2019 ANNUAL REPORT

U.S. Centers for Disease Control and Prevention

CDC Zimbabwe

Accessible version: https:// cdc.gov/globalhealth/countries/zimbabwe/annual-report/index.html

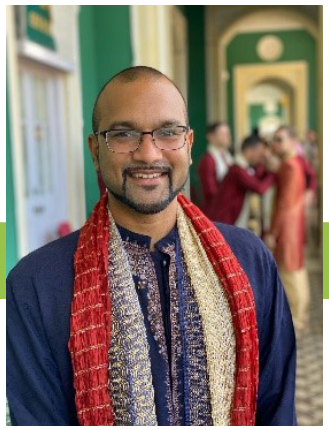
Cover Photo: CDC Zimbabwe Team: Group Photo, at former CDC office, in Harare

List of Acronyms

ACRONYM	DEFINITION
AGYW	Adolescent girls and young women
AIDS	Acquired immunodeficiency syndrome
ALL	Accelerated Immunization Initiative
APHL	Association of Public Health Laboratories
ART	Anti-retroviral therapy
ARV	Antiretroviral
BRIDH	Beatrice Road Infectious Disease Hospital
BRTI	Biomedical Research & Training Institute
CD4	Cluster of differentiation 4
CDC	Centers for Disease Control and Prevention
CF	Community Facilitator
COP	Country Operational Plan
CPMs	Community Peer Mentors
CQI	Continuous Quality Improvements
CSO	Civil Society Organization
DATIM	Data for Accountability Transparency and Impact
DHIS-2	District Health Information System
DHS	Demographic and Health Survey
DREAMS	Determined, Resilient, Empowered, AIDS-free, Mentored and Safe
DR	Drug Resistance
DSD	Direct Service Delivery
EHR	Electronic Health Record
FMO	Financial Management Office
FY	Fiscal Year
HBV	HIV, hepatitis B
HCWs	Health Care Workers
HHS	Human Health Services
HIV	Human immunodeficiency virus
HTS	HIV Testing Services
IBBS	Integrated Biobehavioral Survey
IPs	Implementing Partners
iHTS	integration into HIV Testing Services
IRS	Indoor residual spraying
IST	Inter-Country Support Team
IST/ESA	Inter-Country Support Team, East and Southern Africa
IT	Information Technology
I-TECH	International Training & Education Center for Health
KP	Key Population
LEEP	Loop Electrosurgical Excision Procedure
LMIS	Laboratory Management Information Systems
LTFU	Lost to Follow Up
M&E	Monitoring and Evaluation
MNT	Maternal and Neonatal Tetanus
MoHCC	Ministry of Health and Child Care
MSM	Men who have sex with men
NEC	New Embassy Compound
NMCP	National Malaria Control Program
NMRL	National Medical Reference Laboratory
OGAC	U.S. Office of the Global AIDS Coordinator
OI	Opportunistic Infections
OCV	Oral Cholera Vaccination
PC	Primary Counselor
PEPFAR	President's Emergency Plan for AIDS Relief
PHIA	Population-based HIV Impact Assessment

List of Acronyms

ACRONYM	DEFINITION
PLHIV	People Living with HIV/AIDS
PMI	President's Malaria Initiative
PBEMB	Program Budget and Extramural Management Branch
PMTCT	Prevention of mother-to-child transmission
PrEP	Pre-Exposure Prophylaxis
PSE	Population Size Estimates
PWID	People who inject drugs
QMS	Quality Management Systems
RDS	Respondent Driven Sampling
SENAITE	Enterprise Open Source Laboratory System
SGBV	Sexual and gender based violence (SGBV)
SIMS	Site Improvement Through Monitoring System
SI	Strategic Information
SLMTA	Strengthening Laboratory Management Towards Accreditation
SLIPTA	Stepwise Laboratory Quality Improvement Process Towards Accreditation
SRH	Sexual and Reproductive Health
STIs	Sexually Transmitted Diseases
SW	Sex workers
TB	Tuberculosis
TGW/GQ	Transgender Women/Gender Queer
TPT	TB Preventive Therapy
TCV	Typhoid Conjugate Vaccination
UNAIDS	The Joint United Nations Programme on HIV and AIDS
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
VAT	Value Added Tax
VIAC	Visual Inspection with Acetic Acid and Cervicography
VL	Viral Load
VLS	Viral Load Suppression
WHO	World Health Organization
ZACH	Zimbabwe Association of Church-related Hospitals
ZDHS	Zimbabwe Demographic and Health Survey
ZIMS	Zimbabwe Intensive Monitoring and Support
ZIMPHIA	Zimbabwe Population-based HIV Impact Assessment
ZIMRA	Zimbabwe Revenue Authority
ZIMSTAT	Zimbabwe National Statistics Agency



Dear Colleagues,

On behalf of the staff working for CDC Zimbabwe, I am pleased to share our 2019 Annual Report with you.

Our staff at CDC worked tirelessly to support the Ministry of Health and Child Care (MoHCC) and implementing partners in all their work. During 2019, we scaled up index testing to identify undiagnosed HIV-infected individuals by tracing and testing contacts of newly diagnosed persons.

Viral load (VL) coverage in Zimbabwe remains lower in comparison to countries in the region, on the other hand, efforts to improve and expand the Laboratory Information Management System (LIMS) in 2019 have dramatically reduced turn-around time for VL samples, allowing clinicians to use VL results to guide clinical management.

The MoHCC took on the heroic task to conduct a national Antiretroviral Treatment (ART) census to establish the true number of patients receiving ART at each of the 1700+ sites in Zimbabwe and update the age profile of ART patients. More than one million patient files were line-listed by MoHCC clinic staff. To validate the national census, staff from CDC, United States Agency for International Development (USAID), and implementing partners, joined the Ministry in visiting 114 sites and hand-counting more than 200,000 patient files.

In November 2019, CDC, ICAP at Columbia University, and MoHCC commenced data collection for Zimbabwe's second Population-based HIV Impact Assessment (PHIA). In 2015, Zimbabwe conducted its first such survey, which provided information on the nation's progress towards epidemic control of HIV. Zimbabwe is the first country to carry out the second round of these landmark assessments.

In 2019, our work was showcased through the development of 8 conference presentations and 7 publications, a remarkable achievement in our high-paced setting.

None of these achievements would have been possible without the tremendous support from our administration team, whose endless patience and optimism were the backbone of CDC Zimbabwe's success in 2019.

We would like to thank the MoHCC for nearly 20 years of fruitful collaboration, and for their tireless efforts in combatting the HIV epidemic in Zimbabwe. It has, and continues to be, an honor and a privilege for the CDC team to help this nation reach HIV epidemic control.

Sincerely,

Shirish Balachandra, MD

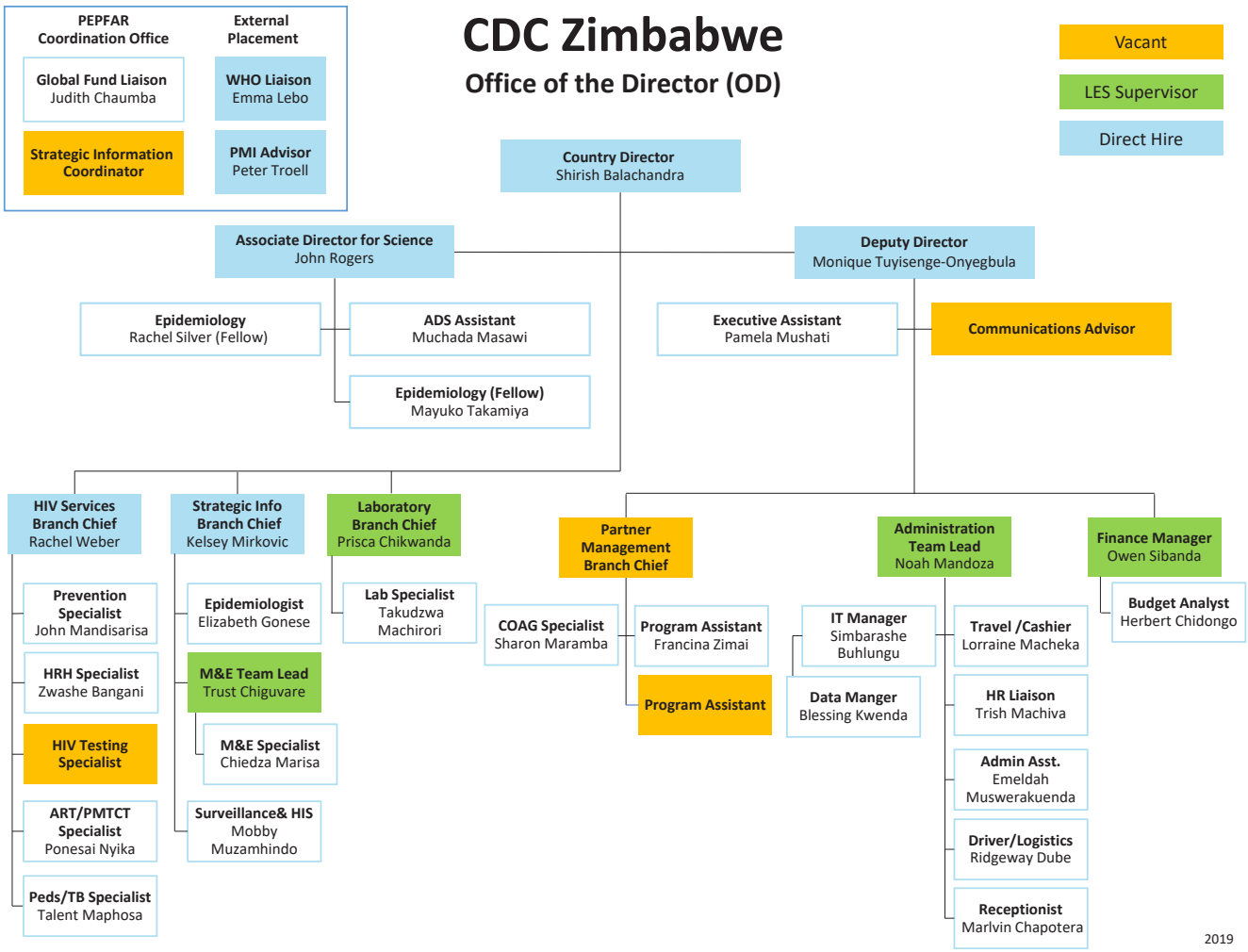
Country Director, CDC Zimbabwe

Table of Contents

Management and Operations

With each year we welcome new staff and say goodbye to valued members of the team. In September, we said 'goodbye' to the former Deputy Director- Laurie Fuller and HIV Prevention Specialist William Brad Fuller and welcomed Monique Tuyisenge-Onyegbula who shifted from her previous role as the Extramural Branch Chief to her new role as Deputy Director. Only a few short months followed with another 'goodbye' as we bid best wishes to Country Director Dr. Shirish Balachandra. We welcomed two new staff to the Strategic Information (SI) branch, Dr. Mobby Muzambhindo and Ms. Chiedza Marisa. PHI/CDC Fellow Rachel Silver joined the CDC Zimbabwe family to coordinate the Zimbabwe Population-based HIV Impact Assessment (ZIMPHIA) 2020. Figure 1 summarizes the CDC Zimbabwe organizational diagram at the close of the year.

On January 17th, 2019, the CDC Zimbabwe team moved from the leased space to join the other United States Government (USG) agencies in the NEC. The daunting task of moving was achieved through an all hands on deck approach. The scheduled move dates coincided with a national "stay away" order issued by the Government of Zimbabwe. As a result, our staff led the pack-out and decommission of all Information Technology (IT) and security infrastructure, moved boxes from our fourth floor walk up and used USG vehicles to transport the property to the NEC. The CDC Zimbabwe team is now working in a state of the art, modern and well-resourced environment where we can call upon our colleagues from USAID or State Department with a quick visit down the hall or upstairs.



HIV Services Branch

CDC has supported the HIV Care and Treatment program in Zimbabwe since its inception in 2004, and currently implements these activities across 20 districts in the provinces of Mashonaland West, Mashonaland Central, Mashonaland East, Matabeleland North, and Harare. With President's Emergency Plan for AIDS Relief (PEPFAR) support, ART coverage has been increasing within CDC districts and nationally. By the end of 2019, ART coverage among all HIV positive adults was 82% for adult men and 88% for adult women. Coverage for children was slightly lower at 78%.

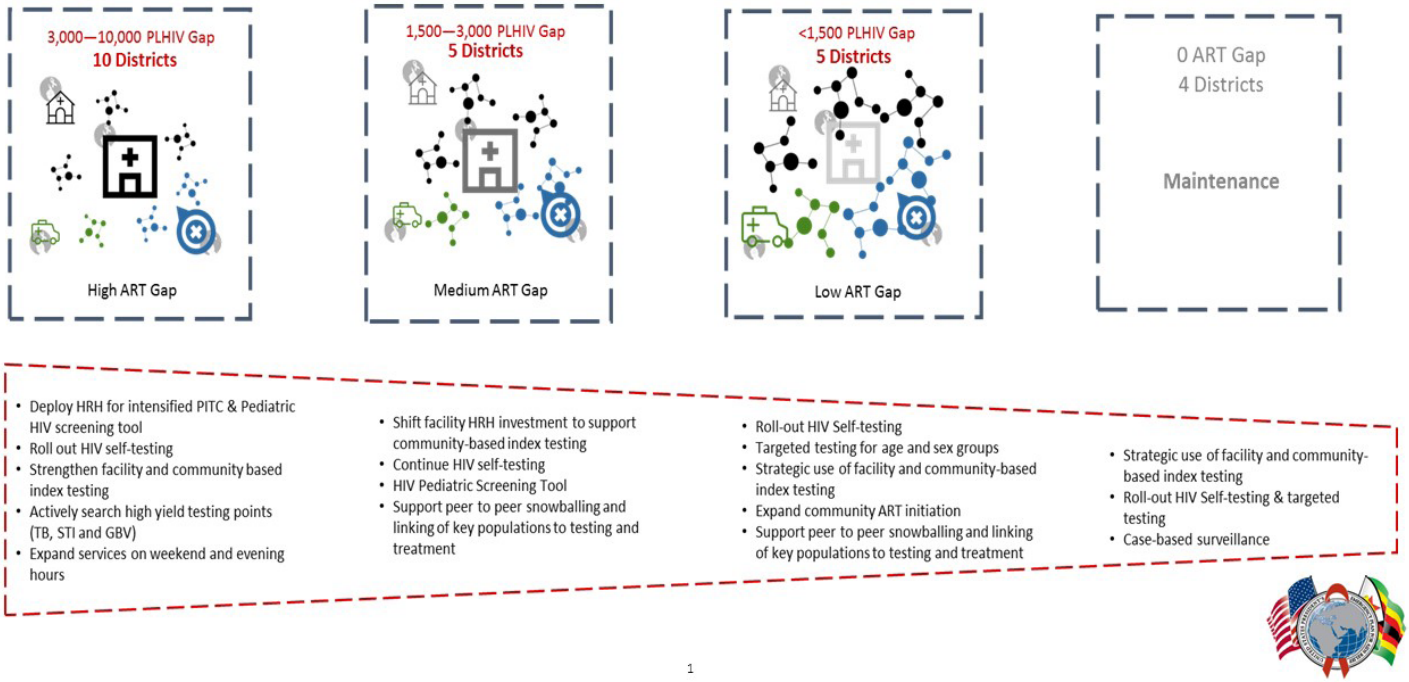
The Zimbabwe HIV Care and Treatment program continues to provide comprehensive HIV testing and treatment services for People Living with HIV/AIDS (PLHIV) through two clinical implementing partners who work across 442 sites.

HIV Testing and Linkage to Care

During 2019, the MoHCC has specifically highlighted human resource challenges in meeting the needs of a maturing HIV program throughout the HIV clinical cascade, a trend which continues through doctors and nurses strikes. As Zimbabwe has adopted the ambitious Joint United Nations Programme on HIV and AIDS (UNAIDS) Fast Track strategy for ending the AIDS epidemic by 2030, differentiated service delivery models have become increasingly necessary to increase convenience and access for patients, reduce out-of-pocket expenditure, and decongest clinical facilities. The integrated HIV Testing Services (iHTS) strategy was developed in response to changing needs for differentiated testing models.

The iHTS strategy was fully implemented in 2019, which included scale up of index testing for newly diagnosed PLHIV and roll out of HIV self-testing. Districts were classified into high, medium and low gap based on the Spectrum generated number of PLHIV needing treatment. Throughout FY19, the proportion of new positives identified through index testing increased over time and a higher proportion of new positives came from index testing in low gap districts compared to high and medium gap districts. Targeted testing strategies will remain important towards finding the remaining undiagnosed PLHIV to achieve 95-95-95 targets (95% of people living with HIV knowing their status; 95% of people who know their status on treatment; and 95% of people on treatment with suppressed viral load).

Figure 1: Review of the iHTS Strategy…



The iHTS strategy was fully implemented in 2019, which included scale up of index testing for newly diagnosed PLHIV and roll out of HIV self-testing. Districts were classified into high, medium and low gap based on the Spectrum generated number of PLHIV needing treatment. Throughout FY19, the proportion of new positives identified through index testing increased over time and a higher proportion of new positives came from index testing in low gap districts compared to high and medium gap districts. Targeted testing strategies will remain important towards finding the remaining undiagnosed PLHIV to achieve 95-95-95 targets (95% of people living with HIV knowing their status; 95% of people who know their status on treatment; and 95% of people on treatment with suppressed viral load).

Figure 2: Distribution of HTS_TST_POS by Testing Modality, FY19 Q1 – Q4

CDC supported HIV programs offered index testing to 53,367 PLHIV during FY19. Of those, 51,306 (96%) accepted index testing and 75,030 contacts were elicited. Through index testing efforts, 10,719 new positives were identified

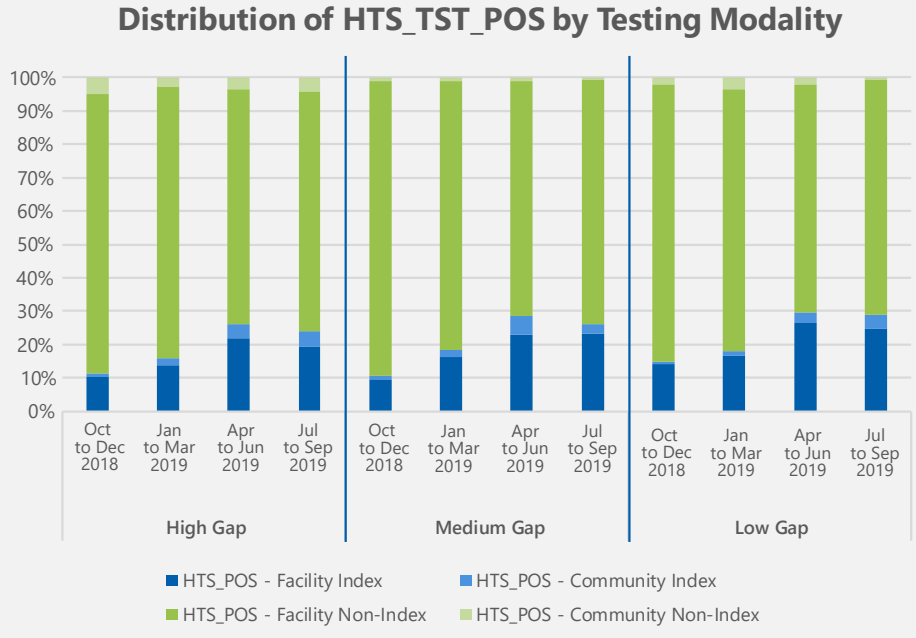
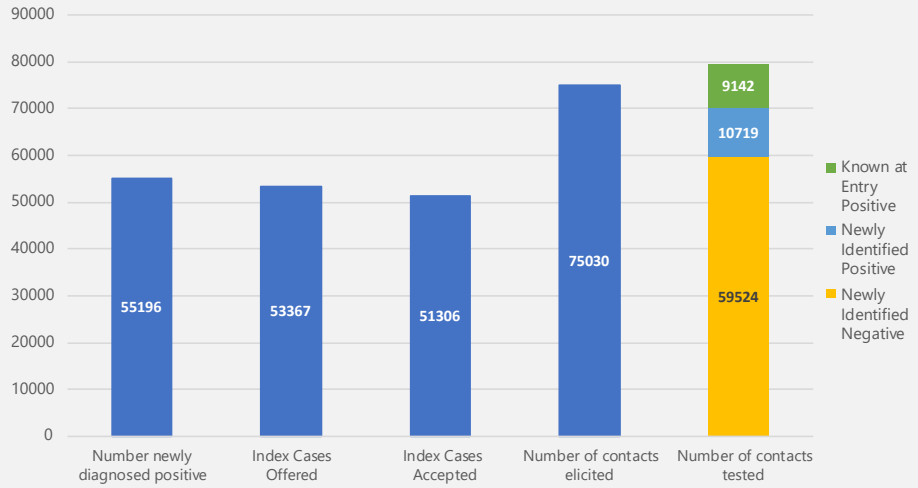


Figure 3: COP18 Index Case Testing Cascade



In addition, linkage to HIV care and treatment for clients at CDC-supported sites has increased over time to over 90%. This reflects PEPFAR support for training as well as additional staff supporting testing and linkage activities in Zimbabwe.

Figure 4: Linkage Trends

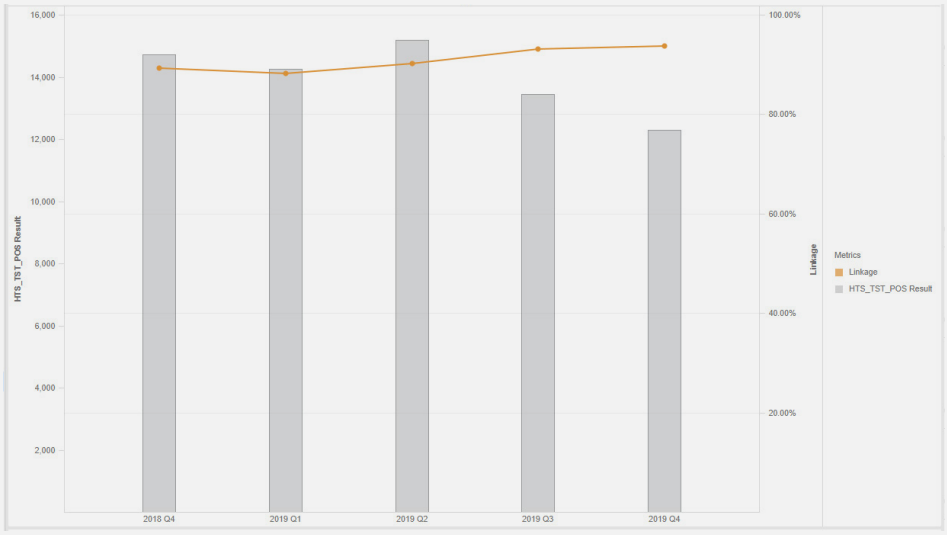
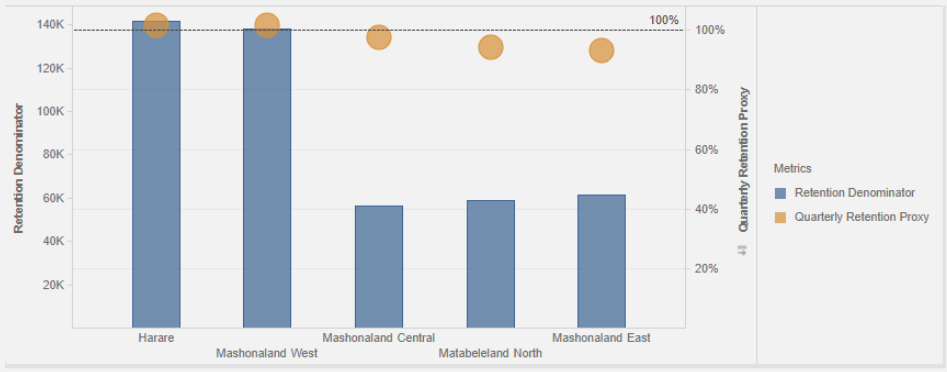


Figure 5: Retention Proxy and TX_CURR

Figure 5 shows the proxy retention estimates from Quarter 3 to Quarter 4 at CDC supported sites in five provinces. This retention measure exceeds 90% in all five provinces and exceeds 95% in Harare, Mashonaland West, and Mashonaland Central.



Lef Photo: CDC, MoHCC health facility, district, provincial and implementing partner staff conduct a ZIMS visit. Right Photo: CDC, MoHCC health facility, district, provincial and implementing partner staff after a ZIMS visit

Site Improvement with Zimbabwe Intensive Monitoring and Support

In the past year, CDC developed a novel strategy for site improvement. Built upon Site Improvement Through Monitoring System (SIMS), we began implementing Zimbabwe Intensive Monitoring Support (ZIMS). This site monitoring model involves half day site visits to health facilities by CDC staff to work with teams including facility, district, provincial and implementing partner staff. During this visit, 11 technical areas are assessed including those assessed through SIMS with deeper dives into the index testing cascade, Tuberculosis (TB) preventive therapy (TPT) cascade, and additional modules related to case-based surveillance and receny testing. ZIMS focuses on monitoring, supportive supervision, and capacity building exercises using medical registers and records routinely collected at HIV service delivery facilities to both assess the program and provide capacity building during the visit. The exercises allow the entire team to look at the quality of care in a group setting and facilitate on-the-spot mentorship to make corrections and address challenges in HIV case-finding and patient care. So far, ZIMS visits have been conducted in Matabeleland North, Mashonaland West, and Harare.

When a health facility is found to need improvement across multiple program areas, the site is revisited after about two months. Two facilities in need of improvement were identified in the first round of ZIMS. The revisits showed marked improvement including a focus on improved and optimized staffing and improved performance across HIV program areas. At one site, the facility staff had been unable to locate the patient files requested. As part of the remediation process, the site involved the full staff (including drivers) to redo their patient filing system. During the revisit, all files requested were located as a result of this effort. These sites also saw dramatic improvement in TPT coverage, VL coverage, HIV index testing for patients not virally suppressed (and more likely to transmit HIV), elicitation of sexual contacts so they could be followed up with HIV testing services, and documentation. Most importantly, staff at these facilities were proud of their work and accomplishments and were further motivated to offer improved patient care that will save lives.

Cervical Cancer Screening and Treatment

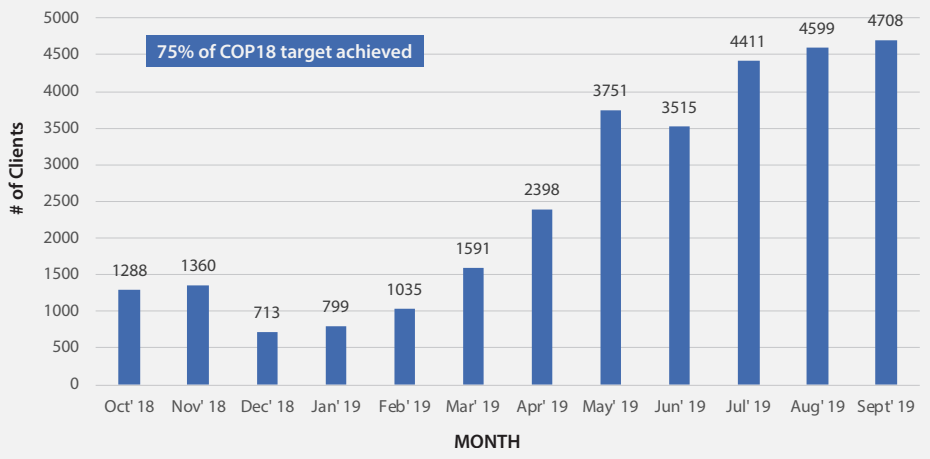
HIV remains an important risk factor for cervical cancer, with HIV-positive women 4-5 times more likely to develop cervical cancer compared to HIV-negative women. The Zimbabwe Demographic and Health Survey (ZDHS) 2015 reported 79% of women had heard of cervical cancer but only 13% ever had a cervical examination. Many women were therefore surviving HIV but dying from cervical cancer, a condition that is both preventable and curable. In order to address this critical need and associated gaps, CDC Zimbabwe introduced cervical screening using visual inspection with acetic acid and cervicography (VIAC) and treatment with cryotherapy, thermal coagulation or Loop Electrosurgical Excision Procedure (LEEP) in a see and treat approach in FY19.

CDC Zimbabwe and its clinical implementing partners introduced and scaled up cervical screening across all CDC supported districts thereby preventing women from developing cervical cancer. This was done through the integration of cervical cancer screening into existing HIV services, extensive technical support and revitalization of existing VIAC sites, recruitment and training of nurses and doctors who conduct cervical cancer screening and treatment, setting up of new VIAC sites to increase coverage and access, and demand creation among HIV positive women.

During FY19, CDC supported the revitalization of 39 VIAC sites and set up 12 new VIAC sites. To build human resource capacity, 72 nurses, 5 doctors, 3 clinical officers and 13 mentors/coordinators were trained quality quality cervical screening and treatment in CDC supported districts and facilities.

CDC and its clinical implementing partners International Training & Education Center for Health (ITECH) and Zimbabwe Association of Church-related Hospitals (ZACH) rapidly scaled up VIAC over FY19, achieving a remarkable 75% of the annual target as illustrated in Figure 6 below.

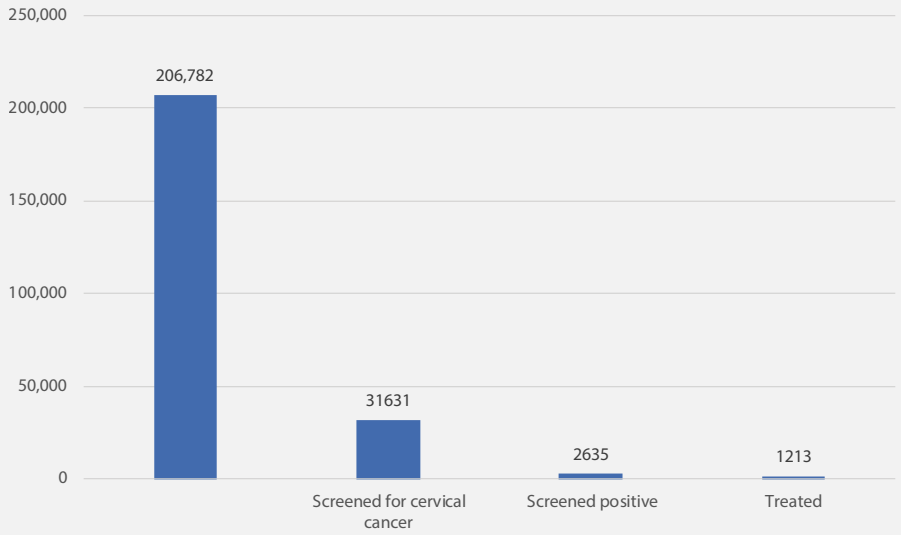
Figure 6: Number of Clients Screened for Cervical Cancer Using VIAC by Month Showing an Upward Trend



A total of 36,127 HIV positive women aged 25-49 years were screened. Service provision started at only 33 high volume sites in early Country Operation Plan (COP) 18. At the end of COP18, 48 facilities were providing VIAC, supported by direct service delivery (DSD) health care workers recruited and/or trained and deployed by CDC partners. The successful introduction and implementation of the program was a result of close collaboration between CDC and its Implementing Partners (IPs) and the MoHCC, recruitment and training of additional health care workers (HCWs) with a focus on VIAC, setting up VIAC sites within Opportunistic Infections (OI)/ART clinics, demand creation through integrated treatment literacy health education talks, and intensive site support and supervision to monitor implementation fidelity and provide on-site mentorship.

However, while encouraging screening numbers were achieved, treatments rates for eligible women were lower than expected as illustrated in Figure 7 below.

Figure 7: CDC FY18 Cervical Cancer Cascade: Overall



Although the positivity rate of 8% is within the expected range, the treatment rate falls short of the expected minimum of 70%. In the coming year, CDC will prioritize efforts to increase coverage of access to treatment services for all eligible women while strengthening the referral system for those women requiring advanced treatment procedures that may not be available locally.

Left Photo: CDC, ZimTTECH and MOHCC cadres review HIV program registers at Mdutshane Clinic in Bubi District. Top Right Photo: ZIMS assessment at Siganda Clinic in Bubi District of Matabeleland North Province. Bottom Right Photo: CDC, district, provincial and partner teams meet with Nkayi leadership during a ZIMS visit.

PrEP Success Story in Mazowe

Mazowe district is using the Peer-to-Peer model to raise oral Pre-Exposure Prophylaxis (PrEP) awareness and create demand for service uptake amongst adolescent girls and young women (AGYW) at risk of contracting HIV. Through the model, a total of 523 AGYW were reached with PrEP messages between January and December 2019. Amongst the AGYW reached is a 21 year old sex worker who was introduced to sex work at 19 by her two sisters in the same profession. She has had sex with men from all walks of life. We will call her Hope in this story.

Most of the time, Hope uses protection during sex but occasionally, some partners pressure her into having unprotected sex with them by offering large sums of cash. All her sexual partners were of unknown HIV status. Hope has been physically and sexually abused more than twice by some of her clients. Hope has contracted and has been treated for Sexually Transmitted Infections (STIs) several times but does not have HIV.

After hearing about PrEP through a PrEP Champion at Bare Clinic in February 2019, Hope decided to be initiated that month as she considered herself to be at significant risk of contracting HIV. During initiation, she consented to follow-ups through phone calls and physical visits to her place of residence by community health workers.

Two weeks after starting PrEP, Hope failed to turn up for her month one visit. In person follow-ups to her place of residence were made by PrEP Champions and Hope had this to say:

> “Taking pills daily is proving to be more work than I anticipated. Yes, I am at risk, yes, I want to remain HIV negative for the rest of my life, but the pill burden is way too much for me. What should I do?”

After noting her concerns, Hope was referred to her local clinic for further counselling. She was re-sensitised on the benefits of combination HIV prevention and was given adherence counselling. Hope decided to be re-initiated on PrEP in April 2019 and since then, she has been consistently taking her drugs. She continues getting adherence support from PrEP Champions. To date, Hope remains HIV negative. She last tested for HIV in September 2019 and her results came out negative. Through using oral PrEP, Hope remains a role model sex worker who refuses to let her lifestyle determine her HIV status.

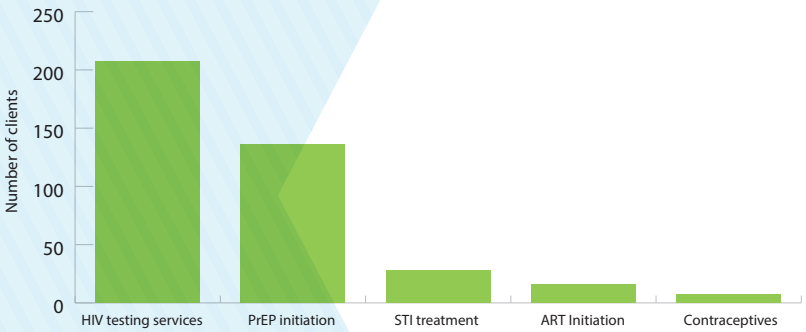
During our last recent encounter with her, she had this to say:

> “I am proud to be on PrEP. Though I still have unprotected sex once in a while, I feel safe because I know I have some level of protection. PrEP has given me control over my health. I am prepared.”

Improving Access and Optimizing Client-Centered and Friendly Services for Key Populations in Harare District

The target population for the Key Populations (KP) program in Harare District is men who have sex with men (MSM) while other subpopulation groups within the KP category such as sex workers (SW), transgender persons and people who inject drugs (PWID) are also considered. The comprehensive and friendly Sexual and Reproductive Health (SRH) and HIV services for KPs are offered through 13 CDC-supported facilities. In FY19, COP18 was the increase in the number of KPs who accessed services, in particular, linkage to PrEP as a prevention method. Other services also saw an increase in uptake despite the challenges with Monitoring and Evaluation (M&E) tools in capturing the client data.

Figure 9: KPs accessing a Wide Range of Services in Public Sector Facilities in Harare, COP18



The most common service accessed in the 13 supported public sector facilities in Harare was HIV testing services (HTS) followed by PrEP initiation.

- The following strategies were employed in order to achieve the project objectives for building capacity for public health facilities to offer KP friendly services, raising awareness among KP's on comprehensive combination HIV prevention and treatment as well as improving access to client centered HIV services such as prevention and treatment literacy sessions and targeted KP moonlight outreach.

Stories of change from two supported facilities

"After attending the literacy session, I wanted to take up PrEP but I was afraid to get it from a public clinic. I was afraid of being stigmatized by the nurses and lack of privacy. Through the help of a community facilitator (CF) who escorted me through the process, I felt more comfortable and realized that the nurses were actually friendly. I have been on PrEP for over a month now and I am confident in sharing with my other colleagues who are afraid of visiting the public clinics."

Tambirai (MSM)

"I was doing my routine facility visit walking through the hallway, some people sitting waiting for services started to look at me differently and making gestures because of my posture. I engaged the primary counsellor (PC) and took the opportunity to sensitize the people who were waiting for services about KPs and my role at the clinic and I told them I am representing many (KP community). The Nurse In Charge and PC weighed in on my role at the facility.

Mai Precious, Community Facilitator, Tariro Clinic

Reaching for Epidemic Control with ZACH's Community Peer Mentors

Throughout FY19, a total of 239 Community Peer Mentors (CPMs) from 16 high volume sites have been active in offering psychosocial counselling, adherence counselling, defaulter tracking, demand creation for viral load collection to their peers. The CPMs have been instrumental in bringing defaulters back to care (Figure 10). A list of defaulters generated by the facilities are given to the CPMs monthly to conduct follow-up of all clients who have been considered to be defaulters. In addition to following up of defaulters, CPMs ensure that all followed up clients are given health education and counseling on the importance of adherence to treatment. During the period under review, tracking of defaulters continued for more than 90 days before being declared lost to follow up (LTFU).

Figure 10a: CPMs in Defaulter Tracking Among Females

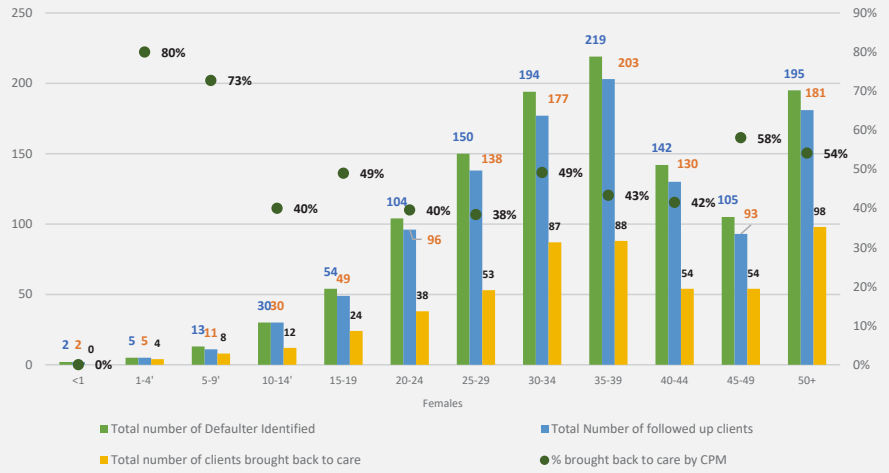
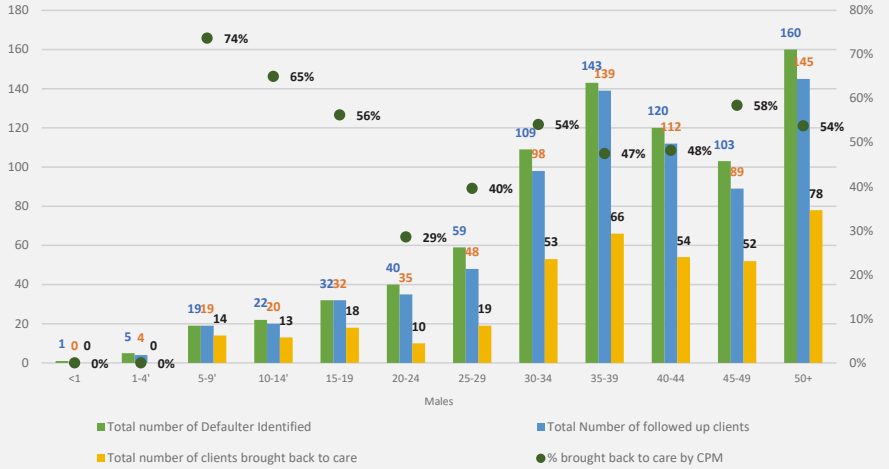


Figure 10b: CPMs in Defaulter Tracking Among Males



TPT South to South Exchange Visit

PEPFAR and CDC have prioritized TPT scale-up as a strategy to end TB. A target of 100% TPT coverage among all eligible patients over FY19 and FY20 was set. Kenya has had great success with their TPT program, where an estimated 85% of PLHIV have received TPT. A one-week TPT learning exchange was conducted in May, for Zimbabwe, Uganda and Zambia teams to learn from Kenya's experience. Participants were drawn from the relevant Ministries of Health, inter-agency teams and implementing partners.

Lessons learned:

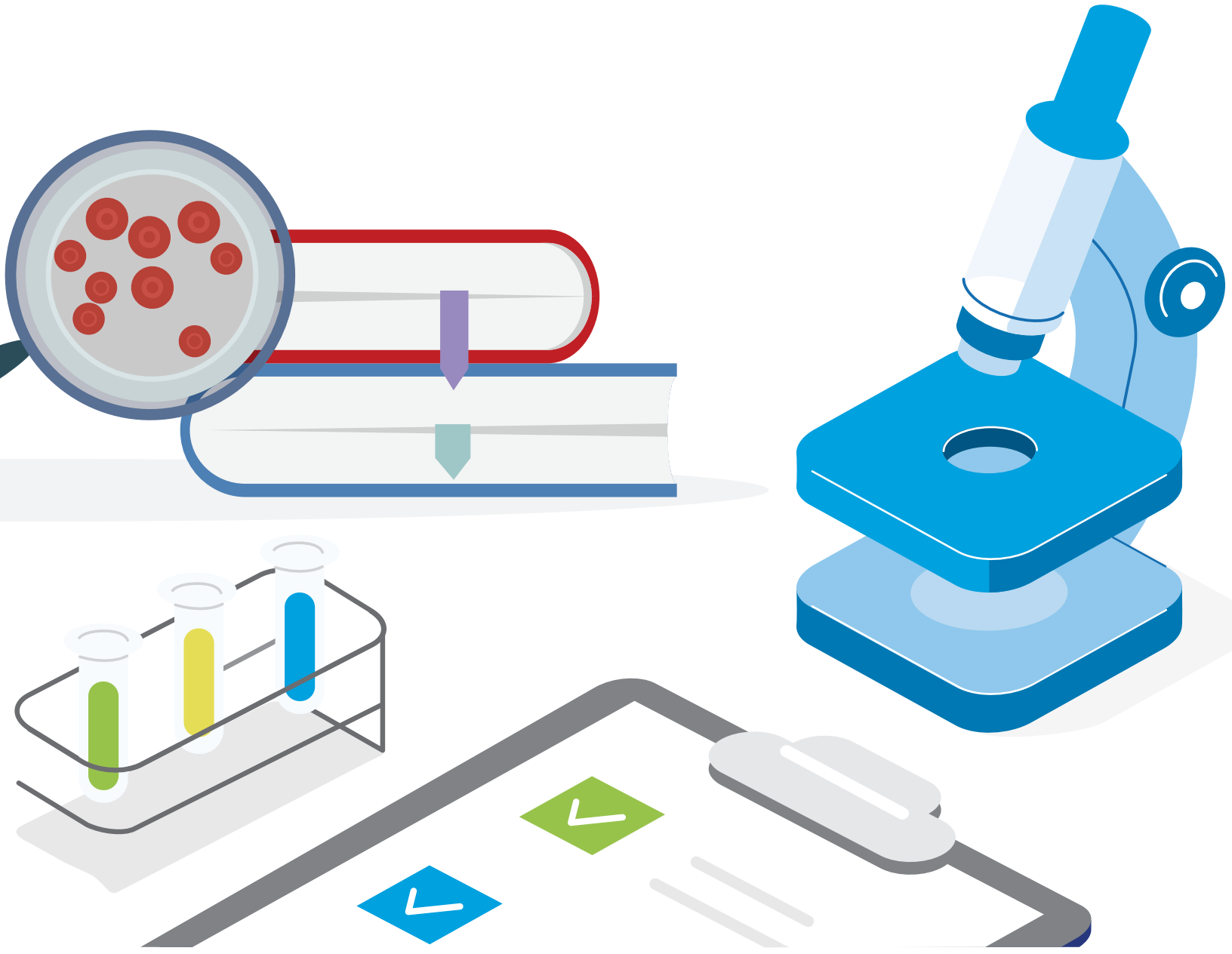
- It is possible to achieve >90% TPT coverage with the right planning and collaboration between all key stakeholders (MoHCC, partners and PLHIV).
- A clear TPT policy and guideline should be developed and consistently communicated, with buy in from the relevant political authorities.
- Success in supply chain management can be achieved through close collaboration between laboratory, pharmacy and clinical teams. To prevent medicine stock out, order based on anticipated consumption, especially during a rapid expansion period. Expiry of commodities can be reduced by use of an expiry tracker chart at all levels.
- Our current TPT guidelines state, isoniazid and pyridoxine should be given simultaneously to prevent peripheral neuropathy as recommended by the World Health Organization (WHO). However, this has created problems in implementation with facilities reporting stock out of either drugs. During the exchange visit we noted Kenya achieved >90% coverage prescribing and dispensing isoniazid (INH) alone without pyridoxine and <1% of the patients reported peripheral neuropathy. Pyridoxine was prescribed only after patients presented with peripheral neuropathy. Efficient and effective pharmacovigilance monitoring and reporting improved TPT adherence and completion.
    - It is critical to identify TPT champions among MoHCC leadership, clinicians and patients. Expert clients help with demand creation and allaying fears surrounding TPT medicines adverse events. Civil Society Organizations (CSO) involvement is key in creating demand.
    - Improving data quality is critical to monitor implementation progress. This was achieved through use of electronic health systems . Uganda developed a weekly dashboard which identifies poor performing health facilities and remediation plans are immediately activated.

Photo: Dr Talent Maphosa (CDC-Zimbabwe) selfie moment with the Kathiani Sub County hospital team, CDC team, and other stakeholders during a South to South TPT learning visit.

After the learning visit, CDC Zimbabwe convened a national TPT stakeholders meeting to review implementation progress and update national guidelines. All ten provincial MoHCC teams, stakeholders and IPs attended the meeting. It was agreed that Zimbabwe must scale up TPT to reduce the burden of TB among PLHIV. TPT treatment guidelines were also reviewed in order to remove the bottlenecks. Changes made to the national guidelines include ART and TPT same day initiation for new HIV patients. All PLHIV on ART who have never received a course of TPT are being recalled to health facilities and started IPT as soon as possible. Patients' resupply of TPT medicines and ART are now synchronized to ensure adherence and timely completion.

Laboratory Capacity Building

CDC has provided strong technical leadership and funding support to the laboratory services of the MoHCC since 2004. In FY19, CDC laboratory program supported Viral Load scale up in 11 laboratories from the 6 laboratories in 2016 through a robust mentorship program, integrated sample transportation system, optimizing the LIMS. Support was also provided through active participation in the national procurement and logistics technical working group, CDC supported quantification and procurement of HIV rapid test kits, VL reagents, and other commodities. Through its implementing partner, Association of Public Health Laboratories (APHL), CDC helped establish clinic laboratory interface in collaboration with USAID, MoHCC and partners. CDC has provided technical assistance to laboratories across the country to attain ISO 15189 accreditation for quality diagnostic services.



Optimization of LIMS for VL Scale Up Services

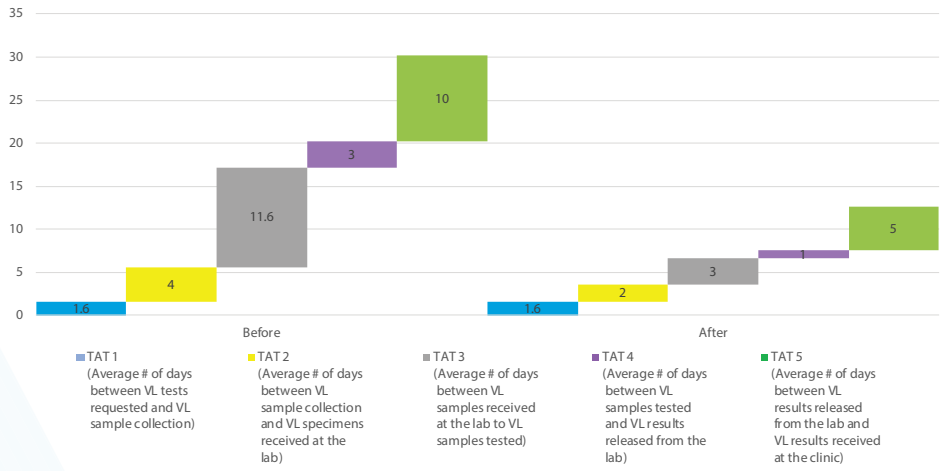
In 2014, the MoHCC adopted an open source electronic LIMS, BIKA. The system had a huge advantage in that despite initial implementation costs the country would then continue to adapt and add new modules and specifications as needs arose. The choice of an open source system would tie in well with the country's EHR, allowing for easy interface.

In 2019, the country implemented an accelerated Viral Load scale up program towards the 90-90-90 goals which resulted in an increase in viral load testing. This led to a significant surge in results sent out from laboratories. Unfortunately, BIKA had no capacity to cope with this influx. In response, CDC through APHL, immediately embarked on an ambitious project to optimize the LIMS through contracting the original developers (NARALABS), to set up a strong LIMS team to lead this project. The new optimized system, Enterprise Open Source Laboratory System (SENAITE), was then launched which revolutionized the workflow in the laboratories.

Improved System Performance

The example below shows overall intralab turn-around time (TAT) reduction of 74% from 11.6 days to 3 days. The delays were primarily caused by the need to perform every action in LIMS, one user at a time. Once the optimization was done multiple users could operate the system at the same time. This improvement also increased staff morale since the work processes could all be done in real time.

Figure 11. Improved Lab Turn-Around-Time After LIMS Upgrade in COP18 (Gweru)



Other capabilities include:

- automatic receipt of samples in the laboratory following remote log in
- the laboratory can generate different types of reports automatically
- interface with VL instruments which ensures that results are automatically transmitted from the analyzer to the LIMS without need for manual input from the users.

Dashboard Improvements

The optimized LIMS, due to its open source nature, allows for customization as needed. Users can visualize, in real time, the number of samples at different stages along the process flow (e.g. number of samples registered.) in the system, those with results, results verified, and number of samples rejected.

Viral Load Laboratory Accreditation

In 2019, CDC through APHL supported laboratory quality mentors to provide technical assistance to the 11 Viral Load laboratories and 55 Viral Load sample collection hubs that manage Viral Load samples and results. The laboratories implemented quality management systems (QMS) using the Strengthening Laboratory Management Towards Accreditation (SLMTA) approach and SLIPTA a Stepwise Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) framework towards ISO 15189 Accreditation.

As a result of these investments in Continuous Quality Improvements (CQI) , six Viral Load Labs (Chinhoyi, Beatrice Road Infectious Disease Hospital (BRIDH), Gweru, Masvingo, Mpilo, Mutare) were recommended for ISO15189 accreditation and one maintained National Medical Reference Laboratory (NMRL) accreditation.

Surveys, Surveillance and Health Information Systems

CDC Zimbabwe continued to play a leading role in supporting the MoHCC's strategic information activities in 2019 by providing technical leadership and programmatic guidance for routine monitoring and reporting, newly diagnosed HIV & recent infection surveillance, and health management information system support. In 2019, significant progress was made in transitioning from paper-based to electronic systems through CDC's support towards developing a comprehensive EHR and LIMS. The long-term goal is to build integrated and interoperable electronic data collection systems that will feed into the District Health Information System (DHIS-2) national repository.

Photo: USG staff supporting data abstraction from HIV patient files

Correction of the National ART Coverage Estimates

In order to ensure sites are reporting accurate information on the number of patients receiving HIV treatment, the MoHCC led a national data quality audit to update the number of PLHIV on HIV treatment as of Oct 31, 2018. This activity took place between December 2018 and March 2019. Each of the 1700+ sites were instructed to abstract a limited amount of information from each patient record including OI/ART number (unique ID), demographic information, date of ART initiation, most recent visit date, and next visit date. Any additional information related to the status of the patient (documented transfer out, death, etc.) was also abstracted. These data were critical for input into the Spectrum model which estimates the number and ages of PLHIV living in the 62 districts across Zimbabwe. This information forms the basis for PEPFAR annual planning, helping the country team determine strategies to employee across the districts based on demographic factors associated with those not yet on HIV treatment.

CDC/PEPFAR worked with our clinical implementing partners to ensure a full listing of HIV patients was line-listed and transmitted to national level for the 1,129 PEPFAR-supported sites (449 CDC- supported sites). To verify the accuracy of the information, the CDC/PEPFAR teams led a national data validation exercise. A sample of 10% of the PEPFAR-supported sites were visited by interagency PEPFAR teams compromised of at least 1 CDC and 1 USAID lead. A manual recount of all active patient files was conducted onsite to validate the line-listed data from the visited site. More than 200,000 patient files were reviewed as part of this initiative from 114 sites across 11 districts. The activity took 12 weeks to complete and CDC Zimbabwe staff across all technical branches contributed more than 160 person-days.

This exercise validated the MoHCC ART census and confirmed the correct national number of patients receiving ART in Zimbabwe was not 1,172,978 as previously reported but 1,021,167 people. Input of the corrected figure into a Spectrum re-run reduced the national PLHIV estimate from 1,361,055 to 1,315,645 a reduction of more than 45,000 people, suggesting a true ART coverage of about 77% at the time of ART census (October 2018).

Large changes in the estimated ART coverage occurred in several district which led to modifications in the case-finding strategies and allowed for PEPFAR programs to identify and initiate 100,601 newly diagnosed patients on treatment (47,985 through CDC-supported activities). The CDC/PEPFAR implementing partners also used this exercise to improve their documentation processes at the supported sites and conducted rigorous trace-back of patients who had been identified as LTFU. At the end of 2019 the estimated national ART coverage in Zimbabwe is now 84%.

Success Story

Implementation of Newly Diagnosed & Recent Infection Surveillance for HIV

As Zimbabwe nears epidemic control, understating the demographic and sexual risk behaviors associated with those previously undiagnosed will be critical. We continue to modify case finding strategies to ensure each HIV-infected person has access to life saving treatment. Utilization of the recently developed point-of-care HIV recency test allows for identification of individuals who acquired HIV infection in the previous 12 months. While high-quality clinical care is provided to all HIV-infected persons regardless of the timing of infection, utilization of this experimental test for surveillance purposes can help identify areas of high HIV transmission as well as demographic or sexual risk behaviors of those most likely to acquire HIV. Understanding geographic and demographic patterns of recent transmission will help ensure rapid extinguishing of HIV micro-epidemics through targeted case-finding and prevention efforts. Moreover, identification of newly infected clients will become increasingly crucial to ensure epidemic control is maintained. As such, CDC has been working with the MoHCC to implement newly diagnosed surveillance and recent infection surveillance for HIV.

In 2019, four districts have been saturated with new infection and recent infection surveillance which include 135 sites across the country. Demographic and sexual risk behavior has been collected on 6,429 newly diagnosed individuals with data transmission systems submitting electronically captured information in near real-time. These data populate national- and district-level dashboards that are routinely monitored for use in directing the MoHCC's national HIV response.

Of the 5,366 people who have had a recent infection test done, 229 were identified to be recently infected. This early data suggest that adolescent girls and young women are most likely to have a recent test result across all districts. As such, we will scale up the Determined, Resilient, Empowered, AIDS-free, Mentored and Safe (DREAMS) programming in COP20 and strengthen counseling and PrEP provision to adolescent girls and young women to ensure we are targeting resources to have the greatest impact.

Success Story

IBBS

Between March and July 2019 CDC Zimbabwe through a partnership with ICAP at Columbia University conducted the first Integrated Biobehavioral Survey (IBBS) among MSM and transgender women/gender queer individuals (TGW/GQ) in Zimbabwe. Consenting participants from Bulawayo and Harare completed a questionnaire on sociodemographic and HIV risk behaviors and underwent biomarker testing including rapid testing for HIV, hepatitis B (HBV), and syphilis, and if testing HIV-positive, were tested for Cluster of differentiation 4 (CD4), viral load, and recent HIV infection. Consensus Population Size Estimates (PSE) of 15,875 (95% CI: 11,907 - 19,843) and 7,451 (95% CI: 6,353 - 8,549) were calculated for Harare and Bulawayo respectively.

Using respondent driven sampling (RDS) we recruited 1,538 MSM and TGW/GQ individuals. HIV prevalence among consenting participants was 17.1% in Harare and 23.3% in Bulawayo. HIV prevalence among MSM and TGW/genderqueer were higher than that in the general male population aged 15-64 years in both Harare and Bulawayo, which are 11.1% and 16.1%, respectively. Viral suppression among all HIV-positive participants was 69.0% in Harare and 61.6% in Bulawayo, which is well below the UNAIDS 90/90/90 target of 73%. Current PEPFAR programming in Zimbabwe aims to serve MSM and TGW/GQ individuals at private clinics. However, nearly 70% of IBBS participants reported that they prefer to seek services at public hospitals and clinics. Given the HIV prevalence of the study population and lack of viral suppression, a shift in how we cater to this vulnerable population is warranted.

Lef Photo: Data collectors interviewing a household for the OCV coverage survey (December 2018) . Right Photo: Data collectors interviewing a household and testing water sample for chlorine level for the TCV coverage survey (April 2019).

CDC Zimbabwe Support for Cholera and Typhoid Vaccine Coverage Surveys

In response to a recurring cholera and typhoid outbreak in Harare, the MoHCC conducted an oral cholera vaccination (OCV) campaign and typhoid conjugate vaccination (TCV) campaign in selected areas in and around Harare most heavily affected by the outbreak. From October 3–31, 2019, 1,296,270 OCV doses were administered to persons ≥ 1 year old in 3 phases, and from February 25–March 4, 2019, approximately 320,000 TCV doses were administered to persons ≥ 6 months old. Both vaccination campaigns were the first large scale campaigns for OCV and TCV conducted in Zimbabwe. The TCV vaccination campaign was the first mass-campaign for TCV in Africa. The MoHCC, CDC, WHO and Zimbabwe National Statistics Agency (ZIMSTAT) conducted coverage surveys for OCV in December 2018 and for TCV in April 2019 to assess each vaccination coverage among persons eligible to have received respective vaccinations. Additionally, a classification survey for TCV was conducted in Mbare to classify TCV vaccinations among adults aged 16-45 years. As CDC Zimbabwe, we supported the preparation, coordination and implementation of the coverage surveys, and conducted field monitoring during data collection.

In the OCV coverage survey, a total of 2,355 OCV-eligible individuals from 850 randomly selected households in 16 suburbs participated. Overall, one-dose OCV coverage following the vaccination campaign was 71% (95% CI: 67%-76%). Most respondents reported receiving information before being vaccinated. The most common reason for not receiving OCV was being absent during the campaign.

In the TCV coverage survey, 1,920 children from 952 households in the 9 suburbs and 298 adults from 135 households in Mbare participated. Overall TCV coverage among all children aged 6 months–15 years was 85.3% (95% CI: 82.1%– 88.0%). A total of 192 adults in Mbare reported being vaccinated, resulting in a point estimate of 64.6%. Among children, the most common reason for not receiving TCV was being absent during the campaign whereas among adults, the most common reason for non-vaccination was not being aware of the campaign. Both the OCV and TCV coverage surveys found that OCV and TCV campaigns in Harare were well-accepted and achieved highest coverage among school-aged children.

The Zimbabwe Population-based HIV Impact Assessment (ZIMPHIA) Survey

ZIMPHIA 2015–2016 was the first of 14 AIDS indicator surveys funded by PEPFAR to better understand the impact of countries' national HIV programming on the epidemic, to gather bio-behavioral data about the subset of the population not accessing HIV health services, and to generate high quality data for policy and program decision-making.

ZIMPHIA provided the first nationally representative population-based estimates of national HIV incidence, viral load suppression, pediatric HIV prevalence , syphilis prevalence, CD4 count, ART coverage, and HIV drug resistance. Additionally, socio-demographic and behavioral data results from the survey have provided updated information on the population-level context of HIV and uptake of health care services in the country.

ZIMPHIA was led by the government of Zimbabwe through the MoHCC and conducted with funding from PEPFAR and technical assistance through the CDC. The survey was implemented by ICAP at Columbia University and ICAP Zimbabwe in collaboration with Westat and local partners, including the National AIDS Council, the Zimbabwe National Statistics Agency, the Biomedical Research and Training Institute, and Lancet Laboratories Zimbabwe. Utilizing robust community mobilization strategies and innovative tablet-based data collection methods and laboratory techniques, over 29,500 participants of all ages tested for HIV and received their results in ZIMPHIA 2015-2016.

The final report, released in August 2019, shows that the HIV prevalence in Zimbabwe has decreased from 15.2% in 2011 (ZDHS 2010–2011) to 13.4% (ZIMPHIA 2015–2016) among 15–49 year olds in Zimbabwe. The face of the epidemic has also changed. PLHIV are living longer, healthier lives, and the number of new infections annually has decreased since the early 2000s. ZIMPHIA confirmed that Zimbabwe has reached a turning point where generalized interventions may no longer impact the HIV epidemic as in previous years. Manuscripts on a host of topics (e.g. HIV incidence, syphilis infection, factors associated with absence from the clinical cascade, etc.) are being published, and more are currently being prepared.

For more information and results from ZIMPHIA 2015–2016, visit http://phia.icap.columbia.edu.

ZIMPHIA 2020 began data collection in November 2019. The data collection timeline has been expedited to span over 6 months, as compared to the yearlong timeline implemented in ZIMPHIA 2015–2016. Data produced in ZIMPHIA 2020 will allow the Zimbabwe MoHCC to assess progress made towards the achievement of the UNAIDS 90-90-90 targets on a national level since ZIMPHIA 2015–2016. These results will further support their endeavor to end AIDS in Zimbabwe by 2030, by allowing for data-driven decision making, targeted prevention activities, and cost-effective solutions that will have the greatest impact on both key populations and the general Zimbabwe population.

Objectives of the survey are to estimate the HIV incidence, HIV prevalence, prevalence of viral-load suppression (VLS) among HIV-positive individuals, and other HIV-related measures such as prevalence of detectable ARVs, prevalence of transmitted HIV Antiretroviral (ARV) drug resistance (DR), and DR amongst persons not virally suppressed. In addition, the survey will collect information on uptake of, and access to, HIV-related services and will estimate the prevalence of select behaviors associated with HIV acquisition and/or transmission and on common HIV co-morbidities. The data generated in ZIMPHIA 2020 on HIV prevalence, incidence and testing status will be comparable to ZIMPHIA 2015–2016 and other country specific population-based surveys, and will produce information on the older age groups that are not usually covered by the Demographic and Health Survey (DHS) and other household surveys. It will also generate information on the impact of HIV care and treatment programs on population-level VLS, the coverage and uptake of various HIV prevention, care and treatment services, and the continuum of care in major HIV programs such as prevention of mother-to-child transmission (PMTCT) and linkage to care. Preliminary data are expected to be available by World Aids Day 2020.

Extramural Management Branch

In 2019, CDC Zimbabwe continued the transition of complex and critical portfolio from international organization to local indigenous organizations. At the start of 2019, local partner funding was 6.4% and by the end of the year it was 27%. During the year Extramural Management Branch (EMB) focused on continuing to build and improve the capacity of local partners to successfully manage cooperative agreements by providing guidance and resources for the implementation, administration, and oversight of the awards. In May 2019, the EMB collaborated with the Office of the Grants Services to conduct a Grants Management Refresher training aimed for the whole office and implementing partners to ensure compliance with law, regulation, and policy in the implementation of the cooperative agreements.

Additionally, during the year there were some firsts worth highlighting. For the first time in CDC Zimbabwe history, CDC Zimbabwe received Value Added Tax (VAT) reimbursement from Zimbabwe Revenue Authority (ZIMRA) totaling $97,108.42. The Embassy Financial Management Office (FMO) team invited the ZIMRA team to present to Implementing Partners on the reimbursement standards and requirements to ensure reimbursement submissions were accepted by ZIMRA and reimbursed. The EM Team worked diligently with each partner to go through each document to ensure accurancy and conformity. In addition, the team went through the process of protocol development, clearance and lifting of funding restrictions such, that for the first time, CDC Zimbabwe cleared all cooperative agreement restrictions, becoming the only CDC country office with no restrictions!

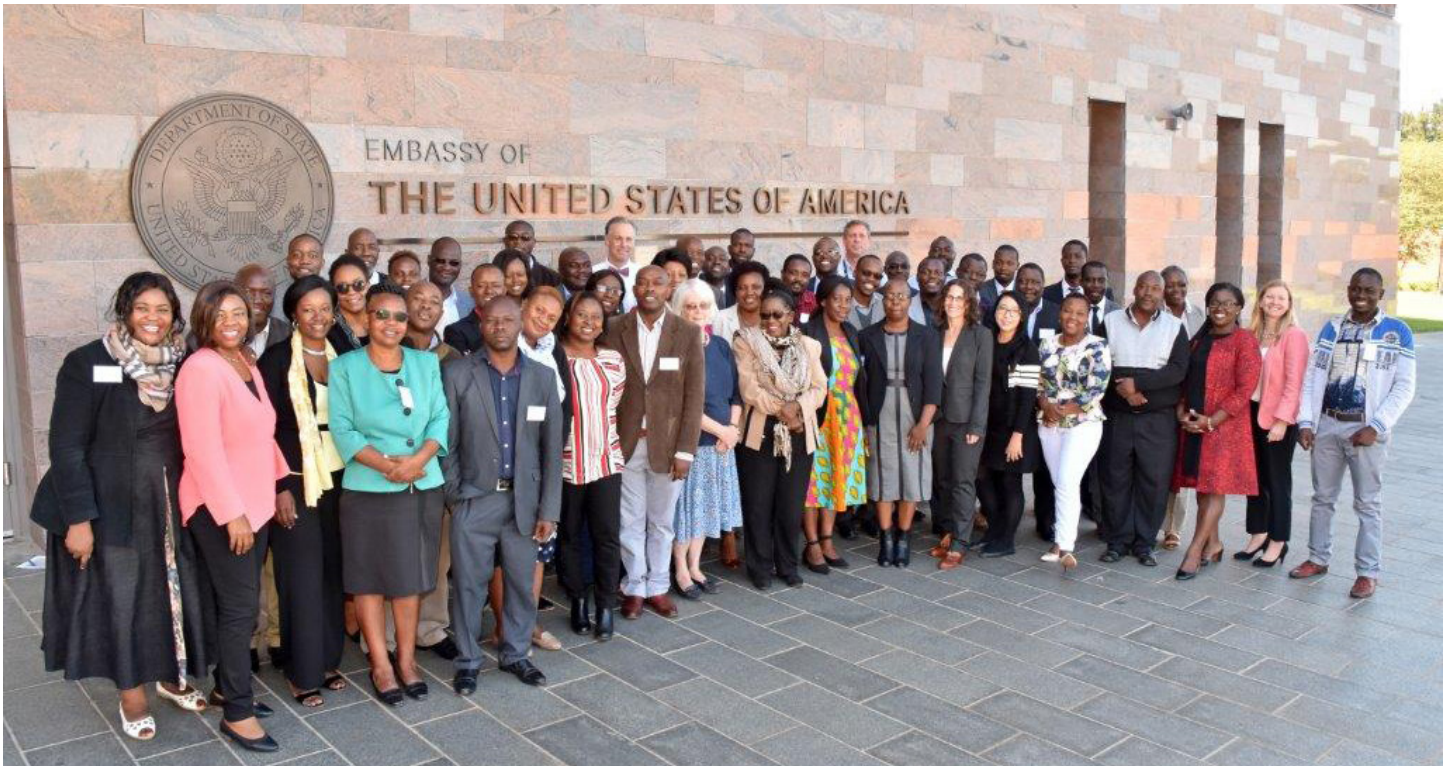
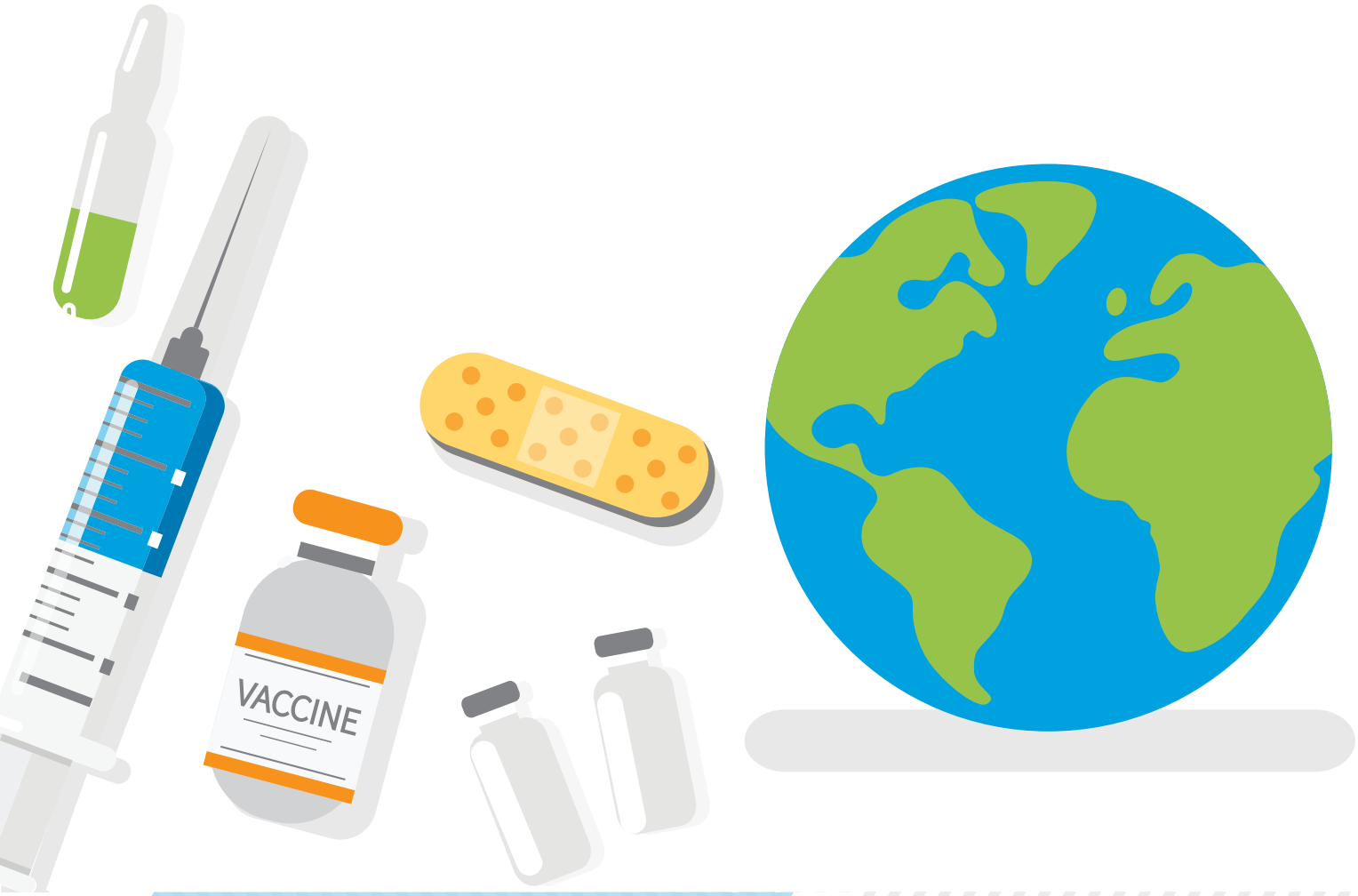


Photo: Participants of the Annual Grants Management Workshop held in Harare on May 15 - 16, 2019

World Health Organization, East and Southern Africa Inter-Country Support Team

CDC supports a secondee to the WHO African Region's Accelerated Immunization Initiative (AII), within the Inter-Country Support Team, East and Southern Africa (IST/ESA) based in Harare, Zimbabwe. This position serves as the lead in providing technical support and coordination for 20 member states within IST/ESA on the elimination of measles, the control of rubella/ congenital rubella syndrome and maternal and neonatal tetanus. Activities at the IST level include promoting coordinated partner approaches, implementation of established strategies and policies, adapting guidelines to respond to country-specific needs, conducting and contributing to capacity building activities, and developing country-specific work plans.

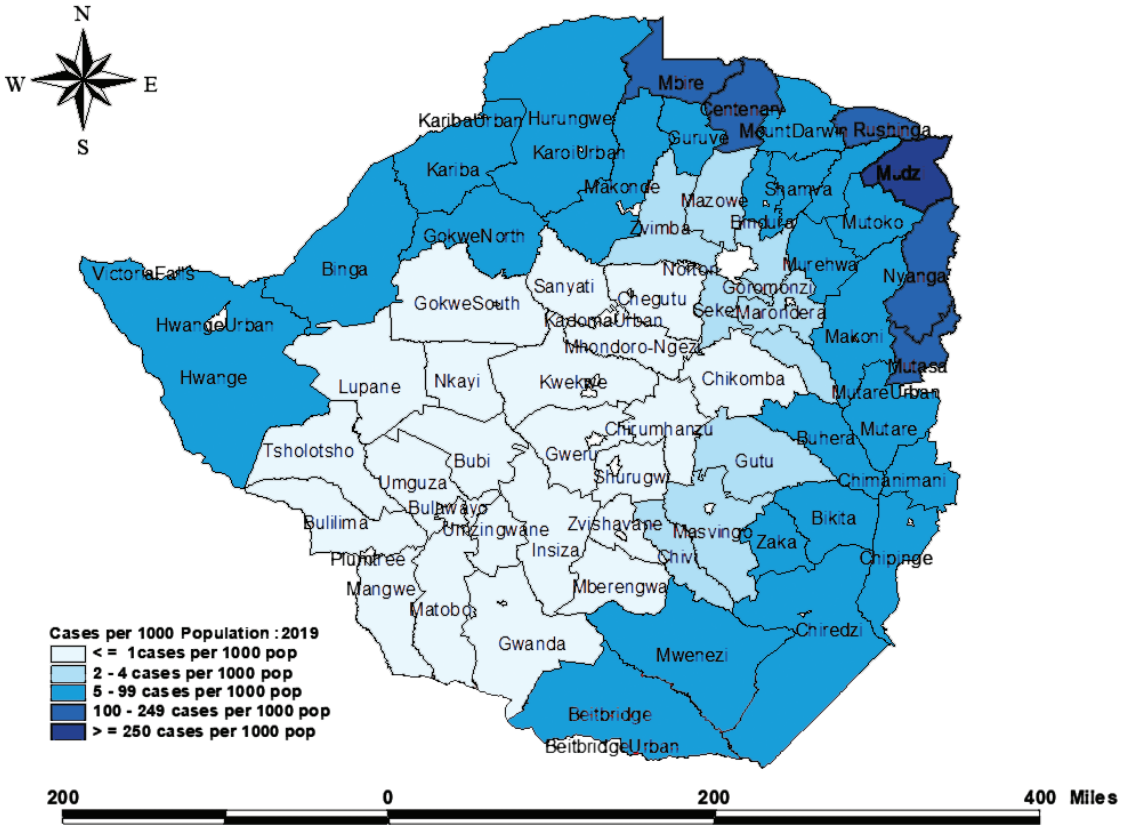
In alignment with the Global Vaccine Action Plan (2011-2020) and the African Regional Immunization Strategic Plan (2014-2020) all member states in the ESA region have established a goal for Maternal and Neonatal Tetanus (MNT) elimination and for measles elimination by 2020. The IST position supports member states in monitoring progress towards achieving the elimination goals and implementing activities to accelerate progress to meet the goals. In 2019, with the exception of South Sudan, all other countries in the ESA region have successfully been validated to have achieved MNT elimination. Significant progress continues towards measles elimination and rubella control in the region, through the implementation of the WHO/United Nations Children's Fund (UNICEF) recommended strategies. In 2019, Comoros, Ethiopia, Madagascar, Mozambique, Uganda, South Sudan and Zambia experienced measles outbreaks, mainly due to persistently insufficient population immunity in different age groups or hard-to-reach populations.



President's Malaria Initiative

Zimbabwe has made substantial progress in reducing malaria incidence compared to levels recorded a decade ago. However, in more recent years, the annual number of reported malaria cases has fluctuated between approximately 250,000 and 500,000 cases, with no sustained downward trend. According to DHIS2 data, approximately 310,000 malaria cases were reported in 2019, equivalent to an incidence rate of 22 cases per 1,000 population. This represented a 19% increase in the number of cases reported in 2018 (approximately 260,000). The number of malaria deaths also rose, from 236 in 2018 to 266 in 2019.

The U.S. President's Malaria Initiative (PMI) was launched in Zimbabwe in 2011. PMI is led by the USAID and implemented together with CDC. CDC Zimbabwe is determined to support PMI/Zimbabwe's efforts to reduce malaria transmission. As a member of the PMI interagency team, the PMI/CDC Resident Advisor works closely with USAID staff to provide well-designed and technically sound support for the Government of Zimbabwe's malaria prevention and control efforts. PMI Zimbabwe provides financial and technical support for a wide range of major malaria interventions, including: entomological monitoring, vector control [insecticide-treated mosquito nets and indoor residual spraying (IRS)], malaria in pregnancy, case management, pharmaceutical and supply chain management, surveillance, monitoring and evaluation, operational research, and social and behavioral change communication. Portions of this support are directed to the central and national levels (e.g., technical assistance to central level MoHCC staff, laboratory capacity building, and procurement of malaria commodities for nationwide distribution), while other components are targeted directly to the provincial and district levels (e.g., malaria case management and IRS). PMI's provincial and district-level support has primarily targeted higher-burdened areas located in the northern and eastern parts of the country (See Figure 13). Under the strong leadership of the National Malaria Control Program (NMCP), PMI support contributed greatly to the overall reduction in malaria burden and, as a result, PMI continues to primarily direct resources to these higher burdened areas. However, Zimbabwe experiences the full spectrum of malaria transmission, including areas with very limited transmission in the central plateau and south-western portions of the country. Beginning in FY18, PMI directed limited support for NMCP-driven elimination activities in these areas.



2019 Publications and Presentations

1. Bochner AF, **Tippett Barr BA**, Makunike B, Gonese G, Wazara B, Mashapa R, Meacham E, **Nyika P,** Ncube G, **Balachandra S**, Levine R, Petracca F, Apollo T, Downer A, Wiktor SZ. Strengthening provider-initiated testing and counselling in Zimbabwe by deploying supplemental providers: a time series analysis. BMC Health Services Research. (2019) 19:351. https://doi.org/10.1186/s12913-019-4169-z
2. Hove J, Masimba L, Murenje V, Nyadundu S, Musayerenge B, Xaba S, Nachipo B, Chitimbire V, Makunike B, Holec M, Chinyoka T, **Mandisarisa J, Balachandra S**, Tshimanga M, Barnhart S, Feldacker C. Incorporating voluntary medical male circumcision into traditional circumcision contexts: Experiences of a local consortium in Zimbabwe collaborating with an ethnic group. Global Health: Science and Practice 2019;7 (1): 138-146. https://doi.org/10.9745/GHSP-D-18-00352
3. Marongwe P, Gonouya P, Madoda T, Murenje V, Tshimanga T, **Balachandra S**, **Mandisarisa J**, Sidile-Chitimbire V, Xaba S, Makunike-Chikwinya B, Holec M, Barnhart S, Feldacker C. Trust but verify: Is there a role for active surveillance in monitoring adverse events in Zimbabwe's large-scale male circumcision program? PLOS ONE 2019; 14(6):e0218137. https://doi.org/10.1371/journal.pone.0218137
4. Rietmeijer CA, Mungati M, **Kilmarx PH**, **Tippett Barr B**, **Gonese E**, Kularatne RS, Lewis DA, Klausner JD, Rodgers L, Handsfield HH. Serological markers for syphilis among persons presenting with syndromes associated with sexually transmitted infections: Results from the Zimbabwe STI Etiology Study. https://doi.org/10.1097/OLQ.0000000000001006
5. Rietmeijer CA, Mungati M, **Kilmarx PH**, **Tippett Barr B**, **Gonese E**, Kularatne RS, Lewis DA, Klausner JD, Rodgers L, Handsfield HH. Performance of a Dual Human Immunodefiency Virus/Syphilis Rapid Test Compared With Conventional Serological Testing for Syphilis and Human Immunodeficiency Virus in Laboratory Setting: Results from the Zimbabwe STI Etiology Study. https://doi.org/10.1097/OLQ.0000000000001022
6. Bochner AF, Meacham E, Mhungu N, Manyanga P, Petracca F, Musere C, Gonese G, Makunike B, Wazara B, Gwanzura C, **Nyika P**, Levine R, Mutasa-Apollo T, **Balachandra S**, Wiktor SZ. The roll out of community ART refill groups in Zimbabwe: a qualitative evaluation. https://doi.org/10.1002/jia2.25393

Morbidity and Mortality Weekly Report

7. N'cho HS, Masunda KPE, Mukeredzi I, Manangazira P, Govore E, Duri C, Aubert RD, Martin H, **Gonese E**, Vere M, **Tippett Barr BA**, **Balachandra S**, Strysko J, Davis WW, Appiah GD, Mintz E. Typhoid Fever Outbreak – Harare, Zimbabwe, October 2017-February 2018

Presentations at International Conferences

1. **Takamiya M**, Takarinda K, **Balachandra S**, Musuka G, Radin E, **Hakim A, Pearson M**, Choto R, Sandy C, **Rogers JH** : IPT use by HIV-positive patients in Zimbabwe: Analysis of the Zimbabwe Population-based HIV Impact Assessment (ZIMPHIA) survey. 50TH Union World Conference on Lung Health, 30 Oct – 2 Nov 2019. Oral.
2. **Balachandra S**, **Rogers JH**, Radin E, Musuka G**, Oboho I, Paulin H**, **Parekh B**, Birhanu S, Takarinda KC, Hakim A, Apollo T. Advanced HIV disease, viral suppression and missed opportunities: Findings from the Zimbabwe Population-based HIV Impact Assessment (ZIMPHIA), 2015-2016. ICASA Conference, Kigali, Rwanda, December 2-7, 2019. Poster.
3. M**irkovic K**, Rogers JH, Musuka G, Radin E, **Barr B**, **Hakim A**, **Patel H**, **Parekh B**, **Duoung Y**, Winterhalter FS, Choto R, Apollo T, **Balachandra S**. Concordance of self-reported HIV status and detectable anti-retrovirals and undetectable viral load in the Zimbabwe Population-Based HIV Impact Assessment (2015-2016). ICASA Conference, Kigali, Rwanda, December 2-7, 2019. Poster.
4. **Takamiya M**, Takarinda K, **Balachandra S**, Musuka G, Radin E, Pearson M, Choto R, Sandy C, **Maphosa T, Rogers JH**. Missed opportunities for TB diagnostic testing among PLHIV with TB symptoms in Zimbabwe. ICASA Conference, Kigali, Rwanda, December 2-7, 2019. Poster.

5. Manyanga P, Bochner AF, Meacham E, Mhungu N, Petracca F, Muserere C, Gonese G, Makunike B, Wazara B, Gwanzura C, **Nyika P,** Levine R, Mutasa-Apollo T, **Balachandra S**, Wiktor SZ. A mixed methods evaluation of the roll-out of Community ART Refill Groups in Zimbabwe ICASA Conference, Kigali, Rwanda, December 2-7, 2019. Poster.

6. Chingombe I, Mapingure MP**, Balachandra S**, Chipango TN, Gambanga F, Mushavi A, Apollo T, **Suraratdecha C**, **Rogers JH, Ruangtragool L**, **Gonese E**, Musuka GN, Mugurungi OM, Harris TG. The cost of providing PMTCT and ART services in Zimbabwe. ICASA Conference, Kigali, Rwanda, December 2-7, 2019. Poster.

7. Harris TG, Parmley LE, Mapingure M, Mugurungi O, **Rogers JH**, Apollo T, Ncube G, Moyo B, Gozhora P, Musuka G, Miller S, Wu Y, **Hakim A**, Chingombe I. HIV Treatment Cascade for Men Who Have Sex with Men and Transgender Women in Zimbabwe. 2020 CROI, Boston, MA, March 8-11, 2020. Poster.

8. Parmley LE, Harris T, Chingombe I, Mapingure M, Owen Mugurungi O, **Rogers JH**, Ncube G, Moyo B, Gozhora P, Wu Y, Miller S, **Hakim A**, Musuka G. Pre-Exposure Prophylaxis Cascade among Men Who Have Sex with Men in Zimbabwe, 2020 CROI, Boston, MA, March 8-11, 2020. Poster.