11	9
Died	1195	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0
Lost to follow-up	5541	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer out	1987	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Age at enrolment																			
0 - 9	913	2	0	2	2	1	1	0	0	0	2	0	2	0	0	0	0	0	0
10 - 19	452	4	2	2	1	1	0	0	0	0	0	0	0	0	0	0	2	2	0
20 - 49	9323	13	7	6	18	14	4	19	10	9	17	13	4	17	12	5	12	8	4
50 and Above	1827	6	4	2	2	0	2	3	2	1	7	3	4	9	5	4	6	1	5
Pregnancy status at enrolment																			
No	7368	12	12	0	12	12	0	10	10	0	12	12	0	15	15	0	7	7	0
Yes	542	1	1	0	4	4	0	2	2	0	4	4	0	2	2	0	4	4	0
ART information																			
Started ART	8103	15	10	5	11	9	2	14	8	6	17	14	3	14	11	3	14	8	6
Started ART in other clinics	1709	5	2	3	6	3	3	3	2	1	6	2	4	6	2	4	3	1	2
Never started ART	1965	5	1	4	6	4	2	5	2	3	3	0	3	6	4	2	3	1	2
All enrolled patients																			
Follow-up visits*																			
Cumulative number of visits	269390	1399	993	406	1463	1038	425	1542	1073	469	1208	853	355	1273	902	371	1147	818	329
Patients on ART and on active follow-up**	3742	4312	2928	1369	4269	2899	1355	4232	2876	1341	4192	2854	1323	4166	2837	1314	4131	2812	1304

*New enrolment of a specific year (its from January -December 31, 2022). *Number of visit includes visits for transit patients too, transit patients are patients who are registered in other HIV clinics but they can come to our HIV clinic either for ART drug refill or when they are sick and they need clinical consultation. **In each month this is cumulative number from 2005.

Characteristics	Cumulative 2005-2022	July, 2022			August, 2022			September, 2022			October, 2022			November, 2022			December, 2022		
		All	Female	Male	All	Female	Male	All	Female	Male	All	Female	Male	All	Female	Male	All	Female	Male
Newly enrolled patients*	326	31	18	13	27	20	7	30	21	9	30	16	14	44	21	23	22	14	8
Total enrolled patients	12411																		
On active follow-up	3688	30	17	13	23	16	7	28	20	8	29	15	14	44	21	23	22	14	8
Died	1195	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Lost to follow-up	5541	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer out	1987	1	1	0	4	4	0	2	1	1	0	0	0	0	0	0	0	4	0
Age at enrolment																			
0 - 9	913	2	0	2	0	0	0	1	1	0	2	1	1	2	1	1	1	0	1
10 - 19	452	2	1	1	2	1	1	2	2	0	0	0	0	1	0	1	0	0	0
20 - 49	9323	18	13	5	17	14	3	25	17	8	21	14	7	28	15	13	15	11	4
50 and Above	1827	9	4	5	8	5	3	2	1	1	7	1	6	13	5	8	6	3	3
Pregnancy status at enrolment																			
No	7368	12	12	0	19	19	0	17	17	0	13	13	0	21	21	0	13	13	0
Yes	542	6	6	0	1	1	0	4	4	0	3	3	0	0	0	0	1	1	0
ART information																			
Started ART	8103	21	15	6	21	17	4	21	15	6	15	8	7	15	6	9	12	9	3
Started ART in other clinics	1709	3	2	1	3	2	1	4	3	1	11	7	4	10	4	6	3	2	1
Never started ART	1965	7	1	6	3	1	2	5	3	2	4	1	3	19	11	8	7	3	4
All enrolled patients																			
Follow-up visits*																			
Cumulative number of visits	269390	1275	891	384	1405	1012	393	1416	986	430	1312	950	362	1595	1129	466	995	693	302
Patients on ART and on active follow-up**	3742	4091	2784	1292	4061	2764	1282	4018	2742	1261	3980	2712	1253	3932	2674	1243	3742	2565	1162

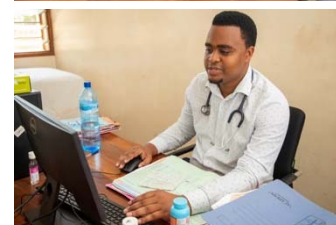
*New enrolment of a specific year (its from January -December 7th, 2022). *Number of visit includes visits for transit patients too, transit patients are patients who are registered in other HIV clinics but they can come to our HIV clinic either for ART drug refill or when they are sick and they need clinical consultation. **In each month this is cumulative number from 2005.



III Staff of the CDCI

Fifty-four local staff members are employed at the CDCI by five different organizations, namely: IHI/Swiss TPH (24), IHI/USB (2), SFRH (5), USAID AFYA YAGU/BENJAMIN MKAPA FOUNDATION (13), and 10 staff members through research projects. The CDCI team is currently composed of 6 medical doctors, 3 clinical officers, 7 nurses, 5 counselors, 3 auxiliary nurses, 1 nutritionist, 2 pharmacists, 2 statisticians, 7 data clerks, 4 biologists, 1 lab technician, and 6 auxiliary staff. This year we had changes in the research team due to more training opportunities, while the rest of the team has been quite stable over the last years, allowing to enhance established and sustainable structures.

The head of the clinic since 01.07.2022 is Dr. Ezekiel Luoga, deputy head is Dr. Bernard Kivuma. Dr. Lilian Moshi heads the One Stop Clinic since august 2022. Dr. Francisca Chuwa and since February this year Dr. Petro Sabuni have the function of the clinical coordinator. Prof. Dr. Maja Weisser (Infectious Disease specialist from the University Hospital Basel, Switzerland, headed CDCI 2016-17) continues to support the CDCI as the clinical research coordinator.



Staff Changes January to December 2022

Departures	New Staff
<ul style="list-style-type: none"> - Dr. Herieth Wilson, master training - Dr. Jacqueline Nkouabi, master training - Dr. Francisca Chuwa, private reasons - Olivia Kitau, master training - Geoffrey Mbunda, Intermediate Care project - Dr. Robert Ndege for PHD - Dr. Cecilia Ligogo, new position in other institution 	<ul style="list-style-type: none"> - Dr. Petro Sabuni, MD (CDCI) - Dr. Namsifueli Ley - Lulu Wilson (Statistician) - Elizabeth Dotto (data officer)

IV Infrastructure

The CDCI is located in the rear area of the outpatient department (OPD) renovated by the Swiss Agency for Development and Cooperation (SDC) in 2017. In close proximity but in a separate building are rooms for tuberculosis outpatients to separate them from the waiting area for HIV-positive patients to prevent TB transmission. Also close, on the other side of the street is the One Stop Clinic located in the Reproductive and Child Health Clinic (RCH) of SFRH and the Heart and Lung Clinic. An HIV testing room is located within the normal OPD to ensure confidentiality and prevent stigmatization.



The CDCI has reception room, a triage room, 2 testing and counseling rooms, 6 clinician's offices, a blood withdrawal room, 3 drug dispensing rooms (1 CDCI, 1 OSC, 1 TB), a trial/infusion room, a data and server room, a meeting hall, toilets for patients and staff. The One Stop Clinic, an integrated service clinic for HIV-affected families is located within the Reproductive and Child Health Clinic (RCH) of SFRH. The pharmacy has an additional storage room within the general pharmacy of the SFRH to fulfill storage requirements and to link to the electronic drug management system (eLMIS) of the hospital for accountability and ordering of antiretroviral drugs from the governmental Medical Stores Department (MSD). The laboratory activities are located within the Ifakara Health Institute laboratory (ISO 9001: 2015 certified), in close proximity to the hospital.

Despite the CDCI has been generously built, and rooms a spacious, the number of rooms is limited to accommodate the increasing number of projects and activities.

IV Organization of the Clinic

Clinical Activities

HIV testing & counselling services

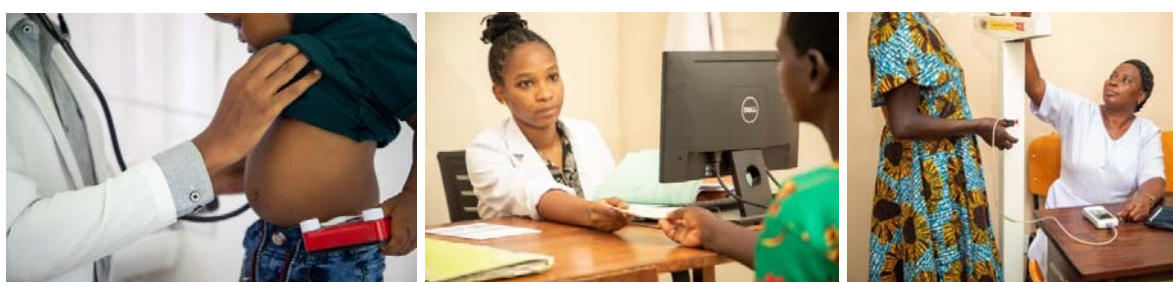
Three trained counselors (2 for adult patients, 1 for paediatric patients and families) are in charge of voluntary counselling and testing (VCT), provider-initiated testing and counselling (PITC) and index testing according to national guidelines. They are supported by volunteers and/or intern students who attend the clinic for 3-6 months at a time. Since 2019, Optimized Provider Initiated Testing and Counselling (PITC) services has been implemented to improve effectiveness of PITC, pre-selecting those to be tested by a questionnaire.

Testing numbers are registered and reported weekly to hospital staff and district authorities. Of equal important is the counselling done either in groups or individual sessions according to the situation. They are provided before/after testing, before/after treatment initiation and any time later in case of adherence problems, high viral load or patient needs. Besides professional counsellors 2 HIV-positive trained lay counsellors support patients with their experience individually or in group sessions.

Medical care

Upon confirmation of a new HIV infection patients are counselled by a professional and an HIV-positive lay counsellor on how to cope with the new condition. An educational video addressing medical facts but also experiences from HIV-positive patients from the Ifakara setting is shown to patients with the aim to reduce stigmatization from the very beginning. The patient then receives a laboratory examination, including screening of sexually transmitted diseases, hepatitis B, tuberculosis and cryptococcal infection according to national guidelines and is seen by a clinician the same or the next day. Antiretroviral treatment is started immediately, if

no contraindication exists. All patient data is collected through standardized electronic questionnaire (Open Medical Record System, www.openmrs.org) for clinical purposes but also as the database of KIULARCO for patients who consented to participate in the cohort. At the same time, we contribute to the NACP database with patient data that are collected through paper forms and transferred to the digital system by two data clerks. After successful enrolment in care, patients are followed up monthly or more frequently if needed, until they are virologically suppressed and medically stable. At patients' request and upon clinical judgments, patient care can be transferred to a care and treatment center closer to the patients' home. Monitoring of treatment response in stable patients is done yearly by CD4 cell count and viral load as well as safety laboratory. In case of suspected treatment failure, patients are switched from 1st to 2nd line. Currently resistance testing is done in case of confirmed failure on 2nd line ART through the MoH. A breakdown has put the Sanger Sequencing Device out of service since 2020. With the start of the NGS platform, we expect to soon re-start resistance testing at the IHI laboratory in Bagamoyo.



Pharmacy

Antiretroviral drugs provided by the governmental Medical Stores Department through the support of International Partners are ordered through an electronic system according to patient consumption (eLMIS) and dispensed by two pharmacists and a nurse. Current first-line treatment for adults is the dolutegravir-based regimen combined with Lamivudine/Tenofovir disoproxil in a single pill and for children dolutegravir combined with Lamivudine/Abacavir for those with weight less than 30kg. In 2022 we had drug shortages during 4 months (July to October 2022) for some of the drugs resulting in shortening drug refill times to monthly for both adults and children.

Reducing attrition and improving Retention in care

Stigma remains a big challenge and a frequent cause of loss to follow-up. We have implemented activities to reduce stigma, notably above-mentioned lay counselling, locally made video for newly diagnosed patients, in which PLHIV talk about their experience, and group therapy during waiting times provided by HIV-positive lay counsellors. A nested research project (Stig2health) will assess the impact on retention in care. Routinely, patients are called within 1 week of a missed visit to ensure their visit attendance. If patients cannot be reached, a network of 15 volunteers funded by USAID Boresha Afya tracks patients at their home, in collaboration with a data clerk from our team. Since implementation of routine viral load testing, we also track patients with a positive viral load results for enhanced adherence counselling sessions, retesting and if needed, switch to second-line treatment.

CDCI has also implemented different service delivery models aimed at decongestion of the clinic, reduce the amount of time spent by the patient at the clinic as well as the clinician's daily workload.

CDCI activities within SFRH Wards

Hospitalized patients with a HIV and/or TB infection are seen by a designated doctor from the CDCI, who takes care of these patients doing daily ward rounds. Once a week a grand round is conducted under the supervision of the Head of CDCI or another senior physician.



Integration of HIV and Tuberculosis Activities

According to the National Tuberculosis and Leprosy Program (NTLP) patients are screened for tuberculosis at routine clinical encounters, and upon clinical suspicion investigated with chest x-ray and real-time PCR (Xpert MTB/RIF). In addition, ultrasound is used for the assessment of extrapulmonary tuberculosis (EPTB) using the eFASH protocol (extended focused assessment with Sonography for HIV-associated tuberculosis). Currently, hospitalized HIV-positive patients are included in the multi-site TB CAPT EXULTANT trial, aiming to improve diagnosis of tuberculosis in this patient population by integrating novel diagnostic tests into the routine workup. We also work in close collaboration with the Heart and Lung Clinic to manage patients with Post-Tuberculosis Disease lung complications - e.g., chronic aspergillosis and those with other chronic heart and/or lung diseases.

Integration of the CDCI with the antenatal and under-five clinic of SFRH

The 'One Stop Clinic' was implemented 2013 (initially financed through a Merck for Mothers grant) as the care and treatment center for families affected by HIV. Located in the Reproductive and Child Health Clinic (RCH) of SFRH, HIV-infected pregnant women, HIV-exposed and HIV-positive children and their families find all needed services under one roof. The team consists of two medical doctors, one clinical officer, a counsellor, a nurse and a receptionist. Besides clinical care the One Stop Clinic functions as a referral clinic for early infant diagnosis and HIV care at the Kilombero district. The One Stop Clinic offers capacity building programs in care for children living with HIV and HIV exposed children to health care workers in the district, offers outreach events and this year, has started to offer teen clubs for adolescents on Saturdays in collaboration with UNAIDS Afya yangu.



Integration of Malnutrition Services

In 2016 the CDCI has started an implementation project for care of undernourished HIV-positive and negative children. Since then, nutritional education for caregivers, family members and healthcare workers are offered within routine care together with nutritional support for infants. The nutritionist works in close collaboration with the hospital nursing staff and clinicians.

Cervical Cancer Screening

Cervical cancer is the leading cause of morbidity and mortality in Tanzania women (NACP 2019), and women living with HIV are at higher risk. Following NACP recommendations, Cervical Cancer Screening is integrated in the routine care and offered once yearly. The Cervical cancer prevention (CECAP) service at SFRH is run by the CDCI (2 nurses) in collaboration with the gynecology department (1 assistant medical officer) and is located in the Reproductive and Child Health Clinic (RCH). This year an MCT-accredited training with gynecologists from Switzerland and SFRH was offered for participants from all over Tanzania. Furthermore, clinical research on improvement of diagnostics using PCR-based tests is ongoing. Two community-based screening events have been organized and have attracted a high number of participants.

Community Activities

For the World AIDS day, this year the CDCI collaborated with the local government, the National Aids Control Programme, the St. Francis Referral Hospital (SFRH) and the Ifakara Health Institute (Ifakara) to set up a community event in Ifakara council with the objective of increasing awareness of HIV disease, the availability, quality and sustainability of services for HIV treatment, testing, and prevention, reform laws, policies and practices to tackle stigma and exclusion faced by people living with HIV. Also, the aim was to help the community to adopt the “Equalize” message to reduce and eliminate inequalities PLHIV face.

We organized a workshop for adolescents who are living with HIV (3rd of December 2022) to give them the opportunity to talk about HIV, receive training and counseling on how to cope, stop, and/or act on stigma from friends, family, co-workers as well as the community.



Care for HIV infected children and adolescent with care givers within the Kilombero District

After a break in community activities due to the COVID-19 pandemics, this year we could take up the community events. Additionally, we were selected by the USAIDS Afya Yangu (implementing partner) to be the mentor champions for the whole Kilombero and Ulanga districts. We managed to perform three outreach events in the Kilombero district in collaboration with Afya yangu. The primary aim was to conduct specialized outreach services for children and adolescents living with HIV, mentorship to the health care providers, and counseling and adherence support to adolescent and care givers via teen clubs and Saturday clinics. During these outreaches we attended 110 children and adolescents, together with their care givers and healthcare providers from the respective facility. We provided specialized HIV services and supportive supervision for healthcare workers with anticipated outcome of eliminating new pediatric infection, stigma, increase viral suppression, expand the yield of HIV testing and reach pediatric population. For the long run of these activities, we are working in collaboration with District Medical Authorities, national AIDS Implementers in TZ (USAID Afya Yangu).

Laboratory activities

Monitoring of HIV-Therapy and Screening and Diagnosis of Opportunistic Infections

Laboratory screening and monitoring is done as per National AIDS Control guidelines. At baseline it consists of full blood and CD4 counts, creatinine, transaminases, screening for syphilis (VDRL), chest X ray, chronic Hepatitis B (HBsAg) and cryptococcal antigen test in patients with a CD4 cell count of <150/ul. In patients with symptoms of tuberculosis, an Xpert TB/RIF in sputum is performed and an eFASH sonography is performed. Stool is analyzed for parasites if clinically indicated. Follow-up examinations in stable patients are done once yearly (safety lab, CD4 cell count and newly HIV Viral Load). We have implemented as a pilot clinic for the National AIDS Control Program the CD4 Visitect as a point of care CD4 triaging test differentiating between >200 and <200 CD4 cells. While this was successful, the provision of reagents for regular CD4 testing was very poor this year with frequent stockouts.



Hub for Viral load Testing

IHI laboratory continues to be the hub for viral load testing for Kilombero, Malinyi and Ulanga Districts. Results are electronically transmitted to NACP. Moving from a central lab to the district has reduced the turnaround time for results from 59 days to 20 days. Besides the direct impact on health of patients (timely switch to an effective treatment in case of failure), the risk of transmission is reduced. Additionally, HIV resistance testing is done in patients with persistently positive viral load or clinical failure.



Early Infant Diagnosis

DNA PCR assays for early infant diagnosis have been routinely implemented at IHI lab with a 2 weeks turnaround time. We are working towards on becoming a hub for EID same as for viral load to improve services for patients living in remote parts of the area.

Quality management system

The Quality Management System according to ISO 15189:2012 for clinical laboratory testing, and specifically full blood count, creatinine, ALAT, CD4, HIV Viral load and Xpert MTB/Rif put in place 2021, has this year been reviewed and approved by SADICAS and IHI.

Bacterial cultures

With the acquisition of an automated system for blood culture and bacterial identification & antimicrobial susceptibility testing (BD Bactec + BD Phoenix), the laboratory team started implementing bacterial culture in clinical specimens, which we could occasionally perform. The lab is currently building internal capacity.

V Research activities

Research Areas

Projects nested within the ongoing Kilombero and Ulanga Antiretroviral Cohort (KIULARCO) allow to tackle and answer questions regarding treatment outcome, retention in care, co-infections and other comorbidities. The aim of research is to improve patient services by improved knowledge and inform national authorities and impact guidelines. Moreover, the research activities provide a unique opportunity for capacity building and career development of the local staff. Central topics are:

Treatment outcome in people living with HIV/AIDS	<ul style="list-style-type: none"> • Virologic outcome and resistance development • Adherence/Loss to Follow up
Comorbidities	<ul style="list-style-type: none"> • Non-communicable diseases such as arterial hypertension, cervical cancer • TB-HIV co-infection/sonography in TB
Maternal and Child health in HIV	<ul style="list-style-type: none"> • Mother-to-child transmission • HIV infection in children and adolescents

Data management and Statistical Analyses

The Clinical Statistics and data Management Group from Swiss TPH (PD Dr. Tracy Glass, Fiona Vanobberghen, James Okuma) support the local data team (Lulu Wilson, Elizabeth Dotto) in the data management and mostly statistical supervision of research projects. James Okuma regularly visits Ifakara to support research projects and database management on site. Jerome Lwali from IdEaE Network in Morogoro supports the clinic in ICT aspects and amending the medical record system (openMRS).

Running Trials

Research projects are done in close collaboration with researchers from IHI, Swiss TPH and the University Hospital in Basel. Moreover, we participated in the National Acquired HIV Drug Resistance survey.

In addition, we also seek international South-North and South-South collaborations for clinical trials. In 2022, several interventional studies were running:

- **Identifying most effective Treatment Strategies to control Arterial Hypertension in sub-Saharan Africa (CoArtha):** This SNSF-funded randomized 3-arm trial compares 3 different drug regimens for patients with uncomplicated arterial hypertension in CDCI and SFRH, Ifakara and Mokhotlong, Lesotho (funded by the Swiss National Science Foundation). Recruitment and follow-up were completed in October 2022, the data analysis started (PI: H. Mapesi, M. Weisser).
- **Genotype-Informed Versus Empiric Management Of VirEmia (Give Move):** In this BOTNAR-funded randomized controlled trial, we assess the role of resistance testing in pediatric HIV patients with a first high Viral load compared to standard of care treatment. Overall, PI is Mrs Jennifer Brown, local PI is Dr. Ezekiel Luoga. Recruiting sites are the One stop Clinic, Ifakara and different sites in Lesotho in collaboration with Solidarmed, Lesotho. Due to slow recruitment following several COVID-related lockdowns three new sites in Dar es Salaam could be added in 2022. Recruitment has been closed; follow-up is ongoing until mid 2023.
- **Sauti ya Vijana (SYV):** A NIH-sponsored mental health intervention to improve HIV outcomes in Tanzanian

youths. This is a collaborative project together with three other sites in different regions of Tanzania including KCMC Moshi, Baylor Mbeya and Baylor Mwanza Tanzania; utilizing peer counselling to improve treatment outcomes among adolescents living with HIV. PI for Ifakara is Dr. Getrude Mollel. The study has been launched in October 2022. Within a pilot study 16 participants were included and completed this first phase in December 2022. The full intervention is planned to commence on Mid-January 2023

- **TB CAPT EXULTANT:** a multisite study in Tanzania (Mbeya and Ifakara) and Mozambique aiming to improve TB diagnosis in hospitalized patients with HIV under the lead of FIND and IS Global, sponsored by the EDCTP. The study started in November 2022 after some delay in obtaining TMDA approval and is currently recruiting patients.

These trials aim at improvement of care in rural sites, but also offer training options and career building.



Data from KIULARCO were presented in national and international conferences:

Publications

See list in the appendix

Conferences

MUHAS-NCD conference, 14-15th July 2022 in Arusha, Tanzania

- **Viral suppression among adolescents living with HIV in rural Tanzania** (poster; GJ Mollel)

Intervention and clinical Trial Department Meeting, Ifakara Health Institute 26-27.9.2022, Morogoro

- **Communicable Diseases:** The Ifakara Clinic Platform (M. Weisser); Update from the KIULARCO Cohort (E. Luoga); GIVE MOVE Study (E. Luoga); Sauti ya Vijana (G. Mollel, remote); Next generation Sequencing for HIV (A. Ntamatungiro); eFASH Study (M. Rohacek); EXULTANT Study (F. Chuwa, remote)
- **Non-communicable Diseases:** Heart and Lung Clinic and Cohort (A. Katende), Peripartum Cardiomyopathy (E. Mahundi), Anemia Study (D. Mnzava), Lung Sonography Study (V. Urio), CoArTHA Study (J. Nkouabi)

National HIV Symposium TACAIDS on the World AIDS Day (01.11.2022) in Lindi, Tanzania

- **Stig2health: An intervention to improve linkage to care** (oral presentation; B. Kivuma)

24th International Workshop on HIV & Hepatitis Observational Databases (IWHOD), 24-26.4.2022 Seville, ES

- **Advanced HIV disease and mortality among children in rural Tanzania: results from 15 years of KIULARCO** (oral presentation, James Okuma)

VI Training activities

The first working hour every day is reserved for education and training of staff including clinical case presentations, state of the art lectures on HIV and associated diseases, interdisciplinary discussion on patients with HIV sequencing results and journal club. Sessions are coordinated by a team member on a rotational basis, contributing to a continuous medical education and fostering clinical discussion among the team.

Ongoing

- Dr Getrude J Mollel is in the 2^o year of pediatric specialization at the Muhimbili University of Health and Allied Sciences.
- Dr. Elizabeth Senkoro started the second year of her Fellowship in HIV/AIDS Care with the International AIDS Society in London
- Miss Aneth Vedastus, statistician continued her PhD program under CARTA.
- Dr. Ezekiel Luoga is finalizing his online Master program in Public Health from the University of Suffolk.
- Leila Samson (counsellor) and Amina Nyuri (lab scientist) are finalizing their Master in Public Health under IHI together with the Nelson Mandela African Institution of Science and Technology (NM-AIST) in Bagamoyo.
- Dr. Herry Mapesi has completed his PhD program through Swiss Government Excellence Scholarship for foreign scholars and artists (ESKAS).
- Alex Ntamatingiro is finalizing his PhD program under CARTA.
- Dr. Robert Ndege has started his PhD program in epidemiology at the University of Basel, Switzerland
- Dr. Herieth Wilson has started a Master in Public Health at the University of Dublin, Dublin, Ireland
- Mrs Olivia Kitau has started a Master in Public Health at Limerick University, Ireland
- Miss Farida Bani has started her online Bachelor of science in food, nutrition, and diet training at the Open University of Tanzania.

From abroad, we had two civil servants (Mr Florent Héritier and Mr Bedran Topyürek) who have just graduated from the Medical Faculty at the University of Basel, Switzerland and have started their rotation at the CDCI. Mrs Johanna Oehri, an MD from Switzerland has spent several months in Ifakara for a project on lung sonography.

VII Collaborations/Important Visits

January 21 st – 26 th 2022	Dr. Marcus Aschwanden and Dr Andrej Isaak visited Ifakara for the training in vascular sonography
May 2 nd – 6 th 2022	PD Tracy Glass & Mrs Fiona Vanobberghen from Swiss TPH visited CDCI for the KIULARCO collaboration
June 2 nd – 3 rd 2022	Adam Penn Nicholson (FIND) and Dr. Alberto Garcia-Basteiro (IS Global) visited CDCI for the opening of the TB CAPT EXULTANT trial
August 29 th - September 6 th 2022	Prof. Albert Urwyler, Fabian Fiechter visited for the implementation of the Intermediate Care unit and the first course in Intermediate Care

September 6 th -9 th 2022	A delegation from Swiss TPH and IHI visited the collaborative projects in Ifakara, Bagamoyo and Dar es Salaam for strategical discussions: Prof. Juerg Utzinger, director Swiss TPH, Prof. Christian Lengeler, country responsible at Swiss TPH, Dr. Werner Kuebler, CEO of the University Hospital Basel, CH, Prof. Manuel Battegay, head of Division of Infectious Diseases and Hospital Epidemiology at USB, Prof Daniel Paris, Head of Project, Medical Director, Swiss TPH, Mrs Christine Fankhauser, PA of Prof. D. Paris.
September 19 th – 30 th 2022	Prof. Daniel Paris in Ifakara for visit and exchange regarding collaborative projects; CDCI, OSC, HLDC, ER, IMC and clinical activities. Dr. Ida Fuglistaler visited SFRH for surgical setup and laparoscopic surgery training (Dr Fadhili and Dr Nyamtema)
October 3 rd – 7 th 2022	Unexpected visit NIMR for KIULARCO and CoArTHA projects (Dr. Otilia Flavian Gwelle, Dr. Elisha Osati, John Stephen Kunda)
October 10 th -14 th 2022	Prof. Albert Urwyler, Fabian Fiechter and Sarah Funk visited for the second course in Intermediate Care
October 17 th – 21 st 2022	Prof. Beat Kaufmann and Dr. Thilo Burkard (cardiology University Hospital Basel) visited for a training course in echocardiography (Heart & Lung Clinic). Dr. André Kind, Dr. Sina Kern (USB), Dr B. Frey (Kantonsspital BL), PD Dr. Andreas Kaufman (Charité Berlin) visited for colposcopy & CCS training
November 2022	Prof. Thomas Zoller, Charité Berlin, visited Heart & Lung Clinic

VII Funding Situation/Budget

The CDCI and KIULARCO are funded through different institutions and organizations. While the funding for drug and basic clinical services comes through the National AIDS Control Program and International HIV Grants (e.g., PEPFAR and Global Fund) implemented by local partners (USAID Boresha Afya), the additional activities for quality care, training and improving health through research were funded through the Canton Basel-Stadt, Switzerland, the Swiss Tropical and Public Health Institute, the University Hospital Basel and the Ifakara Health Institute. This year, Canton Basel-Stadt has pulled out and shifted to another project. In 2023 funding will become a major challenge and we urgently need to get new funders and support from various institutions.

Yearly Budget

Expenses CDCI 2022 in CHF							
	Budget at IHI (SwissTPH-IHI)	Budget at SwissTPH (BS)	USB	Afya yangu (Impl. partners)*	MoH/Hospital*	Research	OVERALL
Staff	315'000	270'000	32'747	30'000	25'000	120'000	792'747
Drugs	0	0	0	1'800'000	0	0	1'800'000
Reagents	19'000	0	0	270'000	0	0	289'000
Infrastructure	0	0	0	0	facilities	0	0
Equipment	4'359	0	0	0	furniture	0	4'359
Maintenance	16'237	0	0	0	for buildings	0	16'237
Other (travel, outreach, others)	15'203	71'000	11'253	0	0	78'000	175'456
Training	4'860	0	10'000	Within special programs	within gvt programs	0	14'860
Freezing+ Bench fees	35'700	0	0	0	0	0	35'700
Salary	0	0	46'000	0	0	0	46'000
Total	410'359	341'000	100'000	2'100'000	25'000	198'000	3'174'359

*estimation of costs

VIII Conclusions

In 2022, the Chronic Diseases Clinic ongoingly contributed to quality services for HIV within the National AIDS control program and through its model clinic has kept its role in piloting new interventions for patients with HIV. The platform for high-quality care, training and research result in improved patient outcomes and has been extended to non-communicable diseases. A strong collaboration with national stakeholders allows us to be nationally accepted implementational partner and participate in national guideline panels. The CDCI model character for services in rural areas is well perceived supports to push the health agenda in Tanzania. With restriction of funds to come we need to focus on core achievements, further delegating routine care into the periphery.



ANNEX I. LIST OF PUBLICATIONS of the CDCI (last 3 years)

1. Rahel E. Bircher, Alex J. Ntamungiro, Tracy R. Glass, Dorcas Mnzava, Amina Nyuri, Herry Mapesi, Daniel H. Paris, Manuel Battegay, Thomas Klimkait, Maja Weisser, on behalf of the KIULARCO study group. High failure rates of protease inhibitor-based antiretroviral treatment in rural Tanzania – A prospective cohort study. *PlosOne* 13, 2020; <https://doi.org/10.1371/journal.pone.0227600>
2. Herry Mapesi. Challenges for HIV-infected adolescents during transition from paediatric to adult HIV clinics in Africa. *International Journal of Public Health* 28.01.2020, <https://doi.org/10.1007/s00038-020-01336-z>
3. Aneth V Kalinjuma, Tracy R Glass, Maja Weisser, Selarine J Myeya, Bryson Kasuga, Yassin Kisung'a, George Sikalengo, Andrew Katende, Manuel Battegay and Fiona Vanobberghen on behalf of the KIULARCO Study Group: Prospective assessment of loss to follow-up: incidence and associated factors in a cohort of HIV-positive adults in rural Tanzania. *Journal of the International AIDS Society* 2020, 23:e25460
4. Arpagaus A, Franzeck FC, Sikalengo G, Ndege R, Mnzava D, Rohacek M, et al. Extrapulmonary tuberculosis in HIV-infected patients in rural Tanzania: The prospective Kilombero and Ulanga antiretroviral cohort. *PLoS ONE* 2020, 15(3): e0229875. <https://doi.org/10.1371/journal.pone.0229875>
5. Omary Ngome, Martin Rohacek. Point-of-Care Ultrasound: A Useful Diagnostic Tool in Africa Praxis (Bern 1994). 2020, may. DOI: 10.1024/1661-8157/a003495
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8. Jennifer Anne Brown, Isaac Ringera, Ezekiel Luoga, Molisana Cheleboi, Namvua Kimera, Josephine Muhairwe, Buntshi Paulin Kayembe, Mosa Molapo Hlasoa, Lorraine Kabundi, Ching Wey David Yaw, Buoang Mothobi, Lineo Thahane, Alain Amstutz, Nadine Bachmann, Gertrud Joseph Mollel, Moniek Bresser, Tracy Renée Glass, Daniel Henry Paris, Thomas Klimkait, Maja Weisser and, Niklaus Daniel Labhardt. Genotype-Informed Versus Empiric Management Of VirEmia (GIVE MOVE): study protocol of an open-label randomised clinical trial in children and adolescents living with HIV in Lesotho and Tanzania. *BMC Infectious Diseases* (2020) 20:773; <https://doi.org/10.1186/s12879-020-05491-9>
9. Herry Mapesi, Ravi Gupta, Herieth Ismael Wilson, Blaise Lukau, Alain Amstutz, Aza Lyimo, Josephine Muhairwe, Elizabeth Senkoro, Theonestina Byakuzana, Madavida Mphunyane, Moniek Bresser, Tracy Renée Glass, Mark Lambiris, Günther Fink, Winfrid Gingo6, Manuel Battegay, Daniel Henry Paris, Martin Rohacek, Fiona Vanobberghen, Niklaus Daniel Labhardt, Thilo Burkard, Maja Weisser The coArTHA trial—identifying the most effective treatment strategies to control arterial hypertension in sub-Saharan Africa: study protocol for a randomized controlled Trial. *Trials* (2021) 22:77. <https://doi.org/10.1186/s13063-021-05023-z>
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15. Getrud Joseph Mollel, Lilian Moshi, Hoda Hazem, Anna Eichenberger, Olivia Kitau, Herry Mapesi, Tracy R. Glass, Daniel Henry Paris, Maja Weisser, Fiona Vanobberghen, on behalf of the KIULARCO Study Group. Causes of death and associated factors over a decade of follow-up in a cohort of people living with HIV in rural Tanzania. *BMC Infectious Diseases* 2022) 22:37

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6. Ndege R, Ngome O, Vanobberghen F, Bani F, Temba Y, Wilson H, Hella J, Gingo W, Sasamalo M, Mnzava D, Kimera N, Hiza H, Wigayi J, Mapesi H, Kato IB, Mhimbira F, Reither K, Battegay M, Paris DH, Weisser M, Rohacek M. Ultrasound in managing extrapulmonary tuberculosis: A randomised, controlled, parallel, superiority, open-label trial. Clin Infect Dis. 2022 Nov 4;ciac871. doi: 10.1093/cid/ciac871. Online ahead of print.
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9. Linda Stöger, Andrew Katende, Herry Mapesi, Aneth V Kalinjuma, Liselot van Essen, Thomas Klimkait, Manuel Battegay, Maja Weisser, and Emilio Letang Persistent High Burden and Mortality Associated With Advanced HIV Disease in Rural Tanzania Despite Uptake of World Health Organization "Test and Treat" Guidelines. Open Forum Infect Dis. 2022 Dec; 9(12): ofac611.