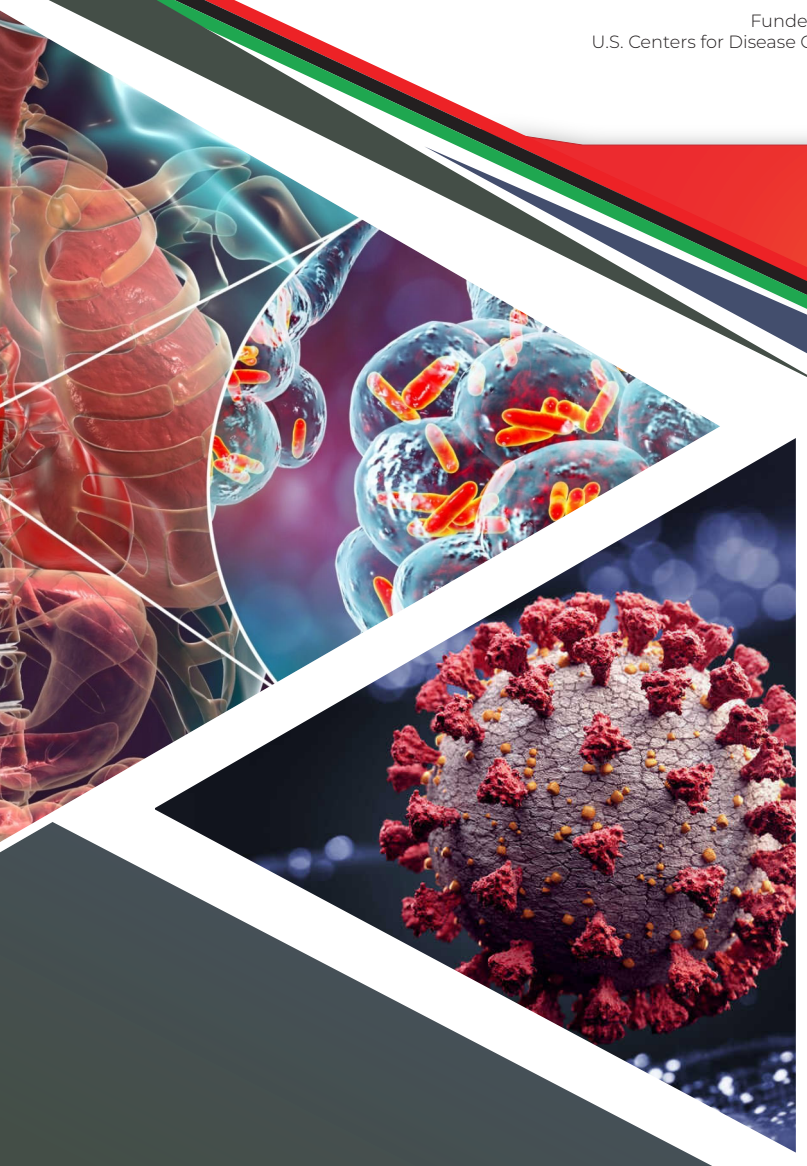
MAKERERE UNIVERSITY
SCHOOL OF PUBLIC HEALTH

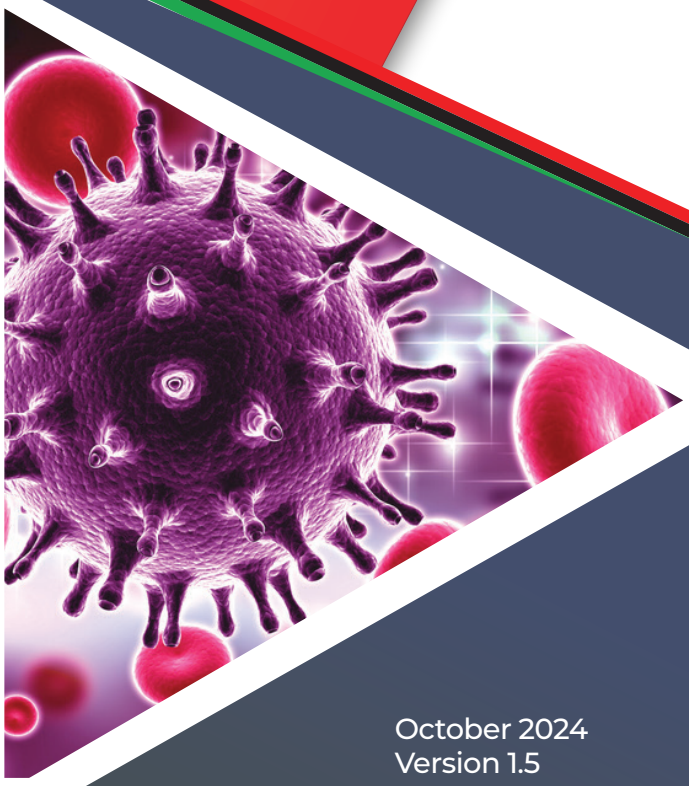
THE REPUBLIC OF UGANDA
MINISTRY OF HEALTH

THE UGANDA NATIONAL SURVEY TO DETERMINE THE PREVALENCE OF LATENT AND ACTIVE TUBERCULOSIS, COVID-19, AND HIV AMONG PEOPLE IN PRISON AND PRISON STAFF IN UGANDA

A Collaboration led by
Makerere University School of Public Health
with: Ministry of Health, Uganda
The Uganda Prisons Service U.S. Centers for Disease Control and Prevention, Uganda

Funded by
U.S. Centers for Disease Control and Prevention





Survey Report

October 2024
Version 1.5

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Several individuals from the four institutions, namely the U.S Centers for Disease Control and Prevention (U.S CDC), Ministry of Health (MOH), Makerere University School of Public Health (MakSPH), and Uganda Prisons (UPS), contributed to the success of the multi-disease (TB, HIV, and COVID-19) survey in Uganda Prisons. They conceptualized the idea, developed the proposal, collected and analyzed the prison data, and drafted and edited the final report. We thank U.S CDC for mobilizing most of the resources, approving protocol through the Science Integrity Branch (SIB), and providing technical assistance at each phase of this project. The Ministry of Health provided oversight and technical assistance. The National TB Reference Laboratory (MOH) provided technical assistance for collecting, transporting, and processing samples for laboratory testing both in peripheral sites and central laboratories. Makerere University of Public Health provided overall management and coordination, sampling, and the implementation team and the respondents. This survey would not be possible without the strong commitment of UPS leadership, staff, and the people in prisons themselves. We are very grateful to all of them. We acknowledge the tremendous support from the Commissioner General of Prisons, Dr. Johnson Byabashaija; the Assistant Commissioner of Health-UPS, Dr. James Kisambu; the Assistant Commissioner of National TB/Leprosy Division, Dr. Stavia Turyahabwe; and the Country Director of CDC, Dr. Lisa J. Nelson. We convey our gratitude to Dr. Lisa Mills (CDC), Dr. Samuel Sendagala (CDC), Kavuma Charles (CDC), Grace Nantege (CDC), Rose N Bbosa (CDC) and Dr. Marungu Leonard (UPS), Dr. Simon Muchuro (MOH) for the technical assistance. We thank Mr. Charles Butagasa (UPS), Mr. Kasule George William and Ms. Prossy Nabateregga for the technical support towards laboratory testing of collected samples. We also thank Mr. Kenneth Mwambi from the CDC office of the Associate Director for Science for his dedication and guidance during protocol, development, clearance and compliance with sponsor requirements throughout the survey. The Radiology team led by Mr. Tugumisireze Didas did a great job.

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The survey demanded special authorization from UPS, as well as commitment, dedication, and sacrifice from the study team. Weekly meetings for the survey team allowed sharing of experiences, lessons, and best practices that guided the course throughout the survey period. Special thanks go to Dr. Simon Kasasa (Senior Lecturer, MakSPH, the Principal investigator), Dr. Deus Lukoye (the survey co-lead from CDC), Dr. Simon Walusimbi (MakSPH) and the field team leaders. In addition, the survey team appreciates the following people who contributed to the writing of the study protocol: Dr. Moses Arinaitwe, Dr. Robert Majwala, Ms. Mabel Nakawooya, Mr. Vincent Kamara, Micheal Muhoozi, Jonathan Mayito, Veronicah Masanja, Nswemu Kaggwa Michael and Dr. Joseph Andama. Many thanks to the very capable and diligent members of the five field teams who worked tirelessly to implement the study in unique settings. Your cooperation, innovativeness, and commitment made the entire exercise worthwhile.

To all those not mentioned by name, especially survey participants, including people in prison and prison staff, you are dearly acknowledged. Your contribution to this survey will greatly inform the programming of infectious disease response among people in prison and prison staff in Uganda and beyond.

Signed by CGP

FOREWORD

We are delighted to present to you findings from a national survey that aimed at estimating the burden of tuberculosis (TB), HIV and COVID-19 among people living in prisons (PIP) and prisons staff in Uganda. This survey was based on a national representative sample of 6047 PIP and 825 prisons staff from 38 prisons distributed throughout the country.

The survey collected information on socio-demographic characteristics, respiratory signs and symptoms, and COVID-19 vaccination status. All participants were screened for TB using a digital chest X-ray. Sputum and blood samples were collected to test for TB, HIV and past COVID-19 infection related indicators. Current COVID-19 status was established from nasal swabs. An assessment tool was used to capture information on ventilation and crowding of wards where sampled PIP resided.

The national indicators measured from this survey will guide all partners on TB, HIV, and COVID-19 to appropriately improve service delivery models in UPS and other congregated populations. UPS will further utilize this information to justify additional resources to ensure proper health and quality of life for PIP and prison staff PIP in the county.

The prevalence survey was conducted by Makerere University School of Public Health in collaboration with the National TB and Leprosy program/Ministry of Health, the Centers for Disease Control and Prevention (CDC) and UPS. Regional referral Hospital provided support for sample testing and storage.

This survey would not have been possible without funding from the U.S President's Emergency Plan for AIDS Relief (PEPFAR) through the U.S Centers for Disease Control and Prevention .

We acknowledge the efforts of the local experts and international partners that were involved in the protocol design, survey planning and implementation, analytics and writing this report. We are grateful to the Commissioner General of UPS for granting us access to PIP and prisons staff in the entire country. We are grateful to our field team and survey participants who provided their time and data for improved services delivery for the entire country.

We hope that partners involved in TB, HIV and COVID-19 control in prisons and other congregated populations will find the report useful for proper planning and evidence-based decision making.

Signed by DG /PS

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List of abbreviations and acronyms

Acronym	
ACP	AIDS Control Program
AIDS	Acquired Immunodeficiency Syndrome
ATBD	Active tuberculosis disease
BCG	Bacillus Calmette Guerin
BMI	Body mass index
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CPHL	Central Public Health Laboratory
CTU	COVID-19 Treatment Unit
CXR	Chest X-ray
DST	Drug susceptibility testing
HIV	Human Immunodeficiency Virus
ICU	Intensive Care Unit
IGRA	Interferon Gamma Release Assay
IRB	Institutional Review Board
LTBI	Latent tuberculosis infection
LMIC	Low- and middle-income country
MDR-TB	Multi-drug resistant tuberculosis
MOH	Ministry of Health
NTBPS	National TB Prevalence Survey
NTLP	National Tuberculosis and Leprosy Program
OC	Officer in-charge
PLHIV	People living with HIV
PPS	Probability proportional to size
PTB	Pulmonary tuberculosis
QFT	QuantiFERON-TB Gold plus
RDT	Rapid diagnostic test for COVID-19
REC	Research and Ethics Committee
RRH	Regional Referral Hospital
SOPs	Standard Operating Procedures
TPT	TB Preventive Therapy
TB ICF	Tuberculosis Intensified Case Finding
UNCST	Uganda National Council of Science and Technology
UNTBCP	Ugandan National Tuberculosis Control Program
UPHIA	Uganda Population-based HIV Impact Assessments
UPS	Uganda Prisons Service
UPS BBHS	Uganda Prisons Service Biobehavioral Survey
WHO	World Health Organization

* Acronyms that require specific working definitions have been recorded below instead

Operational Definitions

Term	Working Definition
95-95-95	The next stage of the Fast-Track Strategy to end the AIDS epidemic. By 2030, 95% of people living with HIV will know their HIV status; 95% of people diagnosed with HIV will be on ART; and 95% of people on ART will have Viral Load Suppression.
Acquired Immunodeficiency Syndrome (AIDS)	AIDS is a disease that can develop after HIV causes severe damage to the immune system, leaving the body vulnerable to life-threatening conditions such as infections and cancers.
Active Tuberculosis Disease Case	A person infected with ***Mycobacterium tuberculosis*** and showing signs and/or symptoms of active TB disease and is confirmed through Xpert, smear microscopy or clinically.
Antiretroviral Therapy (ART)	Antiretroviral therapy (ART) is treatment of people infected with human immunodeficiency virus (HIV) using anti-HIV drugs. The standard treatment consists of a combination of drugs (often called "highly active antiretroviral therapy" or HAART) that suppress HIV replication. The combination of drugs is used in order to increase potency and reduce the likelihood of the virus developing resistance.
COVID-19 case	An individual with laboratory confirmed COVID using rapid diagnostic test (RDT) or PCR.
Xpert Ultra	A WHO-approved cartridge-based rapid diagnostic test that uses molecular technique to identify pathogens from human laboratory specimens. Can be utilized for TB diagnosis, COVID diagnosis, HIV Viral load, and other assays of interest. When used for TB, it simultaneously detects Mycobacterium tuberculosis (MTB) and resistance to Rifampicin.
HIV Viral Load (VL)	The concentration of HIV in the blood, usually expressed as copies per milliliter (mL)
HIV Viral Load Suppression (VLS)	An HIV VL of less than 1,000 copies per mL of blood
Human Immunodeficiency Virus (HIV)	HIV is the virus that causes AIDS. The virus is passed from person to person through blood, semen, vaginal fluids, and breast milk. HIV attacks CD4 cells in the body, leaving the HIV-positive person vulnerable to illnesses that would have otherwise been eliminated by a healthy immune system.
PIP (synonymous with Prisoners)	All individuals described as either convicted, remanded or debtors within the Uganda prisons.
Informed Consent	Informed consent is a legal condition whereby a person can give consent based upon a clear understanding of the facts, implications, and future consequences of an action. In order to give informed consent, the individual concerned must have adequate reasoning faculties and have possession of all relevant facts at the time he or she gives consent.

Latent (hidden) TB Infection	A state of persistent immune response to stimulation by M. tuberculosis antigens without evidence of clinically manifested active tuberculosis and with bacillary replication absent or below some undefined threshold as a result of immunologic control.
Mycobacterium tuberculosis	The bacterium that causes tuberculosis.
People Living with HIV	People having HIV virus in their body.
Prisons Staff	All those working within Uganda Prison Services.
SARS-CoV-2	The virus that causes COVID-19.
Tuberculosis Preventive Therapy (TPT)	The administration of one or two tuberculosis medicines to individuals with latent infection with M. tuberculosis in order to prevent progression to active TB disease.

Collaborating institutions

Institution	Responsibility
Makerere University School of Public Health Kampala, Uganda	Overall development and implementation of the survey in UPS. Activities included protocol development, ethical approval, training of the field teams, data collection, analysis, report writing, dissemination of findings and overall survey coordination process.
Ministry of Health, Uganda P.O. Box 7272 Kampala, Uganda	Overall coordination of the project and alignment with national program goals for TB, HIV and COVID-19. MOH participated in data collection, training, laboratory support, securing mobile X-ray machines, writing and interpretation of survey finding and dissemination.
Uganda Prisons Service (UPS) under Ministry of Internal Affairs Parliament Avenue P.O. Box 7182 Kampala, Uganda	UPS prepared the survey sites, sensitized the PIP and staff about the survey, provided healthcare services to survey cases accordingly and participated in dissemination of the survey findings.
U.S Centers for Disease Control and Prevention (CDC): Uganda Plot 51-91 Nakiwogo Rd. Entebbe, Uganda	Technical advice on project at all stages of development and implementation including design and oversight, data analysis and dissemination of findings. CDC was 'non-engaged' in project, meaning that CDC staff did not interact directly with survey participants or view identifiable data.

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Executive summary

Background: Globally, tuberculosis (TB) remains a major public health problem. In prison facilities, TB poses a more serious problem than in the general population, due to several social and environmental factors. Transmission of TB and progression of latent TB infection (LTBI) to active TB disease (ATBD) in prisons have been reported to be much higher than that in the general population (1-3). This is attributed to several factors such as high HIV prevalence, overcrowding, closed living conditions, insufficient ventilation, and the typically low socio-economic status, poor nutrition, and poor health conditions of people in prison (PIP) (4). TB notification rates for PIP are 11-18 times higher than those of the general population. Without adequate case-finding and completion of treatment for both LTBI and ATBD prior to release from prison, PIP may spread TB to the community. In addition, multi-drug resistant TB (MDR-TB) is more frequent in prisons and fast becoming an emerging threat to national TB control progress (5, 6). The TB notification rate in Uganda prisons in 2023 was 1,786/100,000, nine times greater than that in the general population (193/100,000) (reference).. The high risk of TB in prisons remains an issue of public health significance in Uganda. However, the actual prevalence of TB (both active and latent) among PIP in Uganda prisons was unknown to inform appropriate TB prevention and control measures. This contributed to delay in the generation of policy guidance and achievement of set targets for TB prevention care and support. Not only are prison populations at a higher risk of TB than the general population, but also HIV infection, attributed to several risk factors both before and after incarceration. HIV prevalence among PIP in the Sub-Saharan Africa countries varies from 2.3% to 34.9%. Surveys conducted in Uganda showed HIV prevalence among PIP in the range of 11% (2009) -15% (2013). Due to the same factors that favor transmission of air born infection in prisons summarized earlier in this report, there is also an assumed higher burden of COVID-19 in prison settings. This survey aimed at establishing the prevalence and determinants of TB, COVID-19, and HIV among PIP and staff in Uganda prisons in order to generate evidence that will both provide a baseline burden and inform future interventions to effectively respond to these public health challenges.

Methods: This national survey employed a cross-sectional two-stage cluster study design. A nationally representative sample of 5,273 male PIP, 774 female PIP and 825 prisons staff was randomly selected. A total of 27 prisons were selected with probability proportional to prison size for male PIP and staff. The female PIP were selected from 11 prisons in the entire country. All PIP and prison staff working at the facility at the time of survey implementation were eligible to participate.

The survey collected information on demographic and social status, respiratory signs and symptoms, and COVID-19 vaccination status. Following the radiological safety precautions, all participants were screened for TB using a digital chest X-ray (CXR). Morning sputum and blood samples to test for TB and HIV and TB-related indicators plus past COVID-19 infection were collected. In addition, the survey did nasal swabs for current COVID-19 testing. Participants with positive test results were managed per Uganda Prison Services/Ministry of Health care guidelines. Survey implementation included pilot testing tools and methods, pre-visiting all the sampled prisons, and actual data collection. All laboratory and CXR data were linked to the interview forms using a pre-printed barcode.

Weighted analysis was conducted using the weights calculated from the two sampling stages of the study. The disease-specific prevalences were estimated at the national level. Data analysis was carried out using the survey module in STATA version 17.0.

Results:

TB: Among the 5, 214 inmates, active TB was found in 88 inmates including 85 male and 3 female inmates, giving an overall TB prevalence of 1.9% (95%CI: 1.6%-2.4%). TB prevalence by duration in prison

was 3.5% (95%CI: 2.5% - 4.8%) among inmates with less than 1 year, 1-2 years was 1.5% (95%CI:1.0% – 2.3%), > =3 years was 1.2% (95%CI: 0.8% – 1.9%). Among 6,065 participants, 5,903 (97.3%) underwent a four-symptom screen, 2,380 (40.3%) had at least one symptom and 46 (0.8%) were confirmed with TB after Xpert MTB/RIF testing (Figure 1). Of the 3,523 without TB symptoms, 30 (0.85%) had a suggestive CXR and 10 (33.3%) were confirmed to have TB through Xpert MTB/RIF testing. Of the 3,493 whose CXR was not suggestive of TB, 37 (1.1%) were confirmed with TB. Introducing CXR screening among symptom-negative participants would increase TB case finding by 21.7%. Universal Xpert MTB/RIF testing would increase TB case finding by 102% (+47 cases).

HIV: A total of 5,743 (94.7%) were tested for HIV: 4,374 (94.1%) male PIP, 686 (97%) female PIP, and 683 (96.1%) staff. HIV prevalence was 10.9 % (95% CI: 10.0%-11.9%): 21.1% (95%CI: 18.2%-24.4%) among female PIP, 11.1% (95%CI: 10.2%-12.1%) among male PIP, and 2.3% (95% CI: 1.4%-3.8%) among staff. Out of the 654 participants with HIV, 606 (92.4%) were aware of their status, of whom 99.2% (601) were on antiretroviral treatment (ART). Among those on ART, only 70% (394) had viral load suppression (VLS). All staff with HIV had VLS; VLS among female PIP was significantly lower than that of male PIP (53.1% vs. 69.9% (p <0.0001)). VLS varied by region: 59.0% in Eastern to 83.5% in Central region.

COVID-19: Majority of PIP (82.1%, 4,393) and staff (98.2%, 699) reported receiving COVID-19 vaccines, with 39.8% (1,749) of PIP and 53.2% (370) staff receiving two doses; 67.3% (2,957) of the PIP and 93.9% (658) of the staff were vaccinated in prison. A total of 5,155 (96.3%) PIP and 677 (95.2%) staff were tested for COVID-19 antigen; five (0.1%) PIP and zero (0%) staff tested positive for acute infection. Of 3,893 (75.5%) PIP and 466 (68.8%) staff tested for COVID-19 antibody, 3,159/3,333 (94.7%) of male PIP, 95.9% (537/560) of female PIP and 98.4% (459/466) of staff tested positive for antibody to the nucleocapsid (N), indicating prior infection. Prior COVID-19 infection significantly differed by sex, participant category, inmate type, but did not differ significantly by age group, and region.

Ventilation and crowding: A total of 263 wards in 31 prisons (21 male, 68%) were assessed. Only 13 (4.9%) wards had an adequate surface area for air exchange, including all 12 wards in one women's prison and the only ward in one men's prison farm; none of the wards had mechanical ventilation equipment. Almost all wards (252, 95.8%) and prisons (26, 83.9%) were overcrowded, with 90% more occupants than recommended (2,694 in space designated for 1,415 PIP) across 31 prisons.

Conclusions: Despite current practices to reduce TB in prisons, TB prevalence among prison inmates is seven times higher compared to the general population. TB prevalence is particularly high among new prison inmates. HIV prevalence among PIP in Uganda was high - almost twice that in the GP. The 2nd 95 was achieved but the 1st and 3rd were still below the target of 95%. COVID-19 current infection was low, this could be explained by the stringent isolation policy that was enforced by the prison authorities, while promoting vaccine uptake among prisoners and the prison staff. Most Uganda prisons were overcrowded and had poor ventilation. This may contribute to high TB transmission and the observed high TB notification rates.

Recommendations: GeneXpert testing for all, beyond symptoms screening, double TB case-finding in prisons. Uganda prisons could consider universal Xpert MTB/RIF testing during periodic mass TB screening exercises to minimize missed opportunities for TB case finding in this population. Enhanced diagnosis and treatment for HIV among Ugandan PIP are needed to meet 2025 targets. Improving ventilation such as through the installation of mechanical ventilation systems and reducing crowding such as through the implementation of non-custodial sentences may reduce TB transmission in Uganda prisons.

Section 2: Introduction

2.1 Background

2.1.1 Tuberculosis

Tuberculosis (TB) remains a major public health problem. In 2022, TB was the world's second leading cause of death from a single infectious agent after coronavirus disease (COVID-19), and caused almost twice as many deaths as HIV/AIDS (TB Global report 2023). In addition, it is the number one cause of death among people living with HIV (PLHIV) (7, 8). In 2020, an estimated 5.8 million TB patients were reported, a drop by 18% from 7.1 million in 2019 which is largely attributed to COVID-19 outbreak which might have caused a reduction in case-finding. Both TB and COVID-19 are airborne and the combination of the two medical conditions is deadly because of the associated high mortality levels. Despite the drop in the number of TB patients, overall there was an increase in TB death to 1.5 million compared to 1.2 million in 2019. Of the total TB deaths, 214,000 (14%) were among the HIV co-infected (9).

It is estimated that almost a quarter of the world's population has latent TB infection (LTBI), 5–20% of which will progress to active TB (ATBD) during their lifetime (10, 11); PLHIV are even more likely to progress from LTBI to ATBD. LTBI poses a major barrier to global TB response acting as a reservoir for the ***Mycobacterium tuberculosis***, the bacteria that causes TB. Reactivation of LTBI has been documented to account for over 80% of new cases of TB disease in some settings (12). Additionally, multi-drug resistant tuberculosis (MDR-TB) remains a public health threat globally with 1.5 million patients expected between 2018–2020, of which only 483,000 (32%) were reported in 2020 (11).

Uganda is ranked by the World Health Organization among the highest TB/HIV burden countries in the world (9). A national population-based TB prevalence survey conducted in 2014-2015, reported that about 50% of incident TB patients were not notified to national program (41,000/82,000 estimated TB cases annually).

2.1.1.1 TB in Prisons

Globally, an estimated 11 million people are held in penal institutions on any given day. Further, due to a combination of overcrowding, poor ventilation, poor nutrition, and the lack of access to quality TB care services, prisons are recognized as high-risk environments for TB transmission to people in prison (PIP) and prisons staff (14). Until recently, prisons have been a neglected reservoir for transmission of TB infection and development of TB disease particularly in low-income countries in sub-Saharan Africa (15, 16). In addition, prisons serve as reservoirs for transmission of TB infection to the general community through released PIP, visitors, and prison staff (17). Studies conducted to assess the prevalence of drug resistance and risk factors for acquiring ATBD in prisons revealed high TB prevalence in prisons, in the range of 3 to 1,000-fold that in the general population, as well as higher levels of multi-drug resistant (MDR)-TB and Extensively Drug Resistant (XDR)-TB (15). Relatedly, TB notification rates for PIP are 11–18 times higher than those of the general population (18). Studies have also indicated that TB exposure in prisons is responsible for 8.5% and 6.3% of all TB patients in high- and low-income countries respectively (1).

The high burden and potential for transmission of TB in prisons therefore calls for interventions to identify LTBI before disease onset as well as active case finding for ATBD (19). Current interventions include treating PIP with LTBI to prevent progression to disease (20), and mass screening of entire prison populations and treatment of those found to have ATBD (21).

2.1.1.2 TB services in Uganda Prisons

Uganda Prisons Services (UPS) had a standing population of approximately 62,000 PIP in 259 prisons with an annual turnover of 140,000. Findings from a rapid assessment in Uganda in 2008 estimated that the TB prevalence is 654/100,000 among PIP (27), more than three times higher than it is among the general population (183/100,000). According to UPS reports, approximately 1,000 drug-susceptible and 30 MDR-TB patients are treated in UPS annually. UPS implements routine TB screening in prisons at four key time points: upon entry and exit, regularly during ongoing incarceration, and at all medical visits. UPS implements TB intensified case finding (ICF) and COVID-19 symptom screening when PIP are admitted and prior to exiting the prison, during ongoing incarceration with routine cough monitoring in each prison ward, and with ICF and COVID-19 symptom screening during every medical visit. Periodically, mass screening exercises are conducted for all the PIP depending on the need and availability of resources.

UPS follows the national TPT guidelines where all PIP eligible for TPT are screened for signs and symptoms of ATBD using the 4-symptom screening approach including current cough (cough within 24 hours or more), fever, weight loss and profuse night sweats. All HIV infected PIP and staff who screen negative for the four symptoms are initiated on TPT. With the ongoing transition of the national TPT program to once-weekly dose of isoniazid (INH) and rifapentine (RPT) for three months (3HP), UPS was prioritized, and by the time of the survey it had implemented a 3HP based TPT program for all the new PLHIV who fulfil the eligibility criteria.

Patients with ATBD in Uganda prisons are also routinely identified by cough monitors, who are selected among fellow PIP and health workers either at out-patient department, inpatient or at health care service points such as ART clinic, Maternal and Child Health clinics using the intensified TB case finding (ICF) tool. If a PIP is identified as having symptoms by cough monitors, their sputum samples are collected for Xpert Ultra testing. For facilities with chest x-ray equipment, radiological diagnosis is done guided by the national TB diagnostic algorithm. Confirmed ATBD patients are isolated from other PIP without ATBD for treatment. Uganda Prisons has designated six TB isolation units at health facilities including Kitalya minimax, Jinja main, Gulu main, Murchison Bay hospital, Mbarara main and Mbale main prisons. Other prison facilities have improvised isolation spaces while those without improvised rooms/isolation facilities will refer patients to other public health facilities for TB treatment and follow up accordingly. Prison staff receive medical care at established UPS health facilities or general public health facilities that are close to their workstations.

Limitations in TB diagnostic capacity, challenges in screening and diagnosing LTBI and ATBD within UPS are common, contributing to delayed initiation of preventive therapy or treatment for patients. To better inform planning for an effective TB response in UPS, there was need to generate an accurate estimate of patients with ATBDs and LTBI among the PIP and the prison staff. This survey aimed to assess the prevalence of active and latent TB among PIP and staff in UPS, in order to generate evidence that will inform future interventions**.**

2.1.2 SARS-CoV-2 and COVID-19 Disease

2.1.2.1 Outbreak of coronavirus disease

COVID-19, a disease caused by the SARS-CoV-2 virus, was first reported in early December 2019 in Wuhan China (28). The number of patients confirmed to have the disease rapidly increased and on 30th January 2020, the disease was declared a public health emergency of international concern by

the World Health Organization (WHO). As of 20th March 2022, over 468 million confirmed cases and over 6 million deaths have been reported (29). COVID-19 posed a significant global health emergency especially in under-resourced health settings. Africa has faced many well-documented barriers to addressing pandemics, and COVID-19 strained existing health infrastructure. Uganda reported its first case of COVID-19 on 21st March 2020, and since then more than 170,000 cases and 3,500 deaths have been reported as of September 2024. The first outbreak of COVID-19 in Uganda Prisons was reported among 154 PIP at Amuru prison in August 2020 (32), and several outbreaks have been identified and managed during the course of the pandemic to date. In Uganda's prisons specifically, by 7th February 2023, a total of 2,281 PIP and 247 staff had been diagnosed with COVID-19, with 8 deaths. A total of 2,457 (2,212 PIP and 245 staff) recoveries were registered at that time.

2.1.2.2 COVID-19 management in UPS

Like TB, COVID-19 poses challenges in prisons, because of its high transmissibility in congested settings. When the COVID-19 pandemic began, UPS with support from Ministry of Health and other stakeholders implemented prisons-specific measures to identify, contain, and mitigate COVID-19 in prisons.

UPS established COVID-19 Standard Operating Procedures (SOPs) and IPC measures which guided the entire process including one of the measures refusing visits to PIP in prisons. COVID-19 SOPs were developed and adopted throughout UPS beginning in March 2020. They included IPC measures such as hand washing or sanitizing, wearing of face masks, and social distancing and also the creation of treatment and isolation centers. Additionally, all PIP and staff with COVID-19 signs and symptoms were tested.

Following the onset of the COVID-19 pandemic, the UPS identified 49 prisons within the 16 administrative sub-regions which became isolation centers; later, as the need grew, this number expanded to 83 prisons. At each isolation prison, prison health workers trained in COVID-19 and TB screening and management assessed all new PIP upon arrival. Initially, all PIP remained in isolation prisons for about 6 weeks and were screened for COVID-19, HIV, TB, and nutritional status before they were integrated into main prisons. Later, the quarantine duration was reduced to 14 days, after which the PIP were tested for COVID-19 using a PCR test. If the prisoner tested positive for COVID-19, they were moved to a special ward for COVID-19 cases. Severe cases were transported to any of the five treatment centers in Gulu, Jinja, Mbarara, Kampala, or Luzira Complex, depending on the location.

2.1.3 HIV

The HIV incidence in Uganda among the general population has steadily declined throughout the past decade, to approximately 0.29% [plausibility bounds: 0.17%–0.41%] in 2021 (33). AIDS-related mortality declined steadily during the past decade and is currently estimated at 37/100,000 or approximately 21,800 deaths per year [plausibility limits: 18,000–28,600] in 2019, still far below the number of new HIV infections (33). The preliminary Uganda Population-based HIV Impact Assessment (UPHIA) 2020 survey results indicate the prevalence of HIV among adults aged 15 to 49 years to be at 5.5 % (7.1% among women and 3.8% among men), reflecting a slight decrease from 6.0% in UPHIA 2016-17 (7.5% among women and 4.3% among men). The updated Joint United Nations Programme on HIV/AIDS (UNAIDS) targets for 2025 aim for 95 of those living with HIV to know their status, 95% of those who know their status to be on treatment, and 95% of those on treatment to be virally suppressed. The preliminary UPHIA 2020-21 survey results show encouraging progress toward the achievement of the UNAIDS 95-95-95 targets, particularly among women. Specifically, the survey showed that in adults 15

years and above, 80.9**%** of those living with HIV were aware of their status, 96.1% of those aware of their HIV status were on ART, and 92.2% of those on ART were virally suppressed.

According to a Sero-behavioral survey conducted in Uganda prisons in 2014, HIV prevalence among male PIP was 14.1%, two and half-fold that of the general male population in Uganda. Female PIP had HIV prevalence over three-fold (23.9%) that of women in the general population. HIV prevalence among prison staff (14.7%) was somewhat lower than that of PIP but nearly twice that of adult men and women in the general population. (Uganda Prisons Service Sero-behavioral Survey Report, May 2019). The survey identified several risk factors associated with HIV transmission in prison, and these include being at least 30 years of age, being either in a relationship, having high numbers of irregular lifetime partners, illegal drug use, having sexual relations with someone of the same sex, or history of sexually transmitted infections (STIs). Although the survey was also designed to quantify ATBD, TB testing procedures for the survey failed. As a result, there is a gap in TB data for prisons in Uganda, except for the 2008 rapid assessment mentioned in the TB section above.

Since completing the 2013-2014 survey, UPS, with the support of PEPFAR, built a robust HIV and TB prevention, diagnosis, care and support program. To examine successes and gaps in key indicators of HIV testing, HIV treatment, and HIV viral load suppression, this survey assessed HIV-related indicators and compared them to the findings from 2013-2014. In addition, HIV prevalence among PIP was assessed, allowing us to compare prison prevalence trends to national trends over time. According to UPS health services protocol, testing for HIV among PIP and staff is voluntary.

2.3. Rationale for the survey

A key challenge for reaching the global targets to end the TB epidemic, especially in low- and middle-income countries (LMICs) is the high concentration of TB in specific sub-populations including prisons. These sub-populations serve as reservoirs for the TB epidemic, with spill over into the general population. New evidence indicates that prison-based interventions aimed at improving TB prevention and care in penal systems, including active diagnosis, TPT, screening upon prison entry or exit, and optimized passive case finding, could substantially reduce TB incidence at community and population-level by 40%. Similarly, in Sub-Saharan Africa, where HIV burden is the highest, there is a disproportionate burden among understudied and underserved populations, including prisoners. Uganda is no exception, with HIV prevalence determined at 15% among PIP and at 12% among staff for prisons in 2013 (37). The high prevalence as compared to general populations (7.2% and 5.8% among female and men aged 15 years and above respectively) (42) means prisons have a high potential for increased rates of HIV transmission. The risk is increased by several factors including: sub-standard living conditions sometimes amounting to inhuman or degrading treatment in violation of international law (38), low socioeconomic level of prisoners, illiteracy, history of drug injection, high-risk sexual behavior, tattooing (39) and knowledge gaps and misconceptions about HIV prevention and transmission (20). Consequently, PIP experience high HIV disease burden, and may have limited or no access to HIV prevention care and support. To reduce this burden, there was need to generate evidence to support appropriate services for HIV treatment, prevention, and care services.

Therefore, this survey aimed to gather information on the prevalence of ATBD, LTBI, history of COVID-19 infection, and current COVID-19 infection among the subset of participants with respiratory symptoms. Additionally, data was collected on key factors related to tuberculosis (TB), HIV, and COVID-19, including demographic and behavioral characteristics and COVID-19 vaccination status. The survey collected data on symptoms and radiological screening of air born infection among participants

as well as HIV infection and, access to care and support among HIV positive participants. The data generated could help benchmark for further studies and inform local policies on TB, HIV, and COVID-19 prevention and control. Findings from this survey will enable the Ugandan Prison Service (UPS) to advocate for additional resources to ensure proper health and quality of life for PIP and prison staff PIP in the county.

2.3 Survey Objectives

2.3.1 Overall objective

To determine the burden and factors associated with TB, COVID-19, and HIV among PIP and staff in Uganda prisons, to generate evidence that will inform program interventions**.**

2.3.1.2 Specific primary objectives

i. To estimate the prevalence and associated factors of LTBI among PIP and staff.
ii. To determine the prevalence and associated factors of ATBD among PIP and staff.
iii. To determine the current burden of COVID-19 among PIP and staff using an integrated TB and COVID-19 screening and testing approach.
iv. To establish the burden of past COVID-19 infection among PIP and staff.
v. To determine the prevalence of HIV among PIP and staff.
vi. To determine HIV program achievement and gaps in reference to the UNAIDS targets for HIV testing, HIV positive individuals on treatment, and PLHIV with suppressed viral load (95-95-95).

2.3.1.3 Specific secondary objectives

i. To establish the burden of drug-resistant TB disease among PIP and staff.
ii. To assess the history of past COVID-19 disease and COVID-19 vaccination status among PIP and staff
iii. To establish/document practices on IPC.

Section 3: Methodology

3.1 Introduction

This national cross-sectional survey employed a two-stage cluster design, with probability proportional to population size (PPS) sampling to select prisons at the first stage, and systematic sampling to select PIP and staff at the second sampling stage.

3.2 Study population

The survey population consisted of all PIP and prison staff in Uganda under the UPS by July 1, 2023. By end of July 2023, there were a total of 61,631 PIP in the 259 prisons. Of these, 58,958 (96%) were male PIP. Additionally, a total of , 9,273 prison staff worked in these prisons, of which 6,673 (72%) were males. Prisons were classified as low volume (occupied by <100 PIP), medium volume (100-500 PIP), and high volume (>500 PIP) based on the population in the male prisons by the end of July 2023.

3.3 Eligibility Criteria

3.3.1 Inclusion Criteria

All male and female PIP and prison staff who met the following criteria were eligible for the survey:

- For PIP, current incarceration at the time of selecting a sample in a prison to participate in the survey.
- Prison staff who had been employed in the UPS at the time of selecting a sample of survey participants.
- Aged 18 years and above
- Willingness to participate and able to provide informed consent

3.3.2 Exclusion criteria

- PIP or staff who were unable to provide informed consent
- Those who had mental issues that would preclude them from giving informed consent. In the UPS procedure, PIP undergo mental health screening on entry (screening tools available) and, those who develop abnormal behaviors on wards during incarceration are identified by the peer and/ward leaders and linked to mental health services . UPS maintains a record/ list of mentally unstable PIP. All confirmed PIP with mental health problems are treated following MOH guidelines.
- PIP or staff who were too ill to participate
- PIP in solitary confinement that were high-security risk according to UPS' categorization.

3.5 Sample size estimation

Sample size estimation for male PIP was based on obtaining the prevalence of ATBD at national level and was informed by testing the hypothesis that the ATBD burden in prisons was twice that of the general population, ~253 cases per 100,000 population in the last national TB prevalence survey conducted during 2014/2015. A rapid assessment of TB in prisons conducted in 2008 estimated a prevalence of 649 cases per 100,000 that is, almost three times the burden reported in the national prevalence of 2014/2015. However, the rapid assessment did not employ a rigorous sampling plan to support national-

level inference. Male PIP comprise majority of the prison population and were assumed to have a higher TB burden compared to staff and female PIP. Therefore, using the formula below for detecting a difference between two proportions

$$n = \left\{ \frac{deff * z_{1-\alpha}\sqrt{p_0(1-p_0)} + z_{1-\beta}\sqrt{p_a(1-p_a)}}{\delta} \right\}^2$$

Where;

$deff$; design effect to correct for loss of efficiency due to clustering (1.2 estimated from HIV prevalence study in prisons 2014/2015)

α; significance level (5%)

β; probability of type II error

$1-\beta$; study power (assumed 80%)

p_0; national level active TB prevalence (250/100000

p_a; active TB prevalence in prisons (500/100000)

δ; effect difference (250/100000)

$$n = \left\{ \frac{1.2 * 1.96\sqrt{0.0025(1-0.0025)} + 0.84\sqrt{0.005(1-0.005)}}{0.0025} \right\}^2$$

$n = 4745$; adjusted for a response rate of 90% (pilot study), $n = 5273$ male PIP

Since the burden of active TB is even more rare among female PIP and staff, the required sample sizes needed would surpass the available populations. Therefore, the sample sizes for female PIP and staff were calculated to obtain national representative estimates of the secondary objective that is, the HIV burden. The sampling frame for female PIP at the time comprised of a total of 3032 females. The sample sizes for both subpopulations were calculated using the Kish formula for estimating proportions of non-rare outcomes (Kish, 1965) to provide a maximum sample size and correct for the loss of efficiency due to a clustered design to achieve a reasonable size for national-level estimates. A total of 774 female PIP and 825 staff, respectively, were calculated after adjusting for non-response reported in the last HIV prison survey of 2014 (25.5% and 30% for female PIP and staff, respectively).

$$n = Deff * \frac{z_{1-\alpha}^2 p(1-p)}{\epsilon^2}$$

Where;

$Deff$; design effect (assumed 1.5 from previous study)

$z_{1-\alpha}$; standard normal variate for 5% level of significance

p; proportion (assumed 0.5 to give maximum possible sample) [last survey reported HIV prevalence of 28% among female prisoners]

ϵ; level of precision (5%)

$$n = 1.5 * \frac{1.96^2 * 0.5(1-0.5)}{0.05^2} = 577$$

Adjusting for response rate of 74.5% and 70% for female inmates and prison staff, respectively increases the sample size to 774 and 825 for female inmates and prison staff, respectively.

In summary, the survey targeted a minimum of 6,872 participants that is, 5,273 male PIP, 774 female PIP, and 825 prison staff.

3.6 Sampling of PIP and staff

3.6.1 Sampling frame

The sampling frame used for this survey was the complete list of the 259 prisons in Uganda obtained from the UPS. This list contained additional information of prison location and the number of persons incarcerated and staff per prison. The frame consisted of 1,207 wards, of which 1,051 were for males and 156 were for females.

Further analysis of the prison distribution indicated that most of the male PIP population (63.9%) was located in 33 high-volume prisons despite constituting just 13% of the total number of prisons in the country. Although the 139 low-volume prisons accounted for over 53% of prisons, these hosted just 10% of all male PIP. Given that ATBD prevalence is a rare outcome and transmission is mainly driven by congestion, we selected the study sample from only high and medium-volume prisons (119), which together constituted 46% of all prisons in the country but accounted for over 90% of the prison population. Also, low-volume prisons may a have few PIP with any signs of illness because UPS usually refers sick PIP to larger facilities where medical services are well established. Low-volume prison facilities usually access health services within the community or outreach from the larger nearby prisons and, hence , were unlikely to keep their medical records in prison premises. For these reasons, the survey focused on medium to high-volume prison facilities in the country and on successfully identifying TB patients, the main study outcome.

3.6.2 Sampling procedure

The study employed a two-stage cluster sampling design. In the first stage, prisons were selected using probability proportional to the size of prisons that is the number of PIP. In the second stage, PIP and staff were selected using systematic sampling.

At the first stage of sampling, 27 male prisons were selected with a probability proportional to prison size. This number was determined considering a cluster take of 200 male PIP per prison. Since female prisons in Uganda tend to have low numbers, 11 of these within the proximity of the 27 selected male prisons were selected. This helped with the efficient management of specimen samples. The list of existing prison staff was obtained from the officer in charge's office and guided the staff sampling process.

At the second stage sampling, PIP lists from selected prisons were obtained by the study teams and sorted by ward. Then systematic sampling was used to select PIP spreading the sample over the prison. The study teams worked with UPS health workers and PIP peer leaders to identify the PIP selected in

the sample. For prison staff, in the selected prisons, study teams obtained the list of staff present that day from the office of the in charge (OC) of the prison and selection of participants was also affected by systematic sampling. No replacements were made for either PIP or staff who did not consent to participate in the survey.

3.6.4 First stage sampling units

A total of 38 sampled prisons (27 for male, 11 female) were selected using probability proportional to size sampling at first stage. These were located in 14 out of the 16 administrative regions, in 23 districts as shown on the map below (Figure 1)

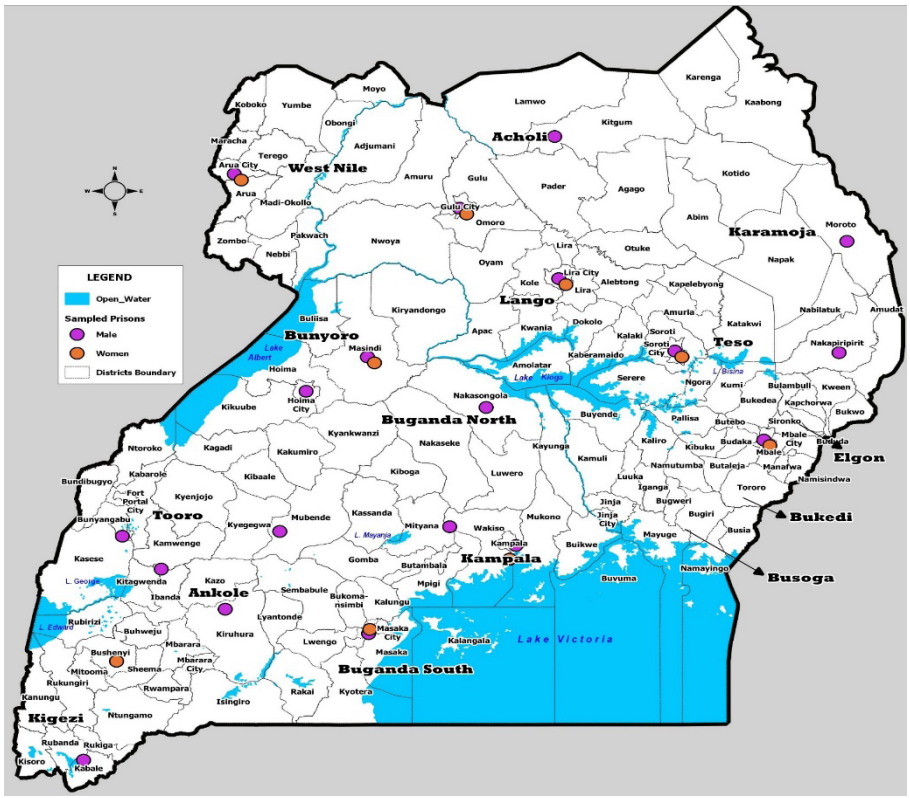


Figure 1: Geographical location of prisons selected in the survey sample

3.7 Survey Implementation

3.7.1 Pre-survey engagements

During the protocol development process, the Director General of health services wrote to the Commissioner General of Prisons (CGP) informing him about the plans to conduct a TB survey in prisons. The CGP cleared the survey and appointed a coordinator to oversee its implementation on behalf of the UPS. After receiving formal approvals, Makerere University school of public health shared a schedule of activities with the CGP who instructed the officers in charge of the prisons to accord the necessary support to survey implementation teams. The letter to the O/Cs received one month before each facility initiated the study activities, included an overview of the study and guidance on how the OC could effectively facilitate and implement the survey among PIP and staff. Prior to the implementation of the survey, the survey team worked with the OC and ward-in-charges to ensure the prison staff made all the necessary preparations for the smooth execution of the survey.

3.7.2 Recruitment and training

Before study implementation, all research team members, including the PI, investigators, survey coordinator, and data managers, were trained/oriented to conduct research with human subjects. The study team was divided into five teams comprising of a field supervisor, interviewers, laboratory technicians, radiographers, and drivers. Survey personnel were selected based on their qualifications and areas of expertise. Each research assistant was required to provide a valid certificate for ethical training. Research assistants received five days of training on standard materials developed by the study leadership team. The training emphasized survey objectives, study design, data collection methods, selection of study participants, completion of survey tools, communication skills, biosafety, expected conduct while collecting data among the PIP and informed consent procedure. Ethics and issues related to research among vulnerable populations like PIP were facilitated by a trainer identified through the local IRB.

Technical staff, including laboratory staff, radiographers, and data managers, were further trained in their subject matter tasks; screening, sample collection, processing, labeling, data management and disposal. Drivers were trained in safe handling of study specimens to minimize possibilities of spillage and wastage. Training involved role-playing and rehearsal of study encounters, with detailed feedback on performance. Upon completing the training, each team member signed a confidentiality form for survey information.

3.7.2 Piloting tools and survey procedures

The survey teams 2 months prior to data collection conducted a three-day pilot in three prisons in Jinja district which were not selected for survey activities namely Jinja maximum for male PIP and female PIP, and remand male prisons. The objective of the pilot was to test the tools and procedures (consent process, recruitment, sample collection, sample processing, and results plus coordination) used in the national survey. Samples were processed on-site and at Jinja Regional Referral Hospital.

Standard operating procedures (SOPs) developed prior to survey implementation were pre-tested during the pilot and pretesting phases. Based on feedback from the survey staff, the SOPs were updated during training and implementation.

All data management procedures and tools, including data collection forms, data entry, data transfer, and feedback loops, were piloted to ensure the identification and correction of illogical or missing steps before the survey started.

Prior to implementation, survey procedures, including the administration of the questionnaire, were pretested in different environments to assess clarity, consistency, and quality across all the survey teams and ensure adherence to the protocol. Learnings from the pre-implementation testing phase were used to refine the procedures accordingly and address any challenges in further SOP development and/or training, as identified.

A questionnaire, X-ray, and field laboratory data were collected on mobile electronic tablet devices using Open Data Kit (ODK), an open-source mobile data collection application. Unique barcoded participant identification numbers (IDs) were scanned, and labels were attached to all the forms, including the consent form.

3.7.3 Site activation

A month prior to data collection, the survey teams including members from MakSPH, UPS, CDC Uganda and MOH visited the 38 survey sites to determine readiness for study activities using a survey activation checklist. Site activation reports were prepared and submitted to CDC detailing activity steps that were not yet fully completed and the documented steps required to meet those standards before survey implementation. The Science Integrity Branch (SIB) at CDC headquarters issued site activation MEMOs authorizing the start of survey implementation activities.

3.7.4 Pre-implementation visits

A team of investigators from the MakSPH, MOH, and UPS survey coordinator conducted a visit to prisons in each of the UPS regions to assess the feasibility of successfully conducting the survey in each facility. During these visits the team sought cooperation from the specific prisons' leadership, met with the PIP peer leaders (Counselors, Cough Monitors, and Expert clients) and sensitized them about the study. These provided a platform for receiving feedback on concerns about PIP participating in the study. A letter from UPS top leadership explaining the study's purpose was shared with peer leaders.

The OC was requested to allow PIP peer leaders to act as witnesses for their colleagues who at the time of the survey were unable to read and write. The team reviewed the possibilities of conducting laboratory tests and identified the nearest health facility with capacity to carry out the testing required for the survey. The survey team identified a senior HIV/TB counselor, who would be in charge of providing post-test counseling and test results, in addition to linking positive participants to appropriate care. Information obtained during this visit was used to develop precise local implementation plans.

3.7.5 Data collection

Data collection was done during the period from 28 July – 30 September 2023, almost a month after the pre-implementation field visit to allow sufficient preparations. The survey teams received security debrief from the OC to ensure their safety and conduct within the prison premises during data collection using the UPS safety and conduct protocols for all visitors to the prisons. For the survey teams, these included the provision of escorts, identifying a secure space for data collection, and mapping emergency exits in case of a major incident. The escorts kept a reasonable distance to ensure privacy and confidentiality of the data collection process. On the first day, the survey team toured the prison, conducted a final sensitization session with PIP in English with a prison translator, sampled and consented the participants, and also gave each participant a sputum container for collection of an early morning sputum sample on the following day (second day). All participants were expected to provide only one sputum sample. On the second day, the survey team conducted interviews and collected all samples including sputum, nasal swab, and blood. Interviews continued for the subsequent days for all sampled participants. The unsampled peer leaders for the PIP supervised the collection of morning sputum to avoid sample sharing. A chest X-ray was taken from all consented participants. The team spent at least five days in each prison.

Data was collected from sampled PIP and prison staff using a questionnaire to participants after collection of biological samples in privacy. It was available on tablets using ODK software. Paper copies of the questionnaire were available in case of equipment failure. Data was collected on socio-demographic characteristics, past medical history, including contact with confirmed TB patients, history of treatment for ATBD and LTBI, HIV testing and treatment history, viral load (for HIV-positive participants), other co-morbidities (Diabetes, hypertension, kidney disease, chronic pulmonary diseases). Further attributes

were captured, including history of COVID-19 infection, COVID-19 vaccination status, evidence of COVID-19 vaccination, and current symptoms of COVID-19.

3.7.6 Presurvey engagement with survey participants

People in prison were initially informed about the study as a group through parade sessions conducted routinely in the morning before daily PIP work sessions. At these sessions, one or more study staff introduced the purpose of the study and explained the presence of study personnel at the prison facility. PIP peers who were routinely engaged in health service provision were linked with the study team. The peer leader then informed the prospective enrollees to meet with the study team in a designated meeting space within the prisons. Using the informed consent forms approved for the survey, a survey team member met with prospective enrollees individually to explain the risks and benefits of participating in the study, emphasizing voluntary participation and that each is free to stop at any stage of the data collection process as s/he wishes. They were informed that survey activities would occur with minimal disruption of daily routine.

The consent form was translated into nine languages including English, Karamoja, Kiswahili, Luganda, Lugbara, Lunyakitara, Luo, Lusoga, and Teso to ensure that all participants understood and made informed choices before participation. Additional study-related information addressing the study objectives, biological testing, the interview process, provision of treatment, and the risks and benefits of study participation were explained. All survey activities, including the informed consent session, were conducted in a private room whenever available. However, in cases where a private room was not available, the study activities were conducted in a survey tent, which provided privacy and allowed participants to complete survey procedures without being overheard or unduly observed. For a few prospective participants informed consent forms were given to them to review and return later if they consented to participate. Survey staff answered any questions, and if an individual accepted participation, informed consent was confirmed through a signed consent form written in the individual's primary language. Primary language translations were verified using back-translation to English.

If a participant was unable to read or write according to self-report, the consent form was read to them. Participants initialed, signed, or made their mark on two identical copies of the informed consent form in the presence of a fellow PIP. Each recruited participant was encouraged to identify a witness of their choice among fellow PIP, peer leaders, or study welfare officers. The Flesch-Kincaid reading level (FK) score for the staff informed consent forms was 62.6%, and the FK score for PIP' informed consent forms was 62.0%, indicating the ease of reading.

One signed consent form was kept in the locked study files which were transported to Kampala and stored in a designated location by the study team. The second copy of the signed consent form remained with the participant. If they preferred not to retain it, both signed copies were maintained in the survey files, and the participant was offered an unsigned copy of the consent form, which, again, they could keep or choose not to take.

After the data collection, the survey team leader provided feedback to local prison authorities and prison health workers on the number of participants, samples collected, and response rates. At the end survey, the team handed over the list of all participants to the health team of each prison and the laboratory identifiers to link results to the participants for action as appropriate.

3.7.7 Confidentiality

All essential documents and electronic files from the survey were securely stored and password protected and only accessed by the survey team. For anonymity and unique identification of different individual participants, each form and register were assigned a pre-printed barcode to keep track of and link participant data. The barcodes identifying the participants were also kept separately from the registers and were only accessible to the study team to enable results dissemination through linkage. Each study participant received a copy of the barcode that was used to access the results. All results were kept confidential and private by the study team. An experienced HIV or TB counselor, identified from a nearby health facility, delivered results to the PIP and staff using the barcode which was used to link participants confirmed with TB, HIV or COVID-19 to appropriate care through UPS health care system.

3.7.8 Study procedures

Consented participants were screened for respiratory symptoms using a structured integrated respiratory screening questionnaire. In addition, all participants had a nasopharyngeal or oral pharyngeal sample obtained for COVID-19 testing. Based on the test results, participants were managed per Uganda Prison Services/Ministry of Health COVID-19 care guidelines. Below is a summary of the procedures.

- *Seeking permission to engage participants and consenting*
- *PIP lists from selected prisons were sorted by ward, and systematic sampling was used to select PIP.*
- *Staff were selected after the staff parade using systematic sampling.*
- *Each respondent was assigned an 8-character pre-printed barcode, which was different from the prison/staff identifier assigned by UPS; these were used to link field, clinical and laboratory results*
- *Sputum sample collection containers were handed to the prison health workers who supported the teams.*
- *From the sample survey, health workers were asked to identify those whose HIV and TB status was known and were requested to retrieve their files for data abstraction (VL and TB results). Participants with unknown status were asked to provide blood and sputum samples accordingly.*
- *All consented eligible participants provided a morning sputum sample for ATBD testing, a blood sample for latent TB, HIV, and viral load (VL) testing (for those who tested HIV positive), a COVID-19 oral-pharyngeal sample, and a screening chest X-ray (CXR) taken.*
- *All female participants were subjected to a pregnancy test before the CXR.*
- *All sputum samples obtained were tested using GeneXpert Ultra (Xpert Ultra) for ATBD. Participants who tested positive for TB were linked to TB care, and an aliquot of sputum sample was sent to the national TB reference laboratory for culture and drug susceptibility testing.*
- *Participants with an abnormal chest x-ray and a negative Xpert Ultra test were referred for further evaluation and management. Those with a normal chest X-ray were managed as per latent TB infection, COVID-19, and HIV status.*
- *LTBI was determined using an interferon-gamma release assay (IGRA). Participants who had a positive IGRA did not have signs or symptoms of active TB disease, and did not have a positive Xpert Ultra test were referred for TB preventive therapy (TPT). Participants who were IGRA positive and had signs or symptoms of ATBD and/or a positive Xpert Ultra test were referred for TB disease care and management.*

The procedures for sample collection were systematically followed as summarized in the study documentation.

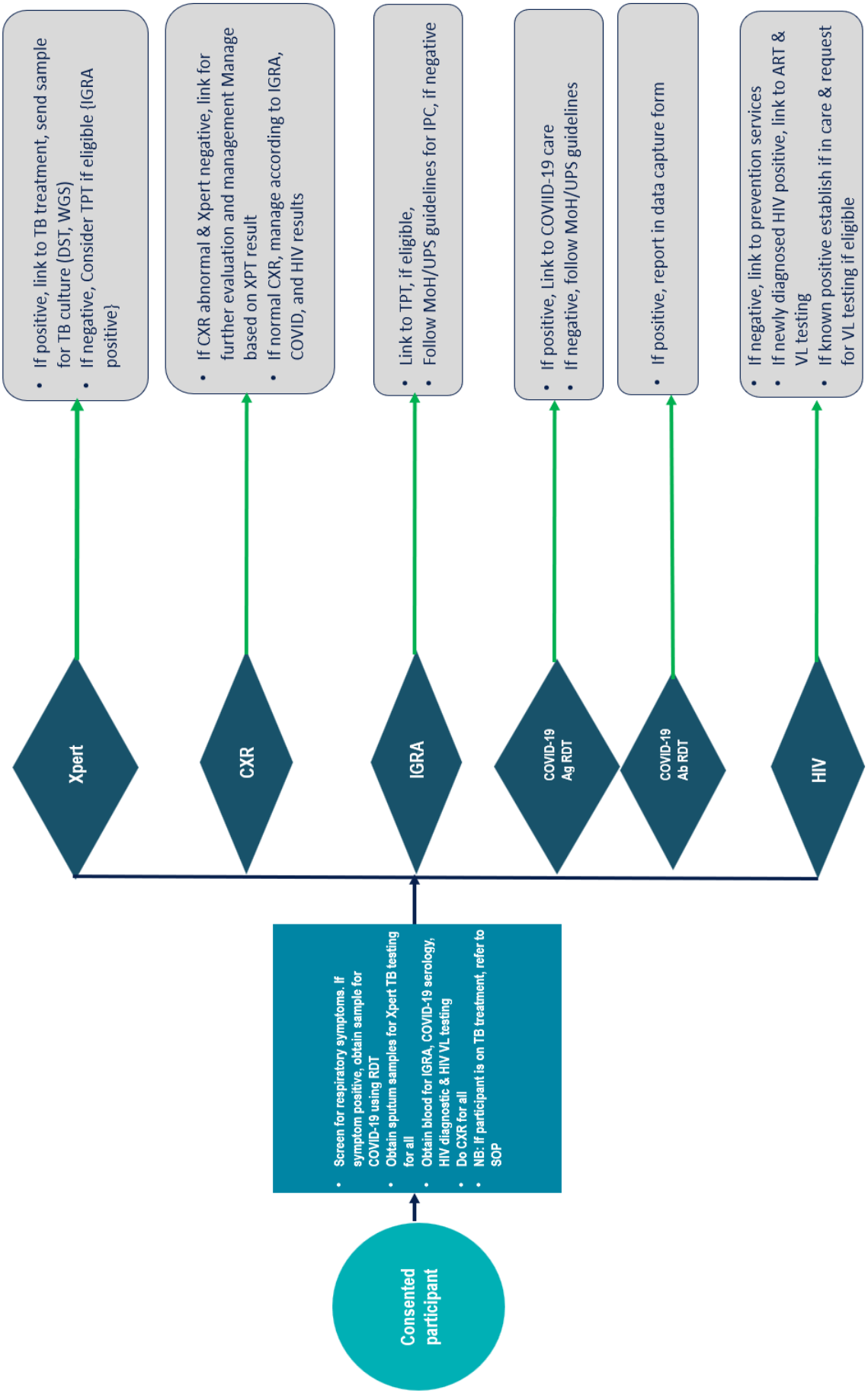


Figure 2: Survey participation procedures and investigations

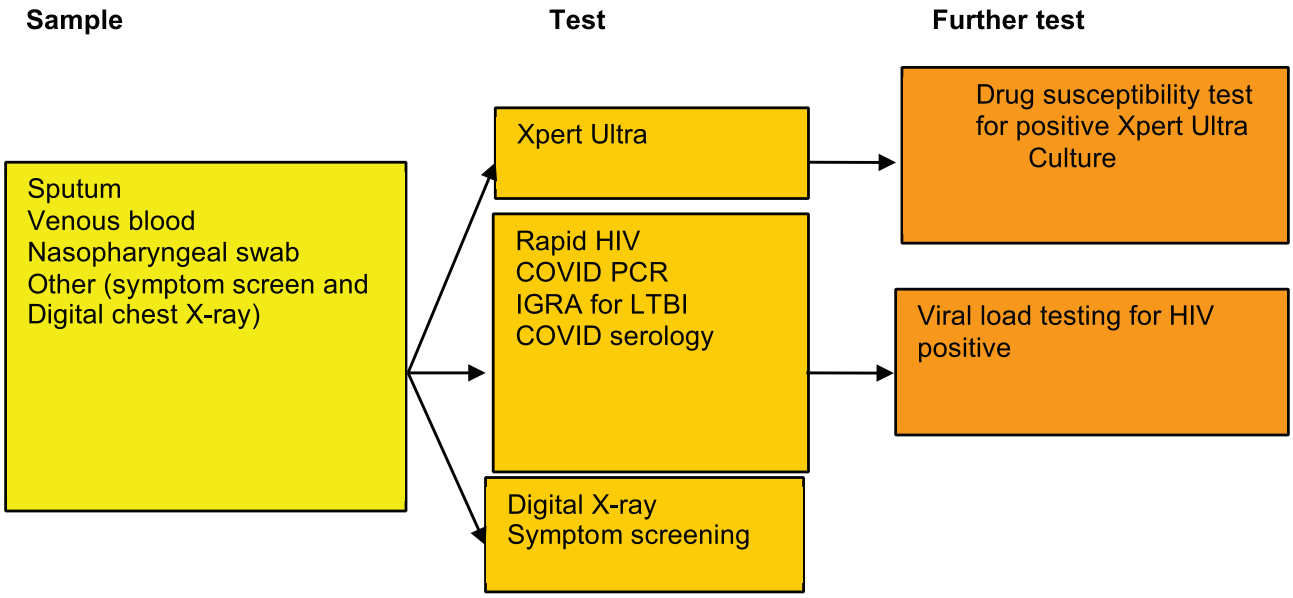


Figure 3: Samples and various tests conducted in the survey

3.7.9 Quality Assurance

Before data collection, the survey team was trained on survey procedures in the protocol and the survey tools. Classroom exercises, role plays, and a pilot study/soft launch were conducted before fieldwork to assess the performance of the field staff in terms of their understanding of the survey concepts. A survey staff member with the best performance in each group was selected to lead the team. The survey data collection tool was programmed with logic checks and scripts to minimize errors and the field manager and team leader checked the data before submitting it to the server.

Data cleaning scripts were also written in STATA and run daily to flag possible errors due to inaccuracy, inconsistency, and incompleteness. Reports from these scripts were shared and discussed through daily meetings between the central survey and field teams to correct errors as necessary.

To ensure maximum quality, all procedures, laboratory tests, and investigations followed the study protocol and agreed-upon standard operating procedures. This allowed for consistency and reduced chances of contamination and erroneous findings/interpretations. Trained field teams were employed to conduct the study. Each field team was under a supervisor who oversaw quality control. In addition, the field teams were supervised by a central survey team (MakSPH, UPS, MOH, and CDC Uganda), who guided and provided oversight of data collection activities, performed quality checks, and provided onsite technical support where needed.

3.7.10 Study Monitoring

As the study sponsor, CDC monitored study activities to ensure scientific integrity and the participants' rights and protection through supervision and auditing activities. During field data collection, CDC teams also conducted review of participant records to confirm eligibility, documentation of informed consent, protocol adherence, data quality, management of any adverse events, and compliance with sponsor-investigator obligations.

3.7.11 Sample collection

3.7.11.1 Integrated Respiratory Screening

The first study procedure to be conducted on the second day was the integrated respiratory screening. The survey implemented integrated respiratory screening of participants, asking specific questions to elicit either presumptive ATBD patients or presumptive COVID-19 cases (or possibly co-infected participants) using the screening tool (Appendix 3)

3.7.11.2 Sputum collection and testing

Early in the morning, the prison health workers provided the containers to the participants and instructed them in how to properly collect the sputum sample. The sample collection was also done under the supervision of the health workers. Once survey staff received this sample, it was placed in a temperature controlled cool box and taken to the nearest identified GeneXpert site. Specimen bottles were labeled on the container with the participant barcode, which was also recorded on the sputum collection and transportation register. The field survey team maintained a sputum collection lab register. Culture and drug susceptibility testing were conducted for all Xpert Ultra positive samples at the National TB Reference Laboratory.

3.7.11.3 Nasopharyngeal swab testing for current COVID Infection

A sterile swab of the surface of the posterior nasopharynx was collected and placed in the tube that contained the transport medium and then taken for analysis using a PCR test, according to the central public health laboratory SOP (*https://www.cphl.go.ug/sites/default/files/2020-07/SOPs%20-%20including%20private%20sector.pdf, p.46*).

3.7.11.4 Blood sample collection for LTBI, HIV, Viral load, and past COVID infection

Qualified laboratory assistant or technician explained to the participants the reason for collecting the samples before samples were drawn, when to expect their results, and where to get them from. A request form, consent form, and unique identifiers were cross-checked to ensure the details matched the participant's particulars. Using a vacutainer, 10mls of venous blood were drawn into the lithium heparin blood collection tube. The samples were labeled with the unique participant barcode and stored in temperature-controlled cool boxes, which were transported to a satellite laboratory for registration in a laboratory information management system, processing into plasma and DBS, and storage at -20°C within 24 hours of collection. Samples were then analyzed for HIV status (2 mls), LTBI (4mls), and COVID serology (2mls). HIV status was determined using the national rapid test algorithm on-site at the UPS health facility. Positive HIV samples underwent additional testing for viral load, per the national protocol, at the Central Public Health Laboratories (CPHL). LTBI was determined using IGRA at regional referral hospitals. Previous COVID-19 infection was determined using a COVID serology (antibody) test. Results from samples that were analyzed off-site were returned through the prison administration, where UPS health workers picked them up for appropriate action.

3.7.11.5 Digital chest X-ray

All participants were screened using a digital X-ray following radiological safety precautions. All female PIP were screened for pregnancy using HCG testing on entry into the Uganda prisons. For purposes of this survey, a repeat HCG pregnancy screening test was conducted for female PIP and staff. Women found pregnant were excluded from radiological TB screening. Each participant received protection in the thyroid area for the duration of exposure. Once the X-ray was taken, the results were reviewed to ensure that it was of good quality before it was shared with the participant.

3.7.11.6 Room assessment for ventilation and crowding

The survey supervisor used the ventilation and crowding assessment tool (Appendix 6) to collect all relevant data. Data were captured in rooms where sampled PIP resided. Information about the expected number of PIP and the actual room population was calculated per the Public Health Act, which recommends floor space of 40 square feet per individual. The floor space per PIP was then calculated using the total floor space divided by the number of PIP in a room. A room was deemed overcrowded if the floor space per PIP was less than 40 square feet. To determine the level of ventilation on the prison wards, the survey team used calibrated tapes to measure the dimensions of the windows and floors to determine the adequacy of open surface areas for natural air exchange.

3.7.11.7 Sample Storage and disposition

All participants' blood samples were aliquoted into cryovials in case of repeat and future testing as per consent form signed. Long term storage was established for a maximum of five years at the designated locations before disposition. The table below shows how each sample was stored before disposition.

Sample	Test type	Site	Storage and retention
Sputum	Raw sputum	Testing sites	Discard after testing
	Culture isolates	NTRL	• Stored 1 vial in storage media (7H9 or 25% glycerol) • Temporarily stored at -20°C • Long term storage at MAKBRC at -80°C for long term storage
Blood	VL Plasma	CPHL	-stored remaining unused sample in a vial -stored at -80°C for long term storage
	IGRA VL	Testing sites	-Stored any remaining plasma per tube in vial -Temporarily stored at -20°C, transferred to MAKBRC for long term storage
	HIV	Testing sites	-Discarded after testing
NPA (Covid19)	Remaining mixture (VTM + Sample)	Testing sites	-Discarded after testing
	Remaining mixture (VTM + Sample)	CPHL	-Aliquoted 1-2ml of remaining mixture (VTM+ Sample). -Stored at -80°C for long-term storage

3.8 COVID-19 Risk management plan

The survey, conducted over two months under Uganda National Council of Science and Technology (UNCST) guidance, implemented rigorous COVID-19 risk management to protect participants and staff. Training included COVID-19 prevention reviews, using both in-person and virtual methods. Screening

for COVID-19 symptoms was mandatory before field deployment, with strict adherence to face mask usage, hand sanitizing, and social distancing. Disposable masks were provided. A standard operating procedure (SOP) was developed for COVID-19 preventive measures, and leadership roles were assigned to ensure compliance with these measures and country-specific pandemic guidelines.

3.9 Data management and analysis

Data was collected onsite at the time of the participant appointment/interview using password-protected tablets using Open Data Kit (ODK) software on a secure, private network, and was synchronized in real-time as data was input. This data was uploaded daily via a secure connection. In case of equipment failure or malfunction, data was collected on paper-based tools and later input into ODK for transmission to the central secure server.

3.9.1 Data cleaning and validation

The survey team ensured that programmed electronic questionnaires were tested and validated to confirm that all the logical skips and plausible ranges in the paper questionnaire worked as expected. Data collected was entered and continuously checked for accuracy, completeness, and consistency throughout the data collection process. The computer tablet and central database had software validation built-in, and the data manager regularly performed consistency checks. The central data management team regularly extracted all data from the server and imported it in comma-separated values (CSV) format into STATA version 16, where cleaning and validation checks were run to flag incompleteness, inaccurate and missing data. Through this process, the data manager obtained a clean and validated dataset to report progress and preliminary results. The datasets and raw CSV files were saved in a business Dropbox account that was password-protected and allowed regulated access to only the data team. The MoH owned the rights to the data, and MakSPH kept all survey data in its possession. Once a week the central data manager ran standardized progress reports and regularly shared them with the study teams and principal investigators and other stakeholders for feedback.

3.9.2 Data confidentiality and safety

The study maintained strict confidentiality for sensitive data, using password-protected ODK tools and assigning unique barcodes to participants for tracking. Only the central data manager accessed linking documents. Laboratory and chest X-ray data were securely managed and linked via barcodes. Paper documents were stored in locked, secure rooms accessible only by data managers. Survey and prison staff received training on data confidentiality, with detailed SOPs developed. Despite prison staff overseeing security, they did not interfere with the survey, ensuring independence. Permissions were obtained from prison authorities, and all research team members signed confidentiality agreements with MakSPH to protect PIP rights, as highlighted during training.

3.9.3 Statistical analysis

Analysis comprised of univariate and bi-variate analysis. Descriptive statistics that is, frequencies and percentages were used to summarize categorical variables, means and standard deviations, and median and interquartile ranges were used to summarize continuous variables. Bivariate methods such as independent t-tests and chi-square tests were used to compare quantitative outcomes and categorical variables, respectively. Survey estimates were weighed using various weights calculated for prison and participant selection at the two stages of selection, participation, and biomarker testing. Data were

analyzed using the survey module in Stata version 16.0.

3.10 Ethical considerations

3.10.1 Ethical review

This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy. 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq, it also received approval from Makerere University Higher Degrees Research and Ethics Committee (HDREC) SPH-2022-264, and the Uganda National Council of Science and Technology (HS2372ES). Survey implementing staff, excluding CDC personnel, interacted directly with participants for data collection, with strict confidentiality measures in place. Approval letters were secured from prison authorities, and preparatory sessions informed prison staff and PIP about the survey, ensuring cooperation. The survey involved collecting various biological samples after securing informed consent, with all data de-identified to protect participant privacy. Positive cases for LTBI, TB, COVID-19, and HIV were referred to the prison medical team for treatment, adhering to UPS guidelines and demonstrating a comprehensive approach to research ethics and participant care.

Risks: The blood and nasal swab collections involved minimal risk, including the possibility of trauma and infection. Participants who became aware of their COVID-19, TB, and HIV infection through survey participation may have experienced anxiety and uncertainty about their health and the possibility of having infected others. Post-test counseling was provided to address these issues along with care, treatment, and referrals as specified by MOH care and treatment guidelines. According to the study, each respondent underwent a CXR examination and was thus exposed to radiation. However, the dose was minimal, and CXRs are part of routine medical practice for clinical examination, presenting little additional risk for participants. Protective measures were applied when X-rays were being taken. There was a risk that misidentification could lead to incorrect diagnoses or inadvertent denial of treatment, but quality control measures minimized this possibility. Due to measures to minimize these potential risks, all of these risks were expected to be extremely rare.

Benefits: Screening and diagnostic testing for COVID-19, TB, and HIV is a standard service in the UPS. Still, the study provided participants with additional diagnostic methods, such as CXR, Xpert Ultra, sputum culture, and IGRA, enhancing case finding in this high-risk population. Participants were actively linked to care and treatment for TB, HIV, and COVID-19. PIP who participated in the survey received two bars of soap, and prison staff were compensated with twenty thousand Uganda shillings (approximately $6.00) for their participation. A soft drink was offered to all participants after blood sample collection. Any protocol changes were subject to IRB review and approval, with adverse events reported as required, including security incidents, confidentiality breaches, delays in test result communication, or adverse reactions from testing procedures and treatment.

Section 4: Results

4.1 Sample selection and distribution

Table 1 details the distribution of survey participants in the five geographic regions categorized by the type of prison (male or female), and subpopulation that is male and female PIP, and prison staff. The sample was selected from 27 male prisons and 11 female prisons. A total of 6,787 survey participants were selected: 5,200 (76.6%) male PIPs, 781 (11.5%) female PIPs, and 806 (11.9%) staff members. The distribution of prisons and participants in the sample by region was calculated to mirror the distribution in the population.

Table 1: Distribution of sampled prisons and participants

Region	Prisons n(%)			PIP and Staff n(%)			
	Total	Male	Female	Total	PIP		
					Male	Female	Staff
Central	8 (21.1)	6 (22.2)	2 (18.2)	1,528 (22.5)	1,200 (23.1)	142 (18.2)	186 (23.1)
Eastern	4 (10.5)	2 (7.4)	2 (18.2)	604 (8.9)	400 (7.7)	142 (18.2)	62 (7.7)
Kampala	3 (7.9)	2 (7.4)	1 (9.1)	533 (7.9)	400 (7.7)	71 (9.1)	62 (7.7)
Northern	11 (28.9)	8 (29.6)	3 (27.3)	2,061 (30.4)	1,600 (30.8)	213 (27.3)	248 (30.8)
Western	12 (31.6)	9 (33.3)	3 (27.3)	2,061 (30.4)	1600 (30.3)	213 (27.3)	248 (30.8)
Total	**38 (100)**	**27 (100)**	**11 (100)**	**6787 (100)**	**5200 (100)**	**781 (100)**	**806 (100)**

4.2 Survey response rates

Table 2 presents the survey response to interviews and various biomarkers. The overall interview participation was high among all the three sub populations: 89.4%, 90.5% and 88.2% for male PIP, female PIP and staff, respectively. Similarly, biomarker testing was high (> 95%) except for COVID-19 antibody testing which was < 80.0% for all sub populations.

Table 2: Interview and biomarker response

Interview indicator	Total	Study population		
		Male PIP n(%)	Female PIP	Staff
Number of eligible individuals	6,787	5200	781	806
	n(%)	n(%)	n(%)	n(%)
Interview response	6,065 (89.4)	4,647 (89.4)	707 (90.5)	711 (88.2)
HIV test	5,743 (94.7)	4,374 (94.1)	686 (97.0	683 (96.1)
TB GeneXpert	5,903 (97.3)	4,517 (97.2)	697 (98.6)	689 (96.9)
TB X-ray	5,883 (97.0)	4,517 (97.2)	690 (97.6)	676 (95.1)
TB IGRA	5,902 (97.3)	4,516 (97.2)	697 (98.6)	689 (96.9)
Covid antigen	5,832 (96.2)	4,466 (96.1)	689 (97.5)	677 (95.2)
Covid antibody	4359 (71.9)	3,333 (71.7)	560 (79.2)	466 (65.5)

4.3 Characteristics of survey participants

Table 3 provides a detailed summary of the background characteristics of participants in the survey. Overall, the median age (IQR) was 30 (25-39) years. Most PIPs had attained a primary education, 60% among male PIP and 56% for female PIP, but as expected staff were more educated, with 64% and 36% having completed secondary and tertiary education, respectively. Christianity was the predominant religion among all groups with over80% belonging to various Christian sects. Majority of the survey population across all groups were married; 85%, 58% and 43% among staff, male PIP and female PIP, respectively. More than half of the PIP (55%) and 45% were on remand. Majority of PIP had been in prison for a period of two years or less (59%), and about a quarter (24%) had stayed for more than four years. Majority (56%) of PIP were serving a period of time in prison but more than 43% did not know.

Table 3: Background and socio-demographic characteristics of survey participants

Characteristic	Total n(%) (n=6,065)	People in Prison n(%)		Staff n(%) (n=711)
		Male (n=4,647)	Female (n=707)	
Age (years)				
Median (IQR)	30 (25 - 39)	30 (24 - 38)	31 (25 - 43)	32 (28 - 39)
Grouped				
18-24	1,400 (25.0)	1,205 (25.5)	164 (23.8)	31 (4.5)
25-34	2,514 (40.2)	1,842 (39.8)	242 (33.7)	430 (60.0)
35-44	1,147 (18.9)	869 (18.8)	144 (20.6)	134 (19.7)
≥45	1,004 (15.9)	731 (15.9)	157 (21.9)	116 (15.8)
Sex				
Male	5,164 (99.2)	4,647 (100)	NA	517 (72.0)
Female	901 (0.8)	NA	707 (100)	194 (28.0)
Religion				
Christian	5,027 (80.0)	3,763 (79.7)	620 (87.9)	644 (89.7)
Moslem	760 (14.9)	671 (15.1)	48 (6.9)	41 (5.9)
Others	278 (5.1)	213 (5.1)	39 (5.1)	26 (4.4)
Education				
None	843 (14.8)	702 (15.1)	140 (20.3)	1 (0.1)
Primary	3,195 (59.0)	2794 (60.3)	397 (55.8)	4 (0.7)
Secondary	1,590 (22.3)	999 (21.4)	142 (19.9)	449 (63.7)
Tertiary	437 (3.9)	152 (3.2)	28 (3.9)	257 (35.5)
Region				
Central	1,175 (22.2)	901 (22.2)	124 (18.9)	150 (25.3)
Eastern	600 (7.7)	399 (7.6)	142 (25.2)	59 (6.3)
Kampala	380 (7.9)	293 (7.9)	50 (5.7)	37 (6.9)
Northern	2,009 (29.0)	1,561 (29.0)	208 (27.3)	240 (29.7)
Western	1,901 (33.3)	1,493 (33.4)	183 (22.9)	225 (31.9)
Marital status				
Single	1,714 (30.6)	1450 (30.9)	167 (22.9)	97 (13.4)
Married	3,588 (58.0)	2687 (57.5)	300 (42.9)	601 (84.7)
Separated	518 (9.1)	409 (9.3)	102 (15.1)	7 (1.0)

Divorced	49 (0.5)	27 (0.5)	21 (2.9)	1 (0.2)
Widowed	158 (0.9)	39 (0.9)	115 (16.0)	4 (0.6)
Unknown				
Category of PIP	n=5354			
Remand	2,434 (44.7)	2,127 (44.7)	307 (43.4)	N/A
Convicted	2,871 (54.6)	2,485 (54.6)	386 (54.8)	N/A
Debtor	29 (0.3)	16 (0.3)	13 (1.7)	N/A
Lodger	20 (0.3)	19 (0.3)	1 (0.1)	N/A
Type of Sentence	n=5354			N/A
Serving a period	2,945 (56.1)	2,550 (56.1)	395 (55.9)	N/A
Life sentence	1 (0.01)	1 (0.01)	0	N/A
Death penalty	6 (0.1)	5 (0.1)	1 (0.1)	N/A
Don't know	2,402 (43.8)	2,091 (43.8)	311 (44.0)	N/A
Duration in Prison (years)	n=5354			
< 1	1,526 (27.6)	1,287 (27.6)	240 (34.9)	N/A
1-2	1,717 (31.2)	1,487 (31.2)	230 (32.2)	N/A
3-4	918 (17.1)	796 (17.1)	122 (16.5)	N/A
5+	1,190 (24.1)	1,075 (24.1)	115 (16.3)	N/A

Additional background characteristics for staff are shown in Table 4. Over half (56%) of staff had served in the UPS for a period of not less than five years and one- third (33%) had worked at the current station for five years plus. Very few staff (4%) resided outside the barracks; 42% lived in the barracks in a single uniport, and about a third (35%) lived in senior staff houses. More than a third (34%) of the staff had a family size of at least four members.

Table 4: Staff specific characteristics

Characteristic	(n=711) n (%)
Staff status	n (%)
Uniformed	673 (94.7)
Civilian	38 (5.3)
Duration as UPS staff (years)	
0-4	312 (43.7)
5 – 10	189 (26.7)
11 – 20	111 (16.0)
>20	99 (13.6)
Duration at the current station (years)	
<1	87 (12.7)
1 – 4	384 (53.9)
5+	240 (33.4)
Current rank	
Cadet	2 (0.3)
Corporal	217 (31.6)
Sergeant	76 (11.2)
Chef	55 (7.8)
Principle Officer	35 (5.5)
Senior Superintendent	10 (1.3)

Assistant Commissioner	3 (0.4)
Other	275 (41.8)
Current Job assignment	
Warden	251 (37.6)
Guard	89 (14.4)
Administrator	56 (7.9)
Officer in charge	17 (2.5)
Others	260 (37.6)
Family size	
0-1	241 (33.6)
2-3	229 (32.1)
>=4	241 (34.3)
Housing situation	
House outside the barracks	27 (4.0)
Senior staff housing in barracks	246 (34.7)
Single uniport in barracks	303 (42.2)
Uniport shared with another family	12 (2.0)
Other	123 (17.0)

4.4 Alcohol, Smoking and other Substance use

Table 5 below shows reported substance abuse behaviors within and outside the prison for both PIP and staff. Tobacco smoking was highest (10%) among male PIP but low among female PIP (1%) and staff (2.1%). Among current male PIP smokers, about two-fifth reported smoking daily and 3.5 times a week, and most (40%) smoked 1-2 sticks per day. Most (30%) had been smoking for a period of two years but close to a half had been smoking for more than five years. This is in line with the high proportion of male PIPs having a duration of stay of five years or less. Drug use is highest amongst staff (25%) and male PIP (22%) but low for female PIP (3%). One third of staff take alcohol but mostly (59%) take 1-2 alcoholic drinks per day. Alcohol intake among PIP was very low.

Table 5: Substance use among survey participants

Characteristic	Total (n=6,065)	Male PIP (n=4,374)	Female PIP (n=707)	Staff (n=711)
	n (%)	n (%)	n (%)	n (%)
Currently smokes tobacco	422 (9.3)	400 (9.5)	5 (0.6)	17 (2.1)
Smoking frequency				
Daily	173 (42.2)	159 (42.0)	3 (60.0)	11 (68.8)
3-5 times a week	166 (38.0)	161 (38.1)	1 (20.0)	4 (20.7)
Once a week	45 (10.5)	43 (10.5)	1 (20.0)	1 (6.0)
Only on weekends	4 (0.9)	4 (0.9)	0	1 (4.5)
On special occasions	34 (8.4)	33 (8.4)	0	0
Duration of smoking (years)				
0-2	125 (29.9)	124 (30.1)	1 (20.0)	0
3-5	98 (23.1)	92 (23.0)	1 (20.0)	5 (31.7)
6-10	97 (22.1)	89 (22.0)	3 (60.0)	5 (28.5)
>10	102 (24.9)	95 (24.8)	0	7.0 (39.9)
Number of tobacco pieces/sticks smoked per day				
1-2	169 (40.5)	157 (40.4)	2 (40.0)	10 (57.4)
3-4	131 (30.2)	124 (30.2)	2 (40.0)	5 (31.6)
5-6	68 (16.4)	67 (16.4)	0	1 (3.9)
7-9	17 (3.9)	17 (3.9)	0	0
>9	37 (8.9)	35 (9.0)	1 (20.0)	1 (7.1)
Smoked before joining prison	1,382 (28.0)	1305 (28.5)	45 (6.2)	32 (3.9)
Ever smoked in the past	271 (6.8)	251 (7.0)	8 (1.2)	12 (1.7)
Use other drugs in prison	1,191 (22.2)	990 (22.2)	26 (3.3)	175 (25.0)
Take alcohol	376 (3.3)	124 (2.7)	3 (0.4)	249 (33.8)
Alcohol drinking frequency				
Daily	51 (19.1)	28 (21.9)	0	23 (7.9)
3-5 times a week	74 (23.1)	31 (25.2)	0	43 (15.7)
Once a week	67 (22.0)	27 (22.9)	0	40 (18.1)
Only on weekends	41 (7.6)	9 (6.4)	0	32 (12.7)
On special occasions	143 (28.1)	29 (23.5)	3 (100)	111 (45.6)
Duration taking alcohol				
1-3	80 (27.1)	36 (29.3)	2 (67.2)	42 (17.7)
4-6	89 (24.4)	32 (25.0)	1 (32.8)	57 (22.4)
7-10	80 (23.5)	29 (24.3)	0	51 (20.7)
>10	127 (25.1)	27 (21.4)	0	100 (39.2)
Alcohol Quantity intake				
1-2	211 (50.9)	59 (48.6)	0	149 (58.9)
3-4	122 (31.8)	41 (31.8)	0	81 (32.6)
5-6	27 (10.9)	14 (12.1)	0	13 (5.9)
7-9	8 (2.9)	4 (3.2)	0	4 (1.9)
> 9	8 (3.6)	6 (4.3)	0	2 (0.7)
Taken alcohol in the past	3,385 (58.9)	2763 (59.3)	0	285 (40.2)

4.5 Screening

All participants were screened for nutritional status, TB symptoms, and chest X-ray abnormalities using the chest X-ray (CXR) analysis, with a CAD4TB score above 60, indicating a suggestion of TB, classified participants as TB suggestive.

4.5.1 Nutritional status

Table 6 provides a detailed overview of the nutritional status of survey participants in Ugandan prisons based on Body Mass Index (BMI) and Mid-Upper Arm Circumference (MUAC).

BMI: The median (IQR) BMI was 21.5 (19.9 – 23.3), indicating a majority in the healthy weight range. Female PIP had the highest median BMI (24), and staff members had a median BMI of 23.6, mostly within the healthy weight range but closer to overweight. Only 9.6% were underweight.

Underweight (<18.5 BMI): Only 9.8% of male PIP, 4.1% of female PIP, and 4.4% of staff fell into this category.

Healthy Weight (18.5-24.9 BMI): Most male PIPs (80.2%) were healthy, compared to 55.4% of female PIPs and 62.2% of staff.

Overweight (25.0 – 29.9 BMI): 8.5% of male PIP, 29.9% of female PIP, and 26.1% of staff were overweight.

Obesity (>=30 BMI): Obesity was least common among male PIP (1.5%), more prevalent among female PIP (10.6%), and observed in 7.2% of staff.

MUAC: Most groups were in the green (healthy) MUAC zone, with 96.6% of male PIP, 98.9% of female PIP, and 99.4% of staff. A small minority were in the yellow (moderate malnutrition) zone: 3.2% of male PIP, 0.9% of female PIP, and 0.6% of staff. Very few were in the red (severe malnutrition) zone, with 0.2% male and 0.3% female PIP, while no staff members fell into this category.

The above results illustrate that prison PIP and staff in Uganda have a generally good nutritional status, with a higher prevalence of obesity among female PIP and staff. Undernutrition is observed mainly among male PIP, with nearly 10% being <18.5 BMI.

Table 6: Nutrition status among study participants

Characteristic	Total (n=6,065) n (%)	Study population		
		Male PIP (n=4647) n (%)	Female PIP (n=707) n (%)	Staff (n=711) n (%)
Weight (kgs) [median (IQR)]	61 (56-66)	60 (56-66)	62 (54.5-70)	68 (61-76)
Height (cm) [median (IQR)]	169 (163 - 174)	169 (163-174)	160 (155-165)	170 (165-175)
BMI [median (IQR)]	21.5 (19.9 – 23.3)	21.4 (19.8-23.2)	24.0 (21.5-27.2)	23.6 (21.2-26.2)
BMI				
Underweight (<18.5)	536 (9.6)	476 (9.8)	27 (4.1)	33 (4.4)
Normal (18.5-24.9)	4,551 (79.8)	3727 (80.2)	384 (55.4)	440 (62.2)
Overweight (25.0 – 29.9)	784 (8.9)	380 (8.5)	216 (29.9)	188 (26.1)
Obesity (>=30)	194 (1.6)	64 (1.5)	80 (10.6)	50 (7.2)
MUAC				
Green	5,887 (96.7)	4481 (96.6)	699 (98.9)	707 (99.4)
Yellow	166 (3.1)	156 (3.2)	6 (0.9)	4 (0.6)
Red	12 (0.2)	10 (0.2)	2 (0.3)	0

4.5.2 Prevalence of TB Symptoms

A participant was considered presumptively positive for TB if they reported any symptoms: a cough lasting at least two weeks, chest pain, blood-stained sputum, weight loss, or night sweats.

Table 7 and Figure 4 outline the prevalence of TB symptoms among study sub populations.

The results highlight the prevalence and duration of tuberculosis (TB) symptoms among people living in prisons. Key findings include:

Current Cough: This was the most common symptom reported by 29.0% of all participants Cough was most common among male PIP (29%) compared to female PIP (16%) and staff (15%). The median (IQR) duration of cough for male PIP (14[7-30]) was twice longer than in other subgroups.

Blood-stained sputum was very rare across all groups, with 1.1% of male PIP, 0.9% of female PIP, and 0.3% of staff reporting it.

Chest pain: A substantial portion of the study population (22.1%) reported chest pain, notably higher among female PIP (25.9%) compared to male PIP (22.4%) and staff (6.5%). The duration of chest pain varied widely.

Weight Loss: This was reported in 11.3% of male PIPs, 9.0% of female PIPs, and 5.3% of staff. The duration of weight loss varied widely especially among female PIPs with a median of 120 (30-365) days.

Night Sweats were a less common symptom, reported by 9.4% of male PIP, 8.5% of female PIP, and 3.0% of staff.

Table 7: TB symptom screening results

Symptom	Total (n=6065)	Male PIP (n=4647)	Female PIP (n=707)	Staff (n=711)
	n (%)	n (%)	n (%)	n (%)
Current cough	1,581 (29.0)	1,360 (29.3)	115 (15.7)	106 (14.8)
Median duration in days (IQR)	14 (7 - 30)	14 (7-30)	7 (5-30)	7 (3-14)
Blood-stained sputum	61 (1.1)	53 (1.1)	6 (0.9)	2 (0.3)
Median duration in days (IQR)	14 (7-60)	30 (7-60)	105 (7-365)	1
Chest pain	1,315 (22.1)	1,088 (22.4)	183 (25.9)	44 (6.5)
Median duration in days (IQR)	31 (14 - 180)	33 (14-180)	120 (14-365)	25.5 (4-360)
Weight loss	634 (11.1)	532 (11.3)	66 (9.0)	36 (5.3)
Median duration in days (IQR)	60 (28 - 120)	60 (28-120)	120 (30-365)	30 (20.5-90)
Night sweats	550 (9.3)	467 (9.4)	61 (8.5)	22 (3.0)
Median duration (IQR)	30 (14 - 180)	30 (14-180)	60 (14-365)	75 (30-300)

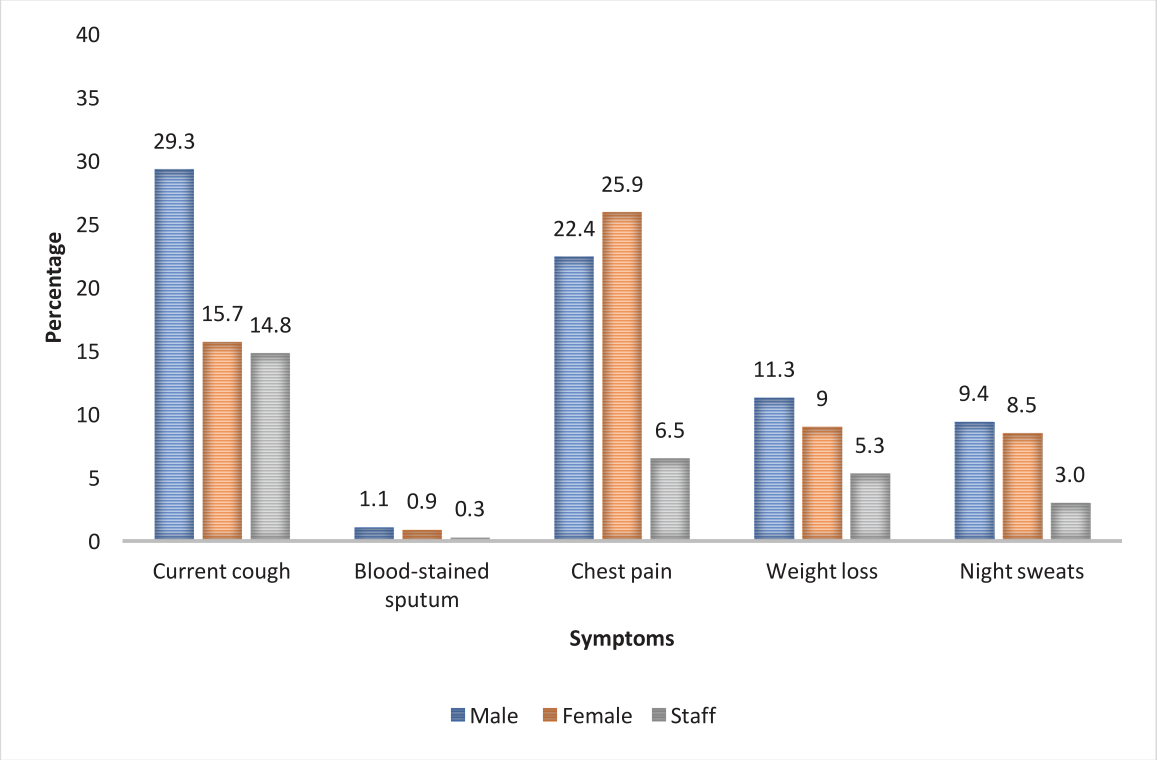


Figure 4: Distribution of TB symptoms reported by study participants

4.5.3 Radiological screening for chest Xray abnormality

Table 8 below shows results of the digital CXR examinations among survey participants. Overall, 1.2% had features suggestive of ATBD while most participants (98%) had a normal CXR. Male PIP had the highest proportion of CXRs abnormality (1.4%) compared to female PIP and staff. Forty-seven (0.8%) of participants had CXRs with abnormalities suggesting other conditions other than ATBD. In general, 182 (3.0%) of the participants had any CXR abnormality including 130 (71%) male PIP, 17 (9%) female PIP and 35 (19%) staff.

Table 8: Chest x-ray results by study sub population

Reading	Total n (%) (n=6065)	People in Prison n (%)		Prison Staff n (%)
		Male (n=4,647)	Female (n=707)	(n=711)
Normal	5,762 (95.0)	4,410 (94.9)	684 (96.7)	668 (94.0)
Suggestive of active TB	74 (1.2)	67 (1.4)	2 (0.3)	5 (0.7)
Suggestive of Healed TB	0	0	0	0
Other abnormalities not consistent with TB	47 (0.8)	40 (0.9)	4 (0.6)	3 (0.4)
Poor Xray	0	0	0	0
Missing	182 (3.0)	130 (2.8)	17 (2.4)	4.9)

Table 9 illustrates variation in characteristics of participants by CXR findings with respect to ATBD. The results highlight disparities across different demographic groups, duration of stay in prison (for PIPs), health statuses, and other characteristics. Variation in risk of CXR findings suggestive of ATBD was almost five times among male PIP (1.4%) compared to female PIP (0.3%)**.** The proportion of male PIP with cough had a three-fold (2.7%) likelihood of having a suggestive CXR for ATBD as compared to participants who reported no history of cough (0.9%). Among participants with blood-stained sputum, an almost ten-fold risk of a CXR suggestive of ATBD was found, as compared to participants with no history of blood stains in their sputum. Chest pain and weight loss were associated with 2-3 times increase in the prevalence of ATBD features on CXR. Past history of ATBD among male PIP had an over ten-fold (11.5%) likelihood of a CXR suggestive of ATBD compared to those who had never been diagnosed with TB prior to the survey (0.9%) while for female PIP, this was almost five times. The role of PIP Status and Incarceration Duration**:** The duration of incarceration and repeat offenses also influenced TB risk, with repeat offenders exhibiting a 2.2% prevalence of TB-suggestive findings, indicating that prolonged exposure and repeated incarcerations elevate the risk of TB.

Table 9: Chest X-ray positivity by selected background characteristics

Characteristic	Chest Xray positivity n (%)			
	Total (n=6,065) n (%)	Male inmates (n=4647)	Female inmates (n=707)	Staff (n=711)
Overall	74 (1.4)	67 (1.4)	2 (0.3)	5 (0.6)
Sex				
Male	67 (1.4)	-	-	4 (0.6)
Female	2 (0.2)	-	-	1 (0.5)
Age group				
18 – 24	12 (0.8)	12 (0.8)	0	0
25 – 34	25 (1.1)	22 (1.2)	2 (0.8)	1 (0.2)
35 - 44	12 (1.3)	10 (1.3)	0	2 (1.5)
45 - 54	12 (3.1)	12 (3.2)	0	0
55 - 64	8 (2.9)	6 (2.8)	0	2 (8.2)
>=65	5 (5.2)	5 (5.2)	0	0
Symptoms				
Cough				
No	38 (0.9)	32 (0.9)	2 (0.3)	4 (0.6)

Yes	36 (2.6)	35 (2.7)	0	1 (0.7)
Blood-stained sputum				
No	69 (1.3)	62 (1.3)	2 (0.3)	5 (0.6)
Yes	5 (12.7)	5 (13.3)	0	0
Chest pain				
No	46 (1.1)	39 (1.1)	2 (0.4)	5 (0.6)
Yes	28 (2.7)	28 (2.8)	0	0
Weight loss				
No	56 (1.2)	49 (1.2)	2 (0.3)	5 (0.6)
Yes	18 (3.4)	18 (3.5)	0	0
Night sweats				
No	56 (1.2)	49 (1.2)	2 (0.3)	5 (0.6)
Yes	18 (3.4)	18 (3.5)	0	0
HIV status				
Negative	53 (1.1)	50 (1.1)	0	3 (0.5)
Positive	21 (4.1)	17 (4.1)	2 (1.3)	2 (8.6)
Volume category				
Low volume	11 (1.0)	9 (1.0)	0	2 (1.6)
High volume	63 (1.6)	58 (1.6)	2 (0.3)	3 (0.3)
TB history				
No prior TB	46 (0.8)	40 (0.9)	1 (0.1)	5 (0.6)
Prior TB	28 (11.3)	27 (11.5)	1 (4.5)	0
BMI				
Underweight	18 (3.5)	17 (3.6)	1 (3.3)	0
Healthy	51 (1.3)	47 (1.3)	0	4 (0.7)
Overweight	3 (0.6)	2 (0.6)	0	1 (0.5)
Obesity	2 (1.0)	1 (1.1)	1 (1.3)	0
MUAC				
Green	66 (1.3)	60 (1.3)	2 (0.3)	4 (0.5)
Yellow	8 (5.5)	7 (5.4)	0	1 (18.1)
Red	0	0	0	0
Duration in prison (years)				
< 1	19 (1.5)	18 (1.5)	1 (0.4)	-
1-2	21 (1.3)	21 (1.3)	0	-
3+	29 (1.5)	28 (1.5)	1 (0.4)	-
Type of inmate				
Remand	27 (1.1)	25	2 (0.6)	-
Convicted	42 (1.7)	42	0	-
Debtor	0	0	0	-
Lodger	0	0	0	-
Officer in charge	0	-	-	0
Others	0	-	-	2 (0.8)
Family size				
0-1	2 (0.8)	-	-	2 (0.8)

2-3	1 (0.6)	-	-	1 (0.6)
>=4	2 (0.4)	-	-	2 (0.4)
Housing situation				
House outside the barracks	0	-	-	0
Senior staff housing in barracks	2 (0.5)	-	-	2 (0.5)
Single uniport in barracks	2 (0.7)	-	-	2 (0.7)
Uniport shared with another family	0	-	-	0
Other	1 (0.9)	-	-	1 (0.9)

-N/A; * chest x-ray positivity estimated by combining 'Abnormal, suggestive of TB (CAD4TB>60%)' and 'Confirmed TB.'

4.5.4 Confirmed ATBD by different screening approaches

Of the 5,903 participants who had a GeneXpert test (figure 5), 2,380 (40%) reported symptoms suggestive of ATBD, and 46 (0.8%) were confirmed through Xpert. Among the 3,523 who did not report any TB symptoms, 30 (0.9%) had a suggestive CXR and 10 (0.3%) were confirmed with ATBD on GeneXpert testing. Overall, of the 2,410 participants who were either suggestive by symptom or CXR, 56 (2.3%) were confirmed with ATBD. A total of 93 (1.6%) participants were confirmed with ATBD on GeneXpert testing including the 37 (0.6%) who were missed by both symptoms and CXR screening.

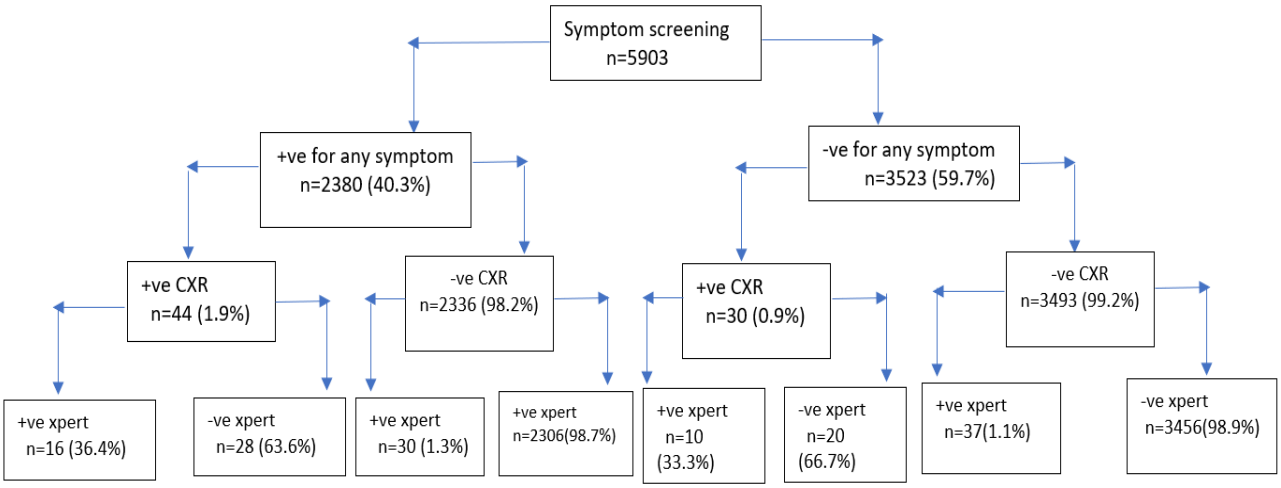


Figure 5: Confirmed ATBD by different screening

4.5.5 Current TB and past TB treatment among survey participants

Table 10 presents information about the history and status of tuberculosis among participants by category. Forty-seven (0.8%) participants were on TB treatment at the time of the survey, including 43 (0.9%) male PIP, 2 (0.3%) female PIP and 2 (0.3%) staff.

Of the total number of participants 289 (5.4%) had ever been treated for ATBD, of which 259 were male PIP, 21 female PIP and 9 prison staff. Among those treated in the past, most male PIP (32.6%) and staff (69.7%,) received treatment in prison. About 60% of male PIP and 42.3% of female PIP had ever sought treatment from traditional healers during the course of ATBD management.

Having been in contact with a TB patient was reported by 25.2% of the participants in general. Prison staff reported the highest level of contact with TB patients at 29.2% followed by male PIP 25.2% while female PIP at 19.1%, reported the smallest proportion having been a TB patient contact.

Eighty seven percent of prison staff had BCG immunization scars, confirming history of vaccination against TB. Among the PIP, vaccination was higher among female PIP with a BCG scar existing on 79.5% of the participants as compared to 70.8% male PIP.

Overall, 31.4% had ever had laboratory test for TB, majority (91%) of these had been done in prison. A higher proportion of male PIP (31.6%) reported having ever had a TB test compared to female PIP (20.6%) and staff (21.3%). Most of these tests were conducted in prisons, 91.5% male PIP, 73.4% female PIP and 63.6% prison staff.

The median duration of symptoms before seeking care for TB and starting treatment shows variability. Both male and female PIPs reported a median of five weeks before seeking care, with a slight increase to six weeks for male PIPs before starting treatment. On the other hand, staff sought care and started treatment within a period of one to two weeks.

High TB treatment completion rates were reported across all groups, 91.9% for male PIP, 94.3% for female PIP, and 88.2% for staff.

Table 10: Current and Past TB information

Characteristic	Total (n=6,065) n (%)	Male PIP (n=4647) n (%)	Female PIP (n=707) n (%)	Staff (n=711) n (%)
Ever been in contact with someone who has TB	1,525 (25.2)	1169 (25.2)	136 (19.1)	220 (29.2)
Evidence of BCG immunization scar	4,505 (71.2)	1300 (70.8)	554 (79.5)	624 (87.0)
Ever had a TB test	1,759 (31.4)	1462 (31.6)	147 (20.6)	150 (21.3)
Place where TB test was done				
In prison	1544 (91.0)	1336 (91.5)	109 (73.4)	99 (63.6)
Out of prison	215 (9.0)	126 (8.5)	38 (26.6)	51 (36.4)
Currently taking anti-TB drugs	47 (0.8)	43 (0.9)	2 (0.3)	2 (0.3)
Median duration on TB treatment in weeks IQR)	8 (5-16)	8 (1-90)	28 (24-32)	1.5 (1-2)
Median duration of symptoms prior to seeking care for TB in weeks (IQR)	5 (2-12)	5 (0-24)	5 (2-8)	1(0-2)
Median duration of symptoms prior to starting TB treatment in weeks (IQR)	5 (2-12)	6 (0-20)	5 (2-8)	5 (0-1)
Ever been treated for TB in the past	289 (5.4)	259 (5.5)	21 (3.0)	9 (1.5)
Place of treatment				
In Prison	99 (32.8)	82 (32.6)	11 (52.0)	6 (69.7)
Public facility	7 (2.4)	7 (2.4)	0	0
NGO facility	11 (4.2)	10 (4.2)	1 (5.7)	0
Private facility	0	0	0	0
Pharmacy/Drug shop	0	0	0	0
Traditional healer	170 (60.0)	158 (60.2)	9 (42.3)	3 (30.3)
Other	0	2 (0.7)	0	0
Completed TB treatment	266 (91.9)	238 (91.9)	20 (94.3)	8 (88.2)

4.6 TB Infection (LTBI) and Active TB Disease (ATBD)

4.6.1 Prevalence of LTBI

Close to half of all study participants, (48.0%) had LTBI; higher among male PIP (47.9%) compared to female PIP (38%) and staff (39%). The prevalence of TB infection was slightly higher in high-volume prisons at 48.6%, compared to low-volume prisons at 45.1% (Table 11).

4.6.2 Prevalence of active TB Disease

Table 11 results indicate confirmed ATBD in 93 (1.9%) participants including 85 (1.9%) male PIP, 3 (0.4%) female PIPs and 5(0.9%) staff. Western and Kampala regions had the higher prevalence at 2.8% compared to Eastern 1.7%, Northern 1.4% and Central 1.0% (NB: regional level estimates should be interpreted cautiously because study was not powered to produce regional level estimates). PIP that had stayed in prison for less than one year had the highest prevalence at 3.5%. Those with cough symptoms for more than two weeks had a two-fold increase in the prevalence of ATBD at 3.1% compared to 1.4% among those who did not report cough as a symptom (P-value 0.0005). Other factors associated with ATBD included HIV status (3.9% vs. 1.7%, p-value=0.0014), TB history (8.2% vs. 1.6%, P-value<0.001))

Table 11: TB positivity results from, IGRA chest X-ray and GeneXpert by selected characteristics

Characteristic	IGRA n (%)				Chest-xrayn (%)				GeneXpert n (%)			
	Total (n=5,902) n (%)	Male PIP (n=4516)	Female PIP (n=697)	Staff (n=689)	Total (n=6065) n (%)	Male PIP (n=4647)	Female PIP (n=707)	Staff (n=711)	Total (n=5903) n (%)	Male PIP (n=4517)	Female PIP (n=697)	Staff (n=689)
Overall	2,753 (47.7)	2206 (47.9)	272 (37.7)	275 (39.2)	74 (1.4)	67 (1.4)	2 (0.3)	5 (0.6)	93 (1.9)	85 (1.9)	3 (0.4)	5 (0.9)
Sex												
Male	2,205 (47.9)	-	-	206 (40.2)	71 (1.4)	-	-	4 (0.6)	85 (1.9)	-	-	1 (0.3)
Female	273 (38.6)	-	-	69 (36.8)	3 (0.4)	-	-	1 (0.5)	3 (0.3)	-	-	4 (2.2)
Age group												
18 – 24	539 (40.1)	478 (40.2)	54 (32.3)	7 (18.4)	12 (0.8)	12 (0.8)	0	0	18 (1.4)	18 (1.4)	0	0
25 – 34	1,140 (48.4)	888 (48.8)	96 (39.1)	156 (38.3)	25 (1.1)	22 (1.2)	2 (0.8)	-	36 (1.9)	31 (1.9)	2 (0.8)	3 (1.0)
35 - 44	572 (53.3)	462 (53.8)	53 (36.2)	57 (41.6)	12 (1.3)	10 (1.3)	0	1 (0.2)	16 (1.8)	14 (1.8)	1 (0.7)	1 (0.9)
45 – 54	306 (50.8)	220 (51.2)	45 (46.2)	41 (43.3)	12 (3.1)	12 (3.2)	0	2 (1.5)	12 (2.9)	12 (3.0)	0	0
55 – 64	134 (51.5)	107 (51.7)	13 (35.8)	14 (54.6)	8 (2.9)	6 (2.8)	0	0	8 (3.0)	7 (3.0)	0	1 (2.8)
>=65	62 (57.1)	51 (57.2)	11 (40.3)	0	5 (5.2)	5 (5.2)	0	2 (8.2)	3 (2.6)	3 (2.6)	0	0
Symptoms												
Cough												
No	2,031 (47.9)	1568 (48.1)	221 (36.8)	242 (40.6)	38 (0.9)	32 (0.9)	2 (0.3)	4 (0.6)	63 (1.4)	45 (1.4)	3 (0.5)	5 (1.0)
Yes	722 (47.4)	638 (47.6)	51 (42.6)	33 (31.1)	36 (2.6)	35 (2.7)	0	1 (0.7)	40 (3.1)	40 (3.1)	0	0
Blood-stained sputum												

No	2,718 (47.6)	2174 (47.8)	269 (37.6)	275 (39.4)	69 (1.3)	62 (1.3)	2 (0.3)	5 (0.6)	91 (1.9)	83 (1.9)	3 (0.4)	5 (0.9)
Yes	35 (61.9)	32 (62.3)	3 (51.6)	0	5 (5.0)	5 (13.3)	0	0	2 (3.4)	2 (3.5)	0	0
Chest pain												
No	2,114 (46.9)	1660 (47.2)	189 (35.5)	256 (39.1)	46 (1.1)	39 (1.1)	2 (0.4)	5 (0.6)	63 (1.7)	56 (1.7)	2 (0.3)	5 (0.9)
Yes	639 (50.6)	537 (50.7)	83 (44.4)	19 (42.2)	28(2.7)	28 (2.8)	0	0	30 (2.8)	29 (2.8)	1 (0.5)	0
Weight loss												
No	2,485 (48.0)	1973 (48.2)	246 (37.9)	266 (40.1)	56 (1.2)	49 (1.2)	2 (0.2)	5 (0.6)	81 (1.9)	73 (1.9)	3 (0.4)	5 (0.9)
Yes	268 (45.4)	233 (45.6)	26 (35.6)	9 (23.1)	18 (3.4)	18 (4.5)	0	0	12 (2.2)	12 (2.3)	0	0
Night sweats												
No	2,485 (48.0)	1973 (48.2)	246 (37.9)	266 (40.1)	56 (1.2)	49 (1,2)	2 (0.3)	5 (0.6)	81 (1.9)	73 (1.9)	3 (0.4)	5 (0.9)
Yes	268 (45.4)	233 (45.6)	26 (35.6)	9 (23.1)	18 (3.4)	18 (3.5)	0	0	12 (2.2)	12 (2.3)	0	0
HIV status												
Negative	2461 (47.9)	1977 (48.1)	216 (38.3)	268 (39.3)	53 (1.1)	50 (1.1)	0	3 (0.5)	74 (1.7)	67 (1.7)	2 (0.3)	5 (0.9)
Positive	292 (46.2)	229 (46.3)	56 (35.3)	7 (38.5)	21 (4.1)	17 (4.1)	2 (1.3)	2 (8.6)	19 (3.9)	18 (4.0)	1 (0.7)	0
Volume category												
Low volume	559 (45.1)	501 (45.3)	-	58 (34.4)	11 (1.0)	9 (1.0)	-	2 (1.6)	28 (2.9)	27 (3.0)	0	1 (0.8)
High volume	1,922 (48.6)	1705 (48.8)	-	217 (40.9)	63 (16)	58 (1.6)	2 (0.3)	3 (0.3)	65 (1.6)	58 (1.6)	3 (0.4)	4 (0.9)
TB history												
No prior TB	2,597 (47.1)	2064 (47.3)	260 (37.0)	273 (39.4)	46 (0.8)	40 (0.9)	1 (0.1)	5 (0.6)	73 (1.6)	66 (1.6)	3 (0.4)	4 (0.6)
Prior TB	156 (58.5)	142 (58.7)	12 (58.4)	2 (27.8)	28 (11.3)	27 (11.5)	1 (4.5)	0	20 (8.2)	19 (8.2)	0	1 (16.7)
BMI												
Underweight	275 (51.7)	248 (51.8)	11 (38.1)	16 (47.4)	18 (3.5)	17 (3.6)	1 (3.3)	0	13 (2.5)	12 (2.5)	1 (3.2)	0
Healthy	2,062 (47.3)	1745 (47.4)	154 (39.7)	163 (39.2)	51 (1.3)	47 (1.3)	0	4 (0.7)	70 (1.9)	68 (2.0)	0	2 (0.6)
Overweight	335 (47.8)	186 (48.8)	77 (34.3)	72 (36.0)	3 (0.6)	2 (0.6)	0	1 (0.5)	8 (1.1)	4 (1.1)	2 (0.9)	2 (1.1)
Obesity	81 (46.3)	27 (46.4)	30 (36.7)	24 (46.5)	2 (1.0)	1 (1.1)	1 (1.3)	0	2 (1.4)	1 (1.4)	0	1 (2.2)
MUAC												
Green	2,676 (47.8)	2133 (48.0)	268 (37.6)	0	66 (1.3)	60 (1.3)	2 (0.3)	4 (0.5)	91 (1.9)	83 (2.0)	3 (0.4)	5 (0.9)
Yellow	71 (44.9)	68 (45.1)	3 (47.5)	275 (39.5)	8 (5.5)	7 (5.4)	0	1 (18.1)	2 (1.6)	2 (1.6)	0	0
Red	6 (51.9)	5 (51.9)	1 (50.0)	0	0	0	0	0	0	0	0	0
Region												
Central	468 (42.0)	381 (42.3)	41 (33.4)	46 (33.2)	14 (1.4)	12 (1.5)	0	2 (0.7)	10 (1.0)	9 (1.0)	0	1 (0.9)
Eastern	264 (50.7)	190 (50.7)	43 (30.6)	31 (58.3)	1(0.2)	1 (0.2)	0	0	7 (1.7)	7 (1.8)	0	0
Kampala	170 (50.4)	135 (50.6)	20 (40.8)	15 (40.7)	8 (3.0)	8 (3.1)	0	0	8 (2.8)	7 (2.9)	1 (2.0)	0
Northern	1,102 (59.9)	919 (60.3)	87 (42.9)	96 (41.5)	33 (1.7)	29 (1.8)	2 (1.0)	2 (0.5)	25 (1.4)	22 (1.5)	2 (1.0)	1 (0.3)
Western	749 (40.0)	581 (40.0)	81 (42.1)	87 (38.1)	18 (1.0)	17 (1.0)	0	1 (0.7)	43 (2.8)	40 (2.8)	0	3 (1.7)

Duration in prison (years)												
< 1	595 (40.5)	516 (40.5)	79 (32.9)	-	19 (1.5)	18 (1.5)	1 (0.4)	-	40 (3.5)	40 (3.5)	0	-
1-2	774 (46.6)	689 (46.6)	85 (36.3)	-	21 (1.3)	21 (1.3)	0	-	24 (1.5)	22 (1.5)		-
3+	1,109 (54.3)	1,001 (54.3)	108 (44.1)	-	29 (1.5)	28 (1.5)	1 (0.4)	-	24 (1.2)	23 (1.2)	2 (0.8)	-
Type of inmate											1 (0.4)	
Remand	1052 (44.2)	928 (44.2)	124 (39.3)	-	27 (1.1)	25 (1.2)	2 (0.6)	-	59 (2.9)	56 (2.9)	3	-
Convicted	1403 (51.1)	1258 (50.9)	145 (36.9)	-	42 (1.7)	42 (1.7)	0	-	28 (1.1)	28 (1.1)	0	-
Debtor	13 (62.1)	10 (63.2)	3 (26.3)	-	0	0	0	-	0	0	0	-
Lodger	10 (55.8)	10 (55.8)	0	-	0	0	0	-	1 (5.2)	1 (5.2)	0	-
Current Job assignment												
Warden	92 (36.9)	-	-	92 (37.5)	2 (0.6)			2 (0.6)	2 (1.2)	-	-	2 (1.2)
Guard	35 (40.4)	-	-	35 (40.9)	1 (0.7)			1 (0.7)	0	-	-	0
Administrator	38 (20.0)	-	-	20 (36.6)	0			0	1 (2.2)	-	-	1 (2.2)
Officer in charge	5 (26.6)	-	-	5 (28.9)	0			0	0	-	-	0
Others	105 (40.6)	-	-	105 (40.4)	2 (0.8)			2 (0.8)	2 (0.7)	-	-	2 (0.7)
Family size												
0-1	97 (40.7)	-	-	97 (41.0)	2 (0.8)			2 (0.8)	2 (1.1)	-	-	2 (1.1)
2-3	80 (35.7)	-	-	80 (36.6)	1 (0.6)			1 (0.6)	2 (1.2)	-	-	2 (1.2)
>=4	98 (40.9)	-	-	98 (40.1)	2 (0.4)			2 (0.4)	1 (0.3)	-	-	1 (0.3)
Housing situation												
House outside the barracks	14 (48.6)	-	-	14 (49.6)	0			0	0	-	-	0
Senior staff housing in barracks	92 (38.8)	-	-	92 (38.3)	2 (0.5)			2 (0.5)	2 (0.7)	-	-	2 (0.7)
Single uniport in barracks	122 (41.0)	-	-	122 (41.3)	2 (0.7)			2 (0.7)	2 (0.9)	-	-	2 (0.9)
Uniport shared with another family	4 (38.3)	-	-	4 (38.1)	0			0	0	-	-	0
Other	43 (33.4)	-	-	43 (33.9)	1 (0.9)			1 (0.9)	1 (1.2)	-	-	1 (1.2)

4.7 COVID-19

4.7.1 COVID-19 exposure

Overall, 3.2% had ever been in contact with someone who had COVID-19 12.7% of staff, 4.9% of female PIP, and 3.0% of male PIP. (Table 12). Additionally, only 125 (1.2%) reported a history of having had COVID-19 before; highest among staff (8.8%) but lower in male PIP (1.0%) and female PIP (1.5%).

Of the PIP who ever had COVID-19 before, 81.7% and 59.6% of the female and male respectively, had it in the community before coming to prison.

Table 12: Exposure to COVID-19 among survey participants

Characteristic	Total n= 6065 n(%)	Male PIP (n=4647) n(%)	Female PIP (n=707) n(%)	Staff (n=711) n(%)
Ever been in contact with someone who has COVID-19 during incarceration	273 (3.2)	141 (3.0)	38 (4.9)	94 (12.7)
Ever had COVID-19 before	125 (1.2)	52 (1.0)	10 (1.5)	63 (8.8)
Period				
Prior to incarceration	39 (59.7)	31 (59.6)	8 (81.7)	N/A
While in Prison	23 (40.3)	21 (40.4)	2 (18.3)	N/A

4.7.2 COVID-19 screening and vaccination status

The results in Table 13 showed that more than half of the respondents had ever experienced at least a COVID-19 symptom. Symptoms were more common among male PIP (52.6%) and female PIP (48.0%), and least amongst staff at (31.1%). Cough and/or sore throat were the most (33.3%) frequently reported COVID-19 symptoms.

About eight out of 10 respondents had ever received a COVID-19 vaccine, and almost all staff had been vaccinated. Among the vaccinated survey participants, the main (70.6%) source of the vaccines was prison. Of the 973 (7135%) who didn't receive the vaccine, the two major reasons for non-uptake of the vaccine included unwillingness to take the vaccine (50.9%) and lack of trust in the vaccines (22.1%).

Table 13: Experienced COVID-19 symptoms and vaccination status

Characteristic	Total (n=6,065) n (%)	Male inmates (n=4647) n (%)	Female inmates (n=707) n (%)	Staff (n=711) n(%)
Experienced COVID19 symptoms				
Fever	926 (16.1)	769 (16.3)	99 (13.7)	58 (8.1)
Cough and/or a sore throat	1,846 (33.3)	1,581 (33.6)	143 (19.6)	122 (16.6)
Muscle aches or weakness	1,148 (19.0)	935 (19.2)	151 (20.1)	62 (8.6)
Headache	1,189 (19.2)	920 (19.4)	214 (31.3)	656 (7.8)
Having difficulty in breathing or shortness of breath	556 (9.1)	450 (9.2)	80 (10.4)	26 (3.5)
Temperature (^{0}C) (Median (IQR))	36.4 (35.9-36.7)	36.4 (35.8-36.8)	36.3 (35.3-36.8)	36.3 (35.9-36.6)

Any COVID19 symptom	3,063 (52.1)	2,490 (52.6)	342 (48.0)	231 (31.1)
Vaccination status				
Received COVID-19 vaccine	5092 (81.2)	3,777 (80.8)	616 (87.0)	699 (98.2)
Doses received (n=3,777)				
One	1208 (26.3)	1,018 (26.9)	151 (25.2)	39 (5.3)
Two	2119 (41.9)	1,559 (41.7)	190 (30.8)	370 (53.2)
Three	1765 (31.7)	1,200 (31.4)	275 (44.0)	290 (41.5)
Where the COVID-19 vaccine was received		(n=3,777)	(n=616)	(n=699)
Within prison	3615 (70.6)	2,607 (70.0)	350 (55.9)	658 (93.9)
Outside prison	1477 (29.4)	1,170 (30.0)	266 (44.1)	41 (6.1)
The main reason never received the COVID-19 vaccine	(n=973)	**(n=870)**	**(n=91)**	**(n=12)**
Don't trust vaccines	206 (22.1)	183 (22.1)	21 (23.1)	2 (22.8)
It is against my religious belief	2 (0.3)	2 (0.3)	0	0
Don't want	479 (50.9)	433 (50.9)	41 (45.2)	5 (40.7)
Other	286 (26.8)	252 (26.7)	29 (31.7)	5 (36.5)

4.7.3 Current and past COVID-19 infection

Results for current and past Covid-19 results are summarized in Table 14. The study identified five (0.1%) COVID-19 positive patients among PIPs (4 male, 1 female) and none among prison staff using COVID-19 antigen testing. The four male PIP cases were identified in Northern region prisons, and the female PIP was from the Western region. Nearly all staff and PIP (94.8%) tested positive for past COVID-19 infection at antibody testing.

Table 14: COVID-19 positivity by antigen and antibody tests by selected participant demographic characteristics

Characteristic	antigen				antibody			
	Overall (n=5832)	Male PIP (n=4466)	Female PIP (n=689)	Staff (n=677)	Overall (n=4359) n (%)	Male inmates (n=3333)	Female PIP (n=560)	Staff (n=466)
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Overall	5 (0.1)	4 (0.1)	1 (0.1)	0	4155 (94.8)	3159 (94.7)	537 (95.9)	459 (98.4)
Sex								
Male	4 (0.1)	-	-	0	3158 (94.7)	-	-	323 (97.8)
Female	1 (0.1)	-	-	0	538 (96.5)	-	-	136 (100)
Age group								
18 - 24	0	0	0	0	962 (95.2)	829 (95.2)	112 (90.3)	21 (100)
25 - 30	2 (0.1)	1 (0.1)	1 (0.3)	0	1190 (94.4)	870 (94.3)	150 (97.4)	170 (98.1)
31 - 40	2 (0.2)	2 (0.2)	0	0	1087 (94.3)	798 (94.2)	118 (95.1)	171 (99.3)
>40	1 (0.1)	1 (0.1)	0	0	916 (95.6)	662 (95.5)	157 (100)	97 (97.1)
Region								
Central	0	0	0	0	948 (96.5)	708 (96.5)	117 (96.7)	123 (98.0)
Eastern	0	0	0	0	357 (93.7)	262 (93.6)	80 (97.4)	15 (100)

Kampala	0	0	0	0	226 (94.3)	162 (94.2)	47 (95.9)	17 (100)
Northern	4 (0.3)	4 (0.3)	0	0	966 (95.3)	732 (95.2)	127 (94.8)	107 (99.2)
Western	1 (0.01)	0	1 (0.4)	0	1658 (93.8)	1295 (93.7)	166 (95.4)	197 (98.1)
Type of inmate								
Remand	2 (0.1)	2 (0.1)	0	0	1841 (93.0)	1600 (93.0)	241 (95.8)	-
Convicted	3 (0.1)	2 (0.1)	1 (0.2)	0	1817 (96.6)	1534 (96.6)	283 (95.8)	-
Debtor	0	0	0	0	100 (25.0)	13 (100)	12 (100)	-
Lodger	0	0	0	0	13 (77.7)	12 (77.7)	1 (100)	-
Duration in prison (years)								-
< 1	2 (0.1)	2 (0.1)	0	0	1052 (89.9)	883 (89.8)	169 (94.2)	-
1-2	2 (0.1)	2 (0.1)	0	0	1170 (94.9)	995 (94.9)	175 (95.4)	-
3-4	0	0	0	0	663 (97.3)	565 (97.3)	98 (97.6)	-
5-6	0	0	0	0	371 (98.5)	329 (98.5)	42 (100)	-
7-9	0	0	0	0	263 (99.3)	231 (99.3)	32 (97.1)	-
10+	1 (0.1)	0	1 (2.4)	0	176 (98.7)	156 (98.7)	20 (100)	-
Current Job assignment								
Warden	0	-	-	0	174 (98.5)	-	-	174 (98.5)
Guard	0	-	-	0	66 (98.8)	-	-	66 (98.8)
Administrator	0	-	-	0	100 (34.0)	-	-	34 (100)
Officer in charge	0	-	-	0	100 (9.0)	-	-	9 (100)
Others	0	-	-	0	156 (97.6)	-	-	156 (97.6)
Family size								
0-1	0	-	-	0	149 (98.3)	-	-	149 (98.3)
2-3	0	-	-	0	145 (98.2)	-	-	145 (98.2)
>=4	0	-	-	0	165 (98.8)	-	-	165 (98.8)
Housing situation								
House outside the barracks	0	-	-	0	16 (100)	-	-	16 (100)
Senior staff housing in barracks	0	-	-	0	135 (98.6)	-	-	135 (98.6)
Single uniport in barracks	0	-	-	0	223 (98.6)	-	-	223 (98.6)
Uniport shared with another family	0	-	-	0	100 (8.0)	-	-	8 (100)
Other	0	-	-	0	77 (97.2)	-	-	459 (97.2)

4.8 HIV Prevalence

Table 15 presents the distribution of HIV prevalence among the three study sub populations by survey participant demographic characteristics.

The overall HIV prevalence was 10.9%; 21.1% among female PIP, 11.1% among male PIP, and 2.3% among staff. HIV prevalence ranged from 11.4% among female PIP aged 18-24 years to 27.8% among female PIP aged 35-44 years, and from 3.7% among male PIP aged 18-24 years to 18.4% among men PIP aged

35-44 years (Figure 6). Variability in HIV prevalence was observed across different regions - prevalence was highest in the Northern region (12.8%) and Kampala (12.5%) and lowest in Western (9.1%) and Eastern (9.2%) regions . Overall, the prevalence by the different education level does not vary – it ranges between 9.3% - 11.4%. Married (12.8%) and separated/divorced (13.5%) participants had a two-fold HIV prevalence compared to participants who were still single (6.5%)

HIV prevalence was more likely to be higher among PIP who had stayed longer in prisons than those who had stayed for a shorter time.

Table 15: HIV prevalence by survey participant demographic characteristics

Characteristic	Overall (n=5,743)	Male inmates (n=4374)	Female inmates (n=686)	Staff (n=683)
	n(%)	n(%)	n(%)	n (%)
Overall	654 (10.9)	489 (11.1)	148 (21.1)	17 (2.4)
Sex				
Male	490 (11.1)	-	-	10 (1.8)
Female	147 (18.3)	-	-	7 (3.7)
Age group				
18 - 24	62 (3.8)	43 (3.7)	19 (11.4)	0
25 - 30	138 (7.0)	90 (70.2)	47 (24.9)	1 (0.2)
31 - 40	223 (15.6)	180 (16.1)	41 (27.9)	2 (0.9)
>40	231 (19.3)	176 (19.5)	41 (20.6)	14 (8.9)
Region				
Central	128 (11.3)	97 (11.5)	29 (23.2)	2 (1.0)
Eastern	62 (9.2)	33 (9.2)	26 (19.1)	3 (5.0)
Kampala	44 (12.5)	36 (12.7)	8 (16.3)	0
Northern	240 (12.8)	186 (13.0)	46 (22.8)	8 (3.7)
Western	180 (9.1)	137 (9.2)	39 (20.7)	4 (2.3)
Education				
None	92 (9.3)	65 (9.3)	27 (20.4)	0
Primary	401 (11.4)	301 (11.4)	100 (25.2)	0
Secondary	139 (10.9)	106 (11.4)	19 (12.9)	14 (3.1)
Tertiary	22 (10.8)	17 (13.1)	2 (7.6)	3 (1.2)
Marital status				
Single	122 (6.5)	91 (6.5)	29 (16.6)	2 (1.9)
Married	406 (12.8)	333 (13.1)	60 (20.3)	13 (2.2)
Separated/widowed/ widowed	126 (13.5)	65 (13.4)	59 (25.1)	2 (12.9)
Type of inmate				
Remand	289 (10.7)	215 (10.7)	74 (24.7)	-
Convicted	341 (11.5)	272 (11.5)	69 (17.8)	-
Debtor	5 (6.8)	1 (6.5)	4 (28.7)	-
Lodger	2 (3.9)	1 (3.8)	1 (100)	-
Type of sentence				
Serving a period	351 (11.5)	278 (11.5)	73 (18.4)	-
Life sentence	1 (100)	0	0	-

Characteristic	Overall (n=5,743)	Male inmates (n=4374)	Female inmates (n=686)	Staff (n=683)
	n(%)	n(%)	n(%)	n (%)
Death penalty	0	1 (100)	0	-
Don't know	285 (10.7)	210 (10.6)	75 (24.6)	-
Status				
Repeat offender	66 (11.9)	60 (11.9)	6 (36.7)	-
First time offender	571 (11.0)	429 (11.0)	142 (20.7)	-
Duration in prison (years)				
< 1	179 (10.6)	128 (10.5)	51 (21.9)	-
1-2	192 (10.4)	150 (10.4)	42 (18.3)	-
3-4	113 (10.9)	81 (10.9)	32 (26.1)	-
5-6	63 (11.0)	50 (11.0)	13 (23.9)	-
7-9	58 (15.5)	51 (15.5)	7 (19.7)	-
10+	32 (12.6)	29 (12.6)	3 (12.8)	-

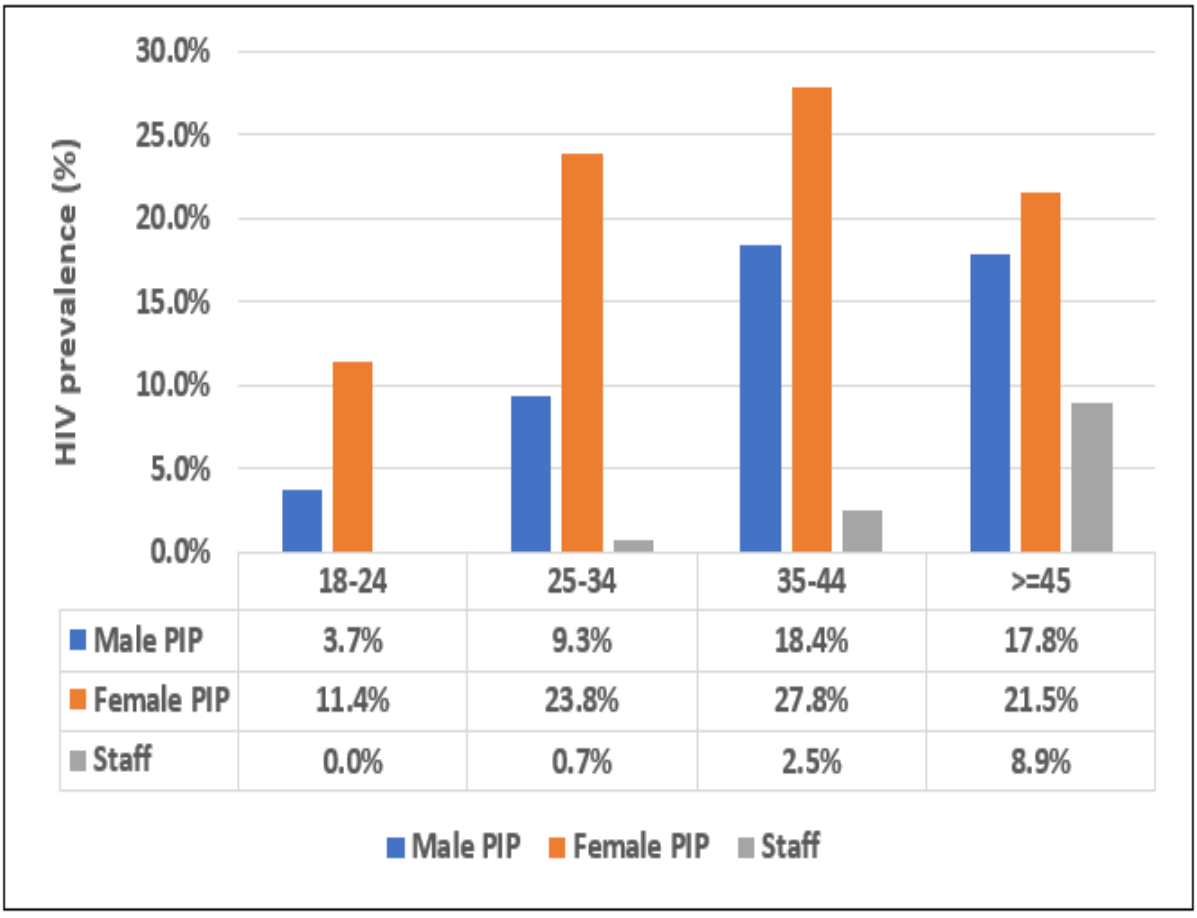


Figure 6: HIV prevalence by age among persons in prisons and prison staff in Uganda, 2023

4.9 Progress towards UNAIDS 95-95-95 targets

4.9.1 Diagnosis - 1st 95

Overall, out of the 654 participants with HIV, 606 (92.4%) were aware of their status: 94.6% of prison staff, 94.1% of female PIP and 92.4% of male PIP (Table 16). Knowledge of status among PLHIV among male PIP varied from 86.8% among 18-24 years to 97.3% among the >=45-year-olds, and from 93.7% among female PIP aged 18-24 years to 96.0% among female PIP aged 35-44 years (Figure 7). By region, survey participants from prisons in Western (97.5%) had the highest awareness of their HIV status, compared to Northern (89.6%) and Kampala (86.8%) regions.

Table: 16: Proportion of survey participants who knew their status by participant sociodemographic characteristics

Characteristic	Total (n=654) n(%)	Male PIP (n=489)	Female PIP (n=148)	Staff (n=17)
Overall	606 (92.4)	450 (92.0)	140 (94.1)	16 (94.1)
Sex				
Male	451 (92.4)	-	-	10 (100)
Female	139 (94.1)	-	-	6 (86.7)
Region				
Central	117 (92.2)	88 (92.2)	27 (92.1)	2 (100)
Eastern	57 (93.7)	31 (94.0)	24 (92.7)	2 (54.5)
Kampala	39 (86.8)	32 (86.8)	7 (87.5)	0
Northern	219 (89.6)	166 (89.5)	45 (97.9)	8 (100)
Western	174 (97.5)	133 (97.5)	37 (93.7)	4 (100)
Type of inmate				
Remand	264 (91.6)	196 (91.6)	68 (90.9)	-
Convicted	320 (93.0)	252 (93.0)	68 (98.8)	-
Debtor	5 (100)	1.0 (100)	4 (100)	-
Lodger	1 (97.3)	1 (100)	0	-
Duration in prison (years)				
< 1	164 (92.6)	119 (92.7)	45 (87.7)	-
1-2	172 (87.2)	131 (87.2)	41 (97.1)	-
3-4	111 (97.9)	49 (97.9)	32 (100)	-
5-6	61 (97.7)	49 (97.7)	12 (93.2)	-
7-9	52 (90.6)	45 (90.6)	7 (100)	-
10+	30 (95.1)	27 (95.0)	3 (100)	-

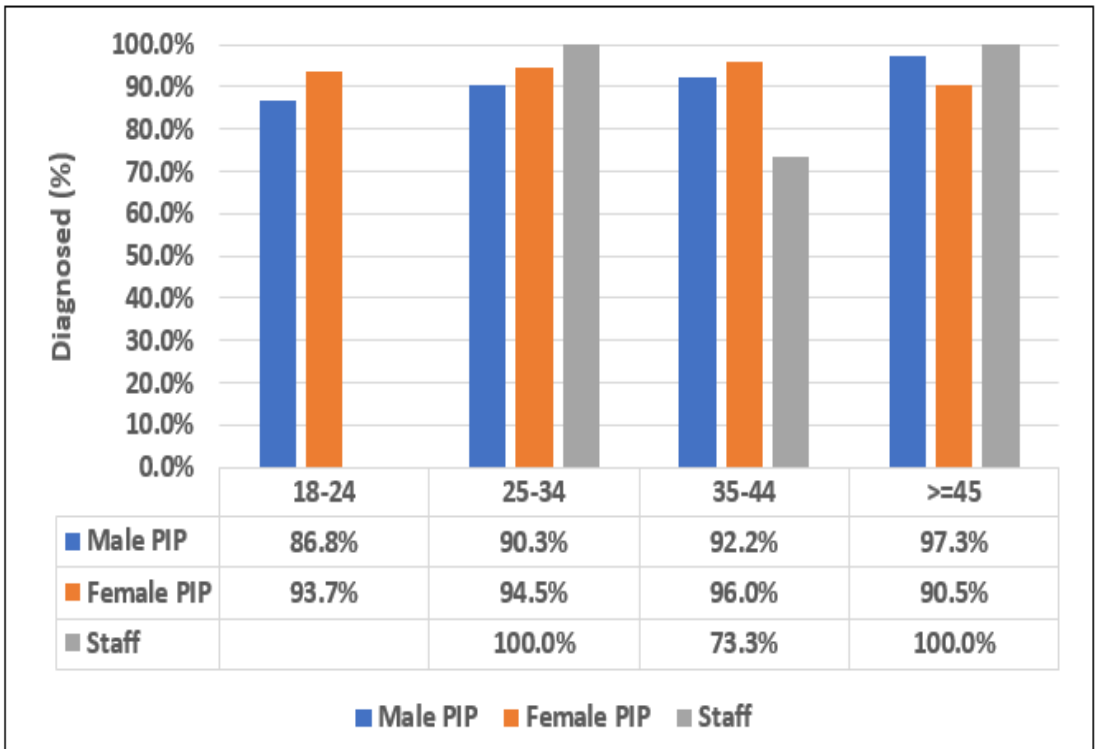


Figure 7: Proportion of PIP and prison staff PLHIV by age who know their status in Uganda, 2023

4.9.2 HIV Treatment services - 2nd 95

Among participants living with HIV who were aware of their status, 601 (99.2%) were on ART: 100% of female PIP, 99.2% of male PIP and 93.1% staff (Table 17). All five regions were above the UNAIDS target of 95%. All those who had stayed in prisons for at least three years and knew their status were receiving HIV treatment.

Table 17: Demographic characteristics of PLHIV with a known HIV status who were on ART

Characteristic	Total (n=606)	Male PIP (n=450)	Female PIP (n=140)	Staff (n=16)
	n (%)	n (%)	n (%)	n (%)
Overall	601 (99.2)	446 (99.2)	140 (100)	15 (93.1)
Sex				
Male	447 (99.2)	-	-	9 (88.4)
Female	139 (100)	-	-	6 (100)
Region				
Central	116 (99.0)	87 (99.0)	27 (100)	2 (100)
Eastern	56 (97.3)	30 (97.2)	24 (100)	2 (100)
Kampala	38 (97.4)	31 (97.4)	7 (100)	0
Northern	217 (99.3)	165 (99.4)	45 (100)	7 (85.9)
Western	174 (100)	133 (100)	37 (100)	4 (100)
Type of inmate				
Remand	262 (99.1)	194 (99.1)	68 (100)	-
Convicted	318 (99.3)	250 (99.3)	68 (100)	-
Debtor	5 (100)	1 (100)	4 (100)	-
Lodger	1 (100)	1 (100)	0	-
Status				

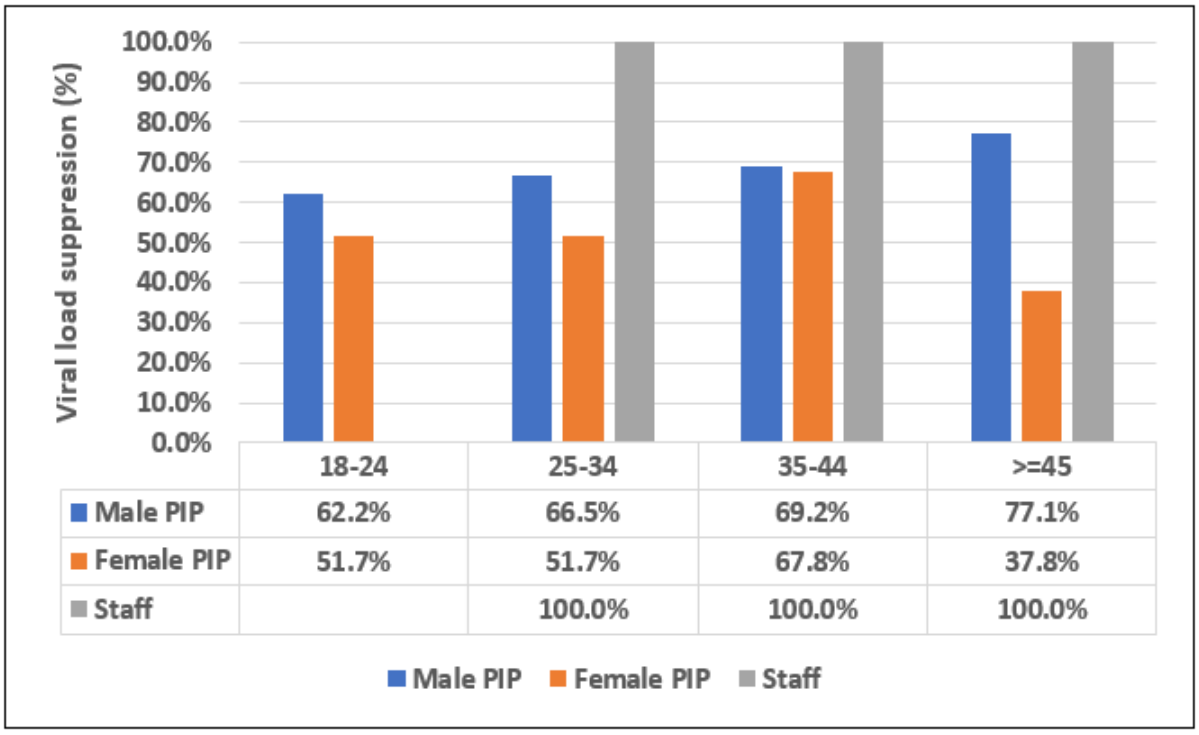
Duration in prison (years)				
< 1	162 (98.5)	117 (98.5)	45 (100)	-
1-2	170 (98.5)	129 (98.5)	41 (100)	-
3-4	111 (100)	79 (100)	32 (100)	-
5-6	61 (100)	49 (100)	12 (100)	-
7-9	52 (100)	45 (100)	7 (100)	-
10+	30 (100)	27 (100)	3 (100)	-

4.9.3 HIV Viral Load Suppression - 3rd 95

Among those on ART, 601 (69.9%) had VLS: 100% of staff, 69.9% of male PIP and 53.1% of female PIP (Table 18). VLS target was achieved by all age groups among staff participants. Among Male PIP, VLS ranged from 62.2% for those aged 18-24 years to 77.1% among those aged 45 years and older. For Women PIP, VLS rose from 51.7% among 18-24 years to 67.8% among those aged 35-44 years (Figure 8). VLS varied by region: 59.0% in Eastern to 83.5% in Central region (Figure 9).

Table 18: Viral load suppression by sociodemographic characteristics

Characteristic	Overall (n=586)	Male inmates (n=446)	Female inmates (n=140)	Staff (n=15)
	n (%)	n (%)	n (%)	n (%)
Overall	601 (69.9)	306 (69.9)	73 (53.1)	15 (100)
Sex				
Male	307 (69.9)	-	-	9 (100)
Female	72 (52.7)	-	-	6 (100)
Region				
Central	89 (83.5)	70 (83.6)	17 (60.4)	2 (100)
Eastern	30 (59.9)	18 (59.0)	10 (42.3)	2 (100)
Kampala	30 (77.4)	23 (77.3)	7 (100)	0
Northern	139 (63.7)	108 (63.5)	24 (52.4)	7 (100)
Western	106 (66.5)	87 (66.4)	15 (49.0)	4 (100)
Type of inmate				
Remand	159 (64.1)	124 (51.2)	35 (51.2)	-
Convicted	216 (73.8)	180 (73.9)	36 (54.7)	-
Debtor	3 (97.7)	1 (100)	2 (58.9)	-
Lodger	1 (100)	1 (100)	0	-
Duration in prison (years)				
< 1	73 (44.2)	51 (44.2)	22 (49.4)	-
1-2	113 (70.8)	90 (70.8)	23 (57.2)	-
3-4	91 (94.7)	74 (94.9)	17 (53.9)	-
5-6	46 (84.0)	41 (84.2)	5 (42.2)	-
7-9	39 (77.8)	34 (77.8)	5 (77.)	-
10+	17 (63.6)	16 (63.6)	1 (31.0)	-



	18-24	25-34	35-44	>=45
Male PIP	62.2%	66.5%	69.2%	77.1%
Female PIP	51.7%	51.7%	67.8%	37.8%
Staff		100.0%	100.0%	100.0%

Figure 8: HIV viral load suppression by age among persons in prisons and prison staff in Uganda, 2023

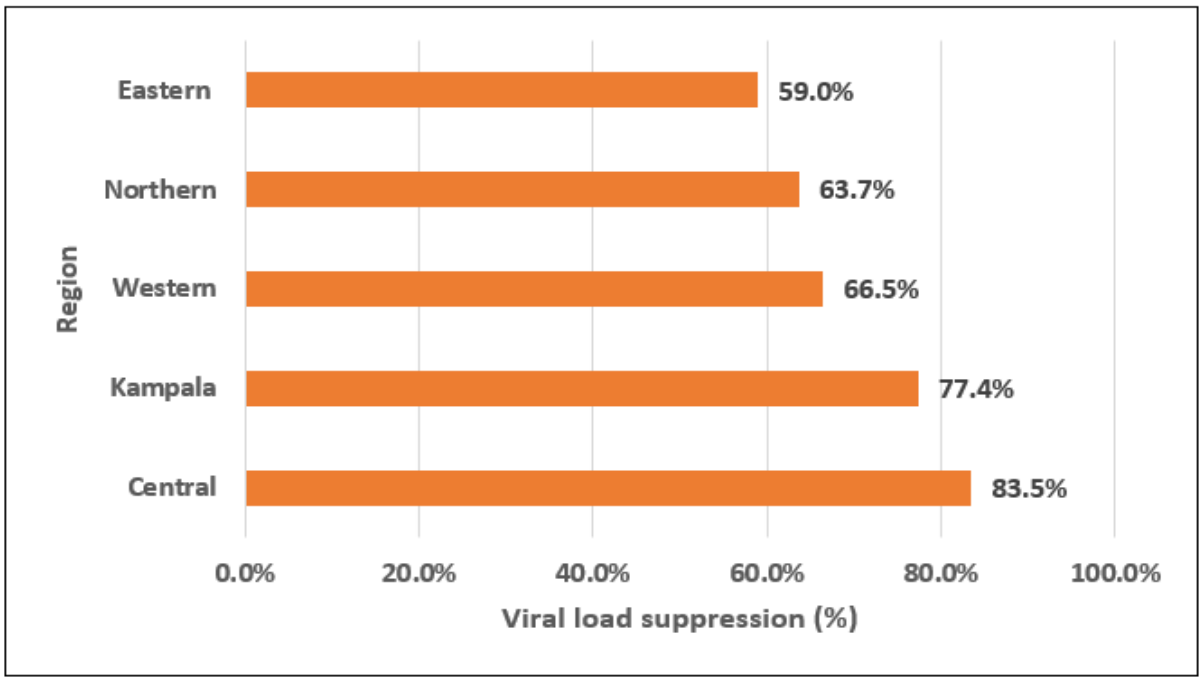


Figure 9: HIV viral load suppression among people in prisons and prison staff in Uganda, 2023

4.10 Ventilation assessment and occupancy rates

4.10.1 Adequacy of open window/ventilator surface areas for natural ventilation in prisons

A total of 276 wards in 31 prisons (21 male and 10 female) were assessed (Table 19). Only thirteen (4.7%) wards had an adequate surface area for natural air exchange. Of these, 12 wards were in one women's prison and the only one ward in one men's (farm) prison. The overall average proportion of openable window-to-floor surface area for natural ventilation was very low at 1.5% (ratio 1:67) compared with the WHO standard of ≥ 20% (ratio ≤1:5). Only two of the 31 prisons assessed met the adequate average surface area for natural air exchange.

None of the prison wards assessed were supported with mechanical ventilation systems.

Table 19: Prison average surface area for natural air exchange - ratio of window: floor surface area

Prison	Average surface area					Prison	Average surface area			
	Open windows (+ventilators)	Floor	Ratio	%			Open windows (+ventilators)	Floor	Ratio	%
1	1	28	1:28	4.4		17	18	1033	1:53	1.8
2	1	8	1:8	13.0		18	6	127	1:21	4.7
3	1	2	1:2	50.0		19	15	731	1:49	2.0
4	10	1500	1:150	0.7		20	15	693	1:46	2.2
5	7	1276	1:182	0.5		21	6	926	1:154	0.6
6	12	461	1:38	2.6		22	4	970	1:242	0.5
7	3	17	1:6	16.8		23	24	1856	1:77	1.3
8	1	18	1:18	5.6		24	20	728	1;36	2.7
9	11	372	1:34	3.0		25	9	1041	1:116	0.8
10	1	1060	1:1060	0.1		26	13	229	1:18	5.5
11	6	671	1:112	0.9		27	1	702	1:702	0.1
12	11	430	1:39	2.6		28	2	6	1:3	33.3
13	25	1431	1:57	1.7		29	1	14	1:14	7.1
14	15	600	1:40	2.4		30	18	1203	1:67	1.5
15	22	1511	1:67	1.4		31	14	463	1:33	3.0
16	13	456	1:35	2.8			306	20,563	1:67	1.5

4.10.2 Prison ward occupancy

Of the 31 prisons assessed, 26 (84%) were overcrowded at the time of the survey (Table 20). These wards lodged variably more PIP than the recommended maximum number of individuals per ward as per prison records. At the time of the survey, all the included prisons designated to accommodate an average of 1,415 PIP, had a total of 2,694 PIP, almost twice as high compared to desired maximum occupancy.

Table 20: Ward occupancy per prison (ratio of actual number of occupants: recommended number of occupants

Prison	Number of occupants	Recommended no. of occupants (average)	Percentage occupancy		Prison	Actual no. of occupants (average)	Recommended no. of occupants (average)	Percentage occupancy
1	60	31	190		17	105	27	395
2	162	50	324		18	40	13	304
3	7	4	171		19	62	16	390
4	93	128	73		20	39	16	244
5	242	32	755		21	164	50	328
6	39	12	338		22	71	14	517
7	172	86	201		23	249	97	257
8	69	60	115		24	57	60	95
9	33	9	355		25	177	26	684
10	84	32	261		26	25	6	445
11	65	34	193		27	81	18	463
12	31	50	62		28	80	141	57
13	136	36	378		29	34	8	444
14	67	36	186		30	113	247	46
15	61	34	180		31	27	17	160
16	49	25	196					
					Total	2,694	1,415	190

Section 5: Conclusions, programming implications and recommendations

The prevalence of ATBD in Uganda prisons is very high compared to the general population. It is much higher among PIP who have stayed in prison for a short period. This could be a result of high LTBI infections in the community which degenerate into ATBD after admission into prisons. It could also be due to high transmission of TB within the prison facilities and eventual development of ATBD owing to individual factors while in prison or system related factors.

This study identified almost half (46/93) of the TB cases that were missed by the routine screening and testing procedures, raising concerns about the sensitivity of the current guidelines in UPS. Over half of the confirmed TB patients in the survey were missed by TB symptom screening while almost 40% were missed by screening using CXR with computerized aided detection (CAD). Therefore, routine on-entry screening, preferably using more sensitive tools such as x-rays, is recommended to improve early detection. To improve the sensitivity of the CXR with CAD screening, the ministry of health (MOH) could consider revising the 'CXR with CAD cut-off' lower, for the prisons than the 60% currently used for the general population.

Secondly timely laboratory testing of PIP (with suggestive x-rays/symptoms) using molecular diagnostic tools such as GeneXpert is required. Hence, improving access to GeneXpert testing in prisons by providing more machines could help minimize delays in TB diagnosis. It will enhance timely initiation of diagnosed TB patients on treatment and minimize the risk of TB transmission to other PIP.

As a strategy to timely identify TB patients missed at entry or develop while on the ward, routine daily TB symptom screening on each ward and complete evaluation of PIP with symptoms should be performed and appropriate action taken timely. Also contact investigations around index cases when they are identified on the ward should be mandatory.

Almost half of the PIP have LTBI which may develop into ATBD. Routine provision of TB preventive treatment (TPT) to all the eligible PIP regardless of their HIV status should be strengthened to minimize chances of developing ATBD if they have LTBI at admission. Relatedly prisons could be prioritized for uninterrupted supply of short TPT regimens such as 3HP or 1HP to ensure treatment completion because majority stay for a short period before release yet UPS capacity to follow them up after release into the community for treatment adherence (while on longer TPT regimens) is limited.

To minimize TB transmission at stations where PIP are kept prior to admission into the prisons, the criminal justice system in the country could examine and improve conditions at stations such as police cells where significant delays occur before decisions are made to either send the individual to prison or secure a bond to be released back to community.

Given this high TB prevalence, prisons classified as 'high-volume' could also be high risk for TB transmission hence a high burden of ATBD. UPS could therefore consider establishment of a TB isolation ward for each of the high-volume prisons for safe and secure custody of confirmed TB patients while on treatment. These isolation units could serve as TB treatment centers for TB patients diagnosed in medium and low volume prisons supported by this high-volume prison. This approach could minimize the risk of exposure to TB infection by other PIP.

HIV prevalence in the Uganda prison population remains high, twice that in the general population. Females in particular exhibit significantly higher HIV seroprevalence– three times higher than in the female general population. Among this population, the 2nd 95 has been achieved; performance on 1st 95 is fair at 92%, but the 3rd 95 performance is suboptimal at 70% which is far below the target of 95%. The HIV prevalence among the PIP although declining compared to the 2013 survey remains very high compared to the general population, especially among the females. The suboptimal viral load suppression especially among the female PIP could most be likely due to poor adherence to treatment or drug resistance to the ART regimens in use. UPS could therefore consider strengthening direct observation treatment (DOT) for PLHIV in prisons being in a closed environment. Viral load monitoring as recommended in the current guidelines should be strictly done to take appropriate action timely. Release of unsuppressed PLHIV into the community could result in further HIV transmission contributing to delays in the achievement of HIV epidemic control. It could also result into continued opportunistic infections to the affected patient hence poor quality of life, reduced productivity and/or death.

Although the current Covid-19 infections were very low at the time of the survey, previous exposure was very high among both PIP and prison staff. This could be due to either past C-19 infection, vaccination or both. Routine C-19 screening for prisons may therefore not be a priority in the foreseeable future although surveillance might remain important.

Most prisons were overcrowded and poorly ventilated, which could contribute to high TB transmission and the observed high prevalence and notification rates. Hence UPS could consider improving ventilation such as through the installation of mechanical ventilation systems on the prison wards to maintain adequate air circulation without compromising security. Additionally, the criminal justice system in Uganda could consider other non-custodial sentences for some offenders to reduce crowding and therefore TB transmission in prisons.

Section 6: Strength and limitations

This survey focused on PIP and UPS staff, which is a special population where multiple disease burdens were estimated namely, LTBI, ATBD, COVID-19 and HIV. This seems to be an efficient utilization of the available resources in generating information that is targeting improved health services for that entire population.

This survey targeted a national representative sample of 6872 respondents among the PIP and UPS staff. A higher overall interview participation rate of 89.3% was registered during this study. Apart from COVID-19 antibody testing, biomarker testing was above 95%. Such response rates are rarely registered in special populations.

Multiple screening tests were applied for TB diagnosis namely, symptoms screening and a digital chest X-ray, with confirmatory testing using the GeneXpert Ultra.

Even with initial screening for respiratory symptoms, all the PIP and staff were tested for current COVID-19to avoid the underestimating the prevalence of the disease. The survey also tested past COVID-19 exposures, complementing the current infection burden data.

The study faced several limitations, including a disproportionate population of men to women, with female PIP representing only 5% of Uganda's prison population, necessitating the over-sampling of women to obtain a representative sample.

PIP younger than 18 years were excluded due to limitations in consent, missing an opportunity to understand the burden of study disease conditions in this group. However, UPS screens all PIP upon entry and routinely for various diseases, and such information is available in their records for use when needed.

Mentally unstable or 'high-security risk' PIP were also excluded for the safety of the research team, possibly leading to an underestimation of the disease burden in these groups. The high mobility of the PIP population posed challenges to data completeness and follow-up, as PIP were continuously transferred or released. Nevertheless, the research team conducted data collection continuously, including weekends, to mitigate this issue.

The survey sampled only high-volume prisons for male PIP to efficiently manage resources and focus on identifying TB patients, raising questions about generalizability. However, the primary objective was to identify TB patients in likely overcrowded (high-volume) facilities, and the inclusion of female prisons provided insights into TB patients in low to medium-volume facilities, given that all 11 sampled facilities were low volume.

We did not report semi-quantitative results of the GeneXpert positive tests in the survey. It was therefore not possible to correlate the would be low bacillary load samples with culture negative findings given that over 90% of all GeneXpert positive samples did not grow on culture. In subsequent surveys, collection of semiquantitative results should be prioritized.

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Section 11: Appendices

Appendix 11.1: PIP Informed Consent Form for People in Prison (English Language) for main study

Title: A National Survey to Determine the Prevalence of Latent and Active Tuberculosis, COVID-19 and HIV Among PIPand Prisons Staff in Uganda Prisons

Purpose

We are doing a research study about TB, COVID-19, and HIV. This study is looking at these diseases among PIP and prisons staff. We would like to know how big the problem is. We also want to understand what increases the risks of PIP and staff getting infected and developing TB, COVID-19, and HIV.

We will use the learnings from the study to understand how to keep PIP and staff from getting these diseases and help those who have it get proper care. A total of 6047 PIP (5237 male and 774 females) from 38 prisons will participate in this study.

We would like you to join this study. If you join, we will do an interview with you. We will offer you tests so that you can learn more about your health. Depending on the results of these tests, you will be referred for treatment for the diseases. You will receive this medical care at the UPS clinics. Depending on your needs, you may also be referred to additional medical care outside of the prison.

The U.S. Centers for Disease Control and Prevention (also called CDC) is working with Uganda Prisons Service, and the MoH National TB and Leprosy Programme to do this survey. We will give you a copy of this document. Your choice to be in this study, or not, will not affect your prison sentence or your ability to get care if you are sick.

B. Study Procedures

If you agree to participate in this study, you will be interviewed by a qualified health worker (nurse/clinical officer/physician) at the first encounter for this study.

What will happen during the study

If you agree to participate, you will do the following:

- You will be examined by a qualified medical health worker
- You will be asked questions about respiratory symptoms that may indicate you are sick with either TB or COVID 19., You will have a chest X-ray done on you to see if your lungs show that you have TB disease.
- Before the Chest Xray, all women will have a repeat HCG test, to rule out pregnancy.
- We will ask you to provide a sputum sample. We will use this sample for further evaluation for TB using a test called Xpert Ultra and a culture to see if the sputum contains TB germs.
- If we find TB germs in the laboratory, the sputum will be tested for resistance to TB drugs to determine which drugs will treat your specific sickness most effectively. Also, the type of genetics of your TB germs will be determined.
- After completion of pre-test HIV counseling, venous blood will be collected. We shall clean

the injection site and collect up to 10ml of blood (a blood collection tube will be used to demonstrate the volume level). The blood collection tube will be used and labeled with the participant ID. 1-2 blood collection tubes will be used, depending on the capacity of the blood collection tubes available on the local market. Nurse counselors or lab techs will draw the blood.

- We will take a sample of your blood to test if you have latent TB infection and HIV, and if you have had COVID-19 infection in the past. Latent TB infection means that you have the TB germs in your body, but they are 'asleep' or not active, so you do not have any symptoms and cannot spread the disease to others. Those with latent TB infection should take a course of treatment to kill the TB germs.
- You will also be tested for HIV and COVID-19. To test you for HIV, we will take a blood sample. To test you for COVID-19, we will swab your nose or mouth/throat.
- We will use the blood collected to determine if you have HIV. If you are found to be HIV positive, we will use the same sample to test the viral load.
- You will also answer several questions about your health and your lifestyle during a confidential interview with a trained health worker.
- You will receive counseling and support from a trained health worker to answer any questions you must help you understand what the results from the tests mean and how you can stay healthy.
- You will receive some of your test results on the same day and the rest within a turnaround time of three months. And the results will be communicated by a professional health worker who will also direct on the next steps.

How long will the survey last?

This survey will take several hours over a period of two days. The first day is today. Today we will review the consent form to determine if you want to participate in this study. We will also give you a container for you to collect sputum tomorrow morning. This sputum allows us to test you for TB disease.

The second day of data collection, we will receive your sputum sample, do the interview, complete the medical evaluation, take samples, and discuss the results with you.

C. Risks

The main risks of taking part in the study include discomfort, pain, or bruising at the site where swabs and blood will be collected. Rarely, the blood taking site may become infected; however, the study staff will use standard techniques to reduce the chance of this happening and appropriate treatment will be available if this does occur. In addition, other risks include possibility of coercion and breach of confidentiality- by the prison staff. However, your name is not going to appear on the data forms. Secondly, the prison staff will not be directly involved in the recruitment of the participants.

Additionally, you will be asked to share some personal information. This information will be kept confidential, and you will be able to ask skip any questions you do not feel comfortable answering.

D. Benefits

You will be able to find out if you have TB, HIV, and/or COVID-19. If you have any of these diseases, you will get the standard treatment and care recommended by the Uganda Ministry of Health. If you join this study, the information you share with us will benefit your health, other PIP, and the health of prisons staff. This study will also help improve the health of PIPand staff of Uganda Prisons services, the surrounding communities, and the general public by helping us to better understand the extent of TB, COVID-19, and HIV in order to make sure that the correct services (test and treat) are provided to other PIP and prisons staff for these diseases.

E. Compensation and costs

There are no costs to you. The study team will manage any costs of testing, treatment that occur during this survey and after. You will receive two bars of soap as compensation for your time during the survey visits and for any other visits that are required by the survey. You will get a soft drink after your blood is taken.

F. Participant rights

Participation in this survey is entirely voluntary. You have the right to refuse to participate in this survey and this decision will not affect your prison sentence, treatment, nor any services you are entitled to in the future. If you choose to participate in this survey, you have the right to withdraw from the survey at any time.

G. Confidentiality

All your records from this survey will be kept confidential by the investigators of this survey. No information that personally identifies you will be disclosed in any publications that arise because of this survey. We will give you a barcode. The barcode helps protect your privacy. Your interview answers will only be labelled with your barcode.

H. Questions and people to contact

You are not giving up any legal claims or rights because of your participation in this research study. If you have questions regarding your rights as a research participant or wish to report a breach, contact Dr. Joseph Kagaayi Chair of the Institutional Review Committee at Makerere University, School of Public Health Tel. +256 393 291397.If you have questions about this study, you can contact Dr. Simon Kasasa from Makerere University School of Public Health, Tel. +256 772 376202 or Dr. Simon Muchuro from the Ministry of Health, Tel +257 772 835073 or Dr. Leonard Marungu from UPS: Tel; +256 700393038. All contacts should made through the welfare office at your station. These telephone numbers will be pinned on your notice board and the welfare office.

I. Disease testing and access to health facility records

During this study, the research team may use some of your health facility information and also carry out tests for TB, HIV and COVID 19 in order to determine your current health status. Tick from the table below the tests you would like to be carried during this research.

Test for or Access to	Tick
Health facility records	
HIV	
Latent TB	
COVID 19	
X-Ray	
Storage and use of blood and sputum for future testing	

J. Informed consent

I have read the above information, or it has been read to me. I have had the chance to ask questions, and all of my questions have been answered. I consent voluntarily to be in this study and to each aspect of the study as shown by my signature, initials, or mark below.

_____ _____

Name of Participant (printed) Signature of participant

or if illiterate, make a thumbprint in the box below*

Date (dd/mm/yyyy)_____

_____

Name of Person Administering Consent (printed) Position/Title_____

_____

Signature of Person Administering Consent **Date: _____ / _____ / ____**
(dd/mm/yyyy)

*If the participant is unable to read and/or write, an impartial witness should be present during the informed consent discussion. After the written informed consent form is read and explained to the participant, and after they have orally consented to their participation in the study, and have either signed the consent form or provided their fingerprint, the witness should sign and personally date the consent form. By signing the consent form, the witness who is an PIP leader (either a Peer leader, Cough monitor or Expert client) attests that the information in the consent form and any other written information was accurately explained to, and apparently understood by the participant and that informed consent was freely given by the participant.

_____ _____

Name of Person Witnessing Consent (printed) Signature of Person Witnessing Consent

Date: _____ / _____ / ____
(dd/mm/yyyy)

Appendix 11.2: Prisons Staff Informed Consent Form

Title: A National Survey to Determine the Prevalence of Latent and Active

Tuberculosis, COVID-19 and HIV Among PIP and Prisons Staff in Uganda Prisons

Purpose

We are doing a research study about TB, HIV and COVID-19. This study is looking at these diseases among PIP and prisons staff. We would like to know how big the problem is. We also want to understand what increases the risks of PIP and staff getting infected and developing TB, COVID-19, and HIV. We will also assess the presence of crowding and adequacy of surface area for ventilation for PIP' rooms.

We will use the learnings from the study to understand how to keep PIP and staff from getting these diseases and help those who have it get proper care. A total of 825prisons staff will participate in this study.

We would like you to join this study. If you join, we will do an interview with you. We will offer you tests so that you can learn more about your health. Depending on the results of these tests, you will be referred for treatment for the diseases. You may also be referred to additional medical care outside of the prison. The choice of care with depend on UPS guidelines and procedures.

The U.S. Centers for Disease Control and Prevention (also called CDC) is working with Uganda Prisons Service, and the MoH National TB and Leprosy Programme to do this survey. We will give you a copy of this document. Your choice to participate or not will not affect either your employment by UPS or your performance evaluation, e

B. Study Procedures

What will happen during the study

If you agree to participate, you will do the following:

- You will be examined by a qualified medical health worker
- You will be asked questions about respiratory symptoms that may indicate you are sick with either TB or COVID 19., You will have a chest X-ray done on you to see if your lungs show that you have TB disease.
- Before Xray, all women will have a repeat HCG test to rule out pregnancy
- We will ask you to provide a sputum sample. We will use this sample for further evaluation for TB using a test called Xpert Ultra and a culture to see if the sputum contains TB germs.
- If we find TB germs in the laboratory, the sputum will be tested for resistance to TB drugs to determine which drugs will treat your specific sickness most effectively. Also, the type of genetics of your TB germs will be determined.

After completion of pre-test HIV counseling, venous blood will be collected. We shall clean the injection site and collect up to 10ml of blood (a blood collection tube will be used to demonstrate the volume level). The blood collection tube will be used and labeled with the participant ID. 1-2 blood collection tubes will be used, depending on the capacity of the blood collection tubes available on the local market. Nurse counselors or lab techs will draw the blood. We will take a sample of your blood to test if you have latent

TB infection and HIV, and if you have had COVID-19 infection in the past. Latent TB infection means that you have the TB germs in your body, but they are 'asleep' or not active, so you do not have any symptoms and cannot spread the disease to others. Those with latent TB infection should take a course of treatment to kill the TB germs.

- You will also be tested for HIV and COVID-19. To test you for HIV, we will take a blood sample. To test you for COVID-19, we will swab your nose or mouth/throat.
- We will use the blood collected to determine if you have HIV. If you are found to be HIV positive, we will use the same sample to test the viral load.
- You will also answer several questions about your health and your lifestyle during a confidential interview with a trained health worker.
- You will receive counseling and support from a trained health worker to answer any questions you must help you understand what the results from the tests mean and how you can stay healthy.
- You will receive some of your test results on the same day and the rest within a turnaround time of three months. And the results will be communicated by a professional health worker who will also direct on the next steps.

How long will the survey last?

This survey will take several hours over a period of two days. The first day is today. Today we will review the consent form to determine if you want to participate in this study. We will also give you a container for you to collect sputum tomorrow morning. This sputum allows us to test you for TB disease.

The second day of data collection we will receive your sputum sample, do the interview, complete the medical evaluation, take samples, and discuss the results with you.

C. Risks

The main risks of taking part in the study include discomfort, pain, or bruising at the site where swabs and blood will be collected. Rarely, the blood taking site may become infected; however, the study staff will use standard techniques to reduce the chance of this happening and appropriate treatment will be available if this does occur.

Additionally, you will be asked to share some personal information. This information will be kept confidential, and you will be able to ask skip any questions you do not feel comfortable answering.

D. Benefits

You will be able to find out if you have TB, HIV, and/or COVID-19. If you have any of these diseases, you will get the standard treatment and care recommended by the Uganda Ministry of Health. If you join this study, the information you share with us will benefit your health, other staff and the health of prisoners. This study will also help improve the health of PIP and staff of Uganda Prisons services, the surrounding communities, and the general public by helping us to better understand the extent of TB, COVID-19, and HIV in order to make sure that the correct services (test and treat) are provided to other staff and PIP for these diseases.

E. Compensation and costs

There are no costs to you. The study team will manage any costs of testing, treatment that occur during this survey and after. You will receive 20,000 UGX (twenty thousand shillings) as compensation for your time during the survey encounters and for any other visits that are required by the survey. You will get a soft drink after your blood is taken.

F. Participant rights

Participation in this survey is entirely voluntary. You have the right to refuse to participate in this survey and this decision will not affect your employment nor any services you are entitled to in the future. If you choose to participate in the study, you have the right to withdraw from the survey at any time. Any survey results obtained prior to your withdrawal of consent will however be used.

G. Confidentiality

All your records from this survey will be kept confidential by the investigators of this survey. No information that personally identifies you will be disclosed in any publications that arise because of this survey. We will give you a barcode. The barcode helps protect your privacy. Your interview answers will only be labelled with your barcode.

H. Questions and people to contact

You are not giving up any legal claims or rights because of your participation in this research study. If you have questions regarding your rights as a research participant, contact Dr. Joseph Kagaayi, Chair of the Institutional Review Committee at Makerere University, School of Public Health Tel. +256 393 291397. If you have questions about this study, you can contact Dr. Simon Kasasa (skasasa@musph.ac.ug) Tel. +256 772 376202 or Dr. Simon Muchuro from Makerere University School of Public Health or Dr. Simon Muchuro from the Ministry of Health, Tel +257 772 835073 or Dr. Leonard Marungu from UPS: Tel; +256 700393038.

I. Disease testing and access to health facility records

During this study, the research team may use some of your health facility information and also carry out tests for TB, HIV and COVID 19 in order to determine your current health status. Tick from the table below the tests you would like to be carried during this research;

Test for or Access to	Tick
Health facility records	
HIV	
Latent TB	
COVID 19	
X-Ray	
Storage and use of blood and sputum for future testing	

J. Informed consent

I have read the above information, or it has been read to me. I have had the chance to ask questions, and all of my questions have been answered. I consent voluntarily to be in this study and to each aspect of the study as shown by my signature, initials, or mark below.

_____ _____

Name of Participant (printed) Signature of participant

or if illiterate, make a thumbprint in the box below*

Date (dd/mm/yyyy)_____

_____

Name of Person Administering Consent (printed) Position/Title_____

_____

Signature of Person Administering Consent **Date: _____ / _____ / ____**
(dd/mm/yyyy)

*If the participant is unable to read and/or write, an impartial witness should be present during the informed consent discussion. After the written informed consent form is read and explained to the participant, and after they have orally consented to their participation in the study and have either signed the consent form or provided their fingerprint, the witness (fellow staff) should sign and personally date the consent form. By signing the consent form, the witness attests that the information in the consent form and any other written information was accurately explained to, and apparently understood by the participant and that informed consent was freely given by the participant.

_____ _____

Name of Person Witnessing Consent (printed) Signature of Person Witnessing Consent

Date: _____ / _____ / ____
(dd/mm/yyyy)

Appendix 11.3: Pre-survey national screening tool for COVID-19

Date: ___/___/_____ **Time: ___:___AM/PM**

Participant Barcode: _____ **EA: _____**

INTERVIEWER:

Please read: We are required per country guidelines to ask you the questions below to determine if you are at risk of infection with COVID-19. We will also take your temperature.

No	Question	Response	Comment
1.	Have you felt like you had a fever in the past day?	|_Y_||_N_|	
2.	Do you have cough and/or a sore throat?	|_Y_||_N_|	
3.	Do you feel muscle ache or weakness?	|_Y_||_N_|	
4.	Do you have headache?	|_Y_||_N_|	
5.	Are you having difficulty in breathing or shortness of breath?	|_Y_||_N_|	
6.	***Interviewer:*** Record the respondent's temperature measurement today	_____ °C	

COVID -19 Vaccination Status

7- Have you received a COVID-19 vaccine?

1- Yes
2- No (GO TO QN 11)
3- Don't know (GO TO QN 11)

8-If you have, how many doses so far received?

1- One
2- Two
3- Three

9-Where did you receive the last COVID 19 vaccine?

1- Within the prisons
2- Outside the prison

10- If your vaccination card available? (***Check and confirm the status***)

1- Card available
2- Card not available

11- If you have never received COVID 19 vaccine, what is the main reason?

1- I don't trust vaccines
2- It is against my religious belief
3- Don't want
4- Others (Specify) _____

Appendix 11.4: PIP PARTICIPANT QUESTIONNAIRE

<table>
<tr><td colspan="5">A National Survey to Determine the Prevalence of Latent and Active Tuberculosis, COVID-19 and HIV Among PIPand Prisons Staff in Uganda Prisons</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td colspan="2">1.Prison: Name</td><td colspan="3">_____</td></tr>
<tr><td colspan="2">2.Prison GPS coordinate</td><td colspan="3">_____</td></tr>
<tr><td colspan="2">3. Location of prison (Region)</td><td colspan="2">• 1-Kampala Extra
• 2-Central
• 3-East-Central
• 4-Mid-Central
• 5-South-Eastern
• 6-Eastern
• 7-Mid-Eastern
• 8-Kigezi</td><td>• 9-North-Eastern
• 10-Mid-Northern
• 11-Northern
• 12-North-Western
• 13-Mid-Western
• 14-Western
• 15-South-Western
• 16-Southern</td></tr>
<tr><td colspan="5">Participant Demographics</td></tr>
<tr><td colspan="2">4. Barcode</td><td colspan="3">_____</td></tr>
<tr><td colspan="2">5. Nationality</td><td colspan="3">• Ugandan
• Foreigner (specify) _____</td></tr>
<tr><td colspan="2">6. Sex:</td><td colspan="3">• Male
• Female</td></tr>
<tr><td colspan="2">7. Age (completed years)/ Date of Birth</td><td colspan="3">__ ___/___ ___ ___/___ ___ ___ __ (_____)
DD/MM/YYYY (Years)</td></tr>
<tr><td colspan="2">8. Home address</td><td>Region
-_____</td><td>District
_____</td><td>Subcounty
_____</td></tr>
<tr><td>9. Education
• 1-None
• 2-Primary
• 3-Senior
• 4-Tertiry
• 5-University
• 6-Unknown</td><td>10.Religion
• 1-Christian
• 2-Muslim
• 3-None
• 4-Other:(Specify)
_____
• 5- Unknown</td><td>11. Marital status
1-Single
• 2-Married
• 3 - Separated
• 4 - Divorced
• 5 - Widowed
• 6- Unknown</td><td colspan="2">12. Occupation in the community
• 1-Business
• 2- Civil servant
• 3-Health worker
• 4-Student
• 5-Unemployed
• 6-Farmer
• 7-Husband/House wife
• 8-Skilled labor
• 9- Child
• 10--Other(Specify) _____</td></tr>
<tr><td colspan="2">13. Type of PIP</td><td colspan="3">• Remand
• Convicted
• Debtors
• Lodger</td></tr>
</table>

14a. Type of Sentence • 1-Life • 2- Death penality • 3-Serving a period (specify) _____ • 4-I don't know	• 14b. In which month and year were you put in prison for the current imprisonment? _____/_____ (mm/yyyy)	
15. What leadership position do you currently hold in this prison (Circle One) 1- Katikiro/Ward leader 2 Cell leader 3 Sports team leader 4 Peer Educator 5 Spiritual leader 6- Water and sanitation 7- Other position (Specify) 8- None		16 Knowledge about TB (Use the guide to determine whether true or not) • 1-What is TB? • 2-What are the sign of TB? • 3-How is TB prevented?
History of previous incarceration		
17a. Have you been imprisoned before? • 1-Yes • 2-No • Refused • Don't know	17b. If Yes, how many times in your life have you been in prison? _____	
181. How old were you when you were first put in the prisons? _____ (Age in complete years)	18b. Altogether, how many years have you spent in prisons? _____-	
19.How many prisons in Uganda have you been confined in? ____	20. For the most recent transfer, why were you transferred to a different prison? (Check all that apply) 1- Sickness 2- Overcrowding 3- To protect me 4- To discipline me 5- Routine transfer 6- Other reason (Specify) _____ 7- Don't Know 8- Refuse to Answer Not Applicable	
Tobacco use		
21. Do you smoke tobacco? • 1-Yes (Go to Q 22) • 2-No (Go to Q 24)	22. If yes, how often? • 1-Daily • 2-3-5 times a week • 3- Once a week • 4- Only on weekends • 5- On special occassions	23. Duration of smoking? • 23a. current and past in years _____ • 23b.Number of tobacco pieces/sticks smoked per day • 1-1-2 • 2-3-4 • 3-5-6 • 4-7-9 • 5-More than 9
24. Did you smoke before joining prison? • 1-Yes • 2-No		

25. Have you ever smoked in the past? • 1-Yes (Go to Q 26) • 2-No (Go to Q 28)	26. If yes, how often? • 1-Daily • 2-3-5 times a week • 3- Once a week • 4- Only on weekends • 5- On special occassions	27. Duration of smoking in the past? 27a. Past in years _____ 27b. Number of tobacco pieces/sticks smoked per day • 1-1-2 • 2-3-4 • 3-5-6 • 4-7-9 • 5-More than 9
Drug & substance abuse		
28. Do people use any other substances/drugs (besides tobacco) in prison? ☐ Yes ☐ No If yes, specify • 1-Mariguana • 2-Petrol • 3-Glue • 4-Kasingiri • 5-Other specify _____	29. How about you? ☐ Yes ☐ No If yes, specify • 1-Mariguana • 2-Petrol • 3-Glue • 4-Kasingiri • 5-Other specify _____	30. Did you use another substance/drug (besides tobacco) prior to imprisonment? ☐ Yes ☐ No If yes, specify • 1-Mariguana • 2-Petrol • 3-Glue • 4-Kasingiri • 5-Other specify _____
Alcohol use		
31. Do you take any alcohol? • 1-Yes (Go to Q 32) • 2-No (Go to Q 34)	32. If yes, how often? • 1-Daily • 2-3-5 times a week • 3- Once a week • 4- Only on weekends • 5- On special occassions	33. Duration of taking alcohol? 33a. currently in years _____ 33b. Number of glasses/bottles/paints drunk per day • 1-2 • 3-4 • 5-6 • 7-9 • More than 9
34. Have you ever taken alcohol in the past? • 1-Yes (Go to Q 35) • 2-No (Go to Q 37)	35. If yes, how often? • 1-Daily • 2-3-5 times a week • 3- Once a week • 4- Only on weekends • 5- On special occassions	36. Duration of taking alcohol in the past? 36a. Past in years _____ 36b. Amount of alcohol consumed per day (in litres) • 1-0.5-1.0-2-1.5- 2.0 • 3-2.5-3.043.5-4.0 • 5-More than 5.0 litres _____
TB treatment history (as reported by the participant)		

37. Are you currently taking any anti-TB drugs? • 1-Yes (go to Q 38) • 2-No (go to Q 41)	38. If yes, how long? (In weeks) _____	39. How long did you have symptoms before seeking care for TB? (In weeks) _____	40. How long did you have symptoms before starting TB treatment? (In weeks) _____
41. Have you been treated for TB in the past? • 1-Yes (go to Q 43) • 2-No (go to Q45)	43. If yes what was the year of your last episode? _____(YYYY)	44. Where did you receive the treatment? (Circle one) • 1 - Public facility • 2 - NGO facility • 3 - Private facility • 4 - Pharmacy/Drug shop • 5 - Traditional healer • 6 - Other (Specify): _____	
Other Medical History(as reported by the participant)			
45.Do you suffer from any chronic illnesses (Circle all those mentioned)	• HIV • Hypertension • Diabetes • Cancer • Other, Specify.....		
46. If HIV positive, are you currently taking antiretroviral treatment (ART).	• Yes • No		
47. If you are on ART, for how long (Years)	• < 3months • < 1 year • > 1 year (specify)	Viral suppression • Yes • No • Don't know	CD4 count • <200 • ≥200 • Don't know
Current symptoms and contact History			
48. Do you have any of these symptoms? (Check all that apply). If Yes, specify for how long (in days)?	• Current cough _____ (days) • Blood stained sputum _____ (days) • Chest pain_____(days) • Weight loss _____ (days) • Night sweats _____ (days) • Others specify_____ (days)	**CXR signs** • Normal CXR • Abnormal, not suggestive of TB (CAD4TB <60%) • Abnormal, suggestive of TB (CAD4TB≥60%) • Confirmed TB (specify signs) _____	
49. Have you been in contact with someone who has the above symptoms • 1- Yes, Specify period ☐ in the last 3 months, ☐ in the last 6 months, ☐ in the last 12 months ☐ more than 12 months ☐ Don't remeber • 2- No • 3- Don't know			

50. If yes to any of the S/S in QN 48 above, Did you seek medical care for your cough? (Check one) • 1-Yes (Go to QN 51) • 2-No (Go to QN 52) • 3- Don't know	51. If yes,what care did you receive? (Check all that apply) • 1-Given medicine • 2-Got a Chest x-ray • 3-Asked to provide sputum • 4-Referred elsewhere for care • 5-Physical examination • 6-Other(Specify) _____	52. If no, what is the **main** reason for not seeking care? (Check one) • 1- Self-treatment • 2 - Not recognized as illness • 3 - Ignored • 4 – Didn't receive permission • 5- Services not available
53. Have you ever been in contact with someone who has TB	• 1- Yes • 2- No • 3- Don't Know	
54a. Have you been in contact with someone who has COVID-19 since you were incarcerated?	• 1-Yes • 2- No • 3- Don't know	
54b. Have you had COVID 19 disease before 1- **Yes if yes,** Specify period ☐ Prior to incarceration ☐ While in Prison 2- **No** 3- **Don't know**		
Physical examination		
55.Weight (Kilograms)		
56. Height (Centimeters)		
57. MUAC ☐ Green ☐ Yellow ☐ Red		
58. Evidence of BCG immunization scar	• 1-Yes • 2-No	
59. Medical Records/Laboratory Test Review and Abstraction		
• Most recent HIV test result and date (if <3m prior to interview) • For known HIV+ - date of first positive HIV test • If HIV positive, ever recevied TB preventive therapy (TPT)? • Currently on ART • If on ART, indicate start date • HIV Viral Load result and date (if within <6 months prior to this interview)	Results (State as written on report form/results slip) • ..... • ..... • ..... • Yes/No • Yes/No..... • ____/____/_____ (dd/mm/yyyy). • ..... • ..... • ..... • ..... •	

Testing/investigations done	
60. Tests done/samples taken • Chest X ray • Sputum for gene Xpert • HIV testing per national algorithm • HIV Viral Load • IGRA -TB Gold plus (QFT plus) • Nasal swab fo COVID-19 PCR • Oral swab for COVID-19 PCR • Blood for COVID-19 antibody test • COVID Xpert Ultra • COVID serology • TB culture • TB Drug Sensitivity Testing • Genetic sequencing	Results (State as written on report form/results slip • ..... • ..... • ..... • ..... • ..... • ..... • ..... • ..... • ..... • .....

Appendix: 11.5 Main questionnaire

1.Prison: Name		_____		
2.Prison GPS coordinate		_____		
3. Location of prison (Region)		• 1-Kampala Extra • 2-Central • 3-East-Central • 4-Mid-Central • 5-South-Eastern • 6-Eastern • 7-Mid-Eastern • 8-Kigezi	• 9-North-Eastern • 10-Mid-Northern • 11-Northern • 12-North-Western • 13-Mid-Western • 14-Western • 15-South-Western • 16-Southern	
Participant Demographics				
4. Barcode		_____		
5. Nationality		• Ugandan • Foreigner (specify) _____		
6. Sex:		• Male • Female		
7. Age (completed years)/ Date of Birth		__ ___/___ ___ ___/___ ___ ___ __ (_____) DD/MM/YYYY (Years)		
8. Home address		Region -_____	District _____	Subcounty _____
9. Education • 1-None • 2-Primary • 3-Senior • 4-Tertiry • 5-University • 6-Unknown	10.Religion • 1-Christian • 2-Muslim • 3-None • 4-Other:(Specify) _____ • 5- Unknown	11. Marital status • 1-Single • 2-Married • 3 - Separated • 4 - Divorced • 5 - Widowed • 6- Unknown	12. Are you uniformed staff or civilian staff? 1- Unifirmed staff 2- Civillian staff	

13. How many years have you worked in UPS ___ (years) 14- For how long have you worked at this stations? 1- Less than 1 year 2- 1-4 years 3- 5 years and above	15- What is your current rank in the UPS? 1-Cadet 2 Corporal 1- Seargent 2- Chief 3- Principle Officer 4- Assistant Superintendent 5- Senior Superintendent 6- Assistant Commissioner 7- Commissioner 8- Director 9- Deputy Commissioner General 10- Commissioner General 11- Other Category (specify) _____
16. What type of job do you currently have in UPS? (Choose one) 1-Warden 2- Guard 3- Administrator 4- Officer in Charge 5- Counselor 6- Peer educator 7- Nurse 8-Doctor 9-Clinical officer 10-Lay counselor 11-Welfare officer 12-Data management 13-Laboratory officer 14-Nursing assistant 15- Others (Specify)_____ 16- Don't Know 17- Refuse to Answer	17. How many different prisons have you worked in while employed by Uganda Prisons service? ---------- 1-Don't Know 2-Refuse to Answer 9-Not Applicable

18. How many family members are currently living with you? -- --	19 - Which of following e best describes your current housing situation? (Choose one) 1- House outside the barracks 2- Senior staff housing in barracks 3- Single uniport in barracks 4- Uniport shared with another family 5- Other (Specify) _____
20. Knowledge about TB (Use the guide to determine whether true or not) • 1-What is TB? • 2-What are the sign of TB? • 3-How is TB prevented?	
Tobacco use	

21. Do you smoke tobacco? • 1-Yes (Go to Q 22) • 2-No (Go to Q 24)	22. If yes, how often? • 1-Daily • 2-3-5 times a week • 3- Once a week • 4- Only on weekends • 5- On special occassions	23. Duration of smoking? • 23a. current and past in years _____ • 23b.Number of tobacco pieces/sticks smoked per day • 1-1-2 • 2-3-4 • 3-5-6 • 4-7-9 • 5-More than 9
24. Did you smoke before joining prison? • 1-Yes • 2-No		

25. Have you ever smoked in the past? • 1-Yes (Go to Q 26) • 2-No (Go to Q 28)	26. If yes, how often? • 1-Daily • 2-3-5 times a week • 3- Once a week • 4- Only on weekends • 5- On special occassions	27. Duration of smoking in the past? 27a. Past in years _____ 27b. Number of tobacco pieces/sticks smoked per day • 1-1-2 • 2-3-4 • 3-5-6 • 4-7-9 • 5-More than 9
Drug & substance abuse		
28. Do people use any other substances/drugs (besides tobacco) in prison? □ Yes □ No If yes, specify • 1-Mariguana • 2-Petrol • 3-Glue • 4-Kasingiri • 5-Other specify _____	29. How about you? □ Yes □ No If yes, specify • 1-Mariguana • 2-Petrol • 3-Glue • 4-Kasingiri • 5-Other specify _____	30. Did you use another substance/drug (besides tobacco) prior to imprisonment? □ Yes □ No If yes, specify • 1-Mariguana • 2-Petrol • 3-Glue • 4-Kasingiri • 5-Other specify _____

34. Have you ever taken alcohol in the past? • 1-Yes (Go to Q 35) • 2-No (Go to Q 37)	35. If yes, how often? • 1-Daily • 2-3-5 times a week • 3- Once a week • 4- Only on weekends • 5- On special occassions	36. Duration of taking alcohol in the past? 36a. Past in years _____ 36b. Amount of alcohol consumed per day (in litres) • 1-0.5-1.0 • 2-1.5- 2.0 • 3-2.5-3.0 • 4-3.5-4.0 • 5-More than 5.0 litres_____	
TB treatment history (as reported by the participant)			
37. Are you currently taking any anti-TB drugs? • 1-Yes (go to Q 38) • 2-No (go to Q 41)	38. If yes, how long? (In weeks) _____	39. How long did you have symptoms before seeking care for TB? (In weeks) _____	40. How long did you have symptoms before starting TB treatment? (In weeks) _____
41. Have you been treated for TB in the past? • 1-Yes (go to Q 43) • 2-No (go to Q45)	43. If yes what was the year of your last episode? _____(YYYY)	44. Where did you receive the treatment? (Circle one) • 1 - Public facility • 2 - NGO facility • 3 - Private facility • 4 - Pharmacy/Drug shop • 5 - Traditional healer • 6 - Other (Specify): _____	

Other Medical History(as reported by the participant)		
45.Have you ever been told that you have of the following diseases? (Circle all those mentioned)	• HIV • Hypertension • Diabetes • Cancer • Other, Specify..... • Don't know	
46. If HIV positive, are you currently taking antiretroviral treatment (ART).	• Yes • No	
47. If you are on ART, for how long (Years)	• < 3months • < 1 year • > 1 year (specify)	Viral suppression • Yes • No • Don't know CD4 count • <200 • >200 • Don't know
Current symptoms and contact History		

48. Do you have any of these symptoms? (Check all that apply). If Yes, specify for how long (in days)? -Don't know	• Current cough _____ (days) • Blood stained sputum _____ (days) • Chest pain_____(days) • Weight loss _____ (days) • Night sweats _____ (days) • Others specify_____ (days)	**CXR signs** • Normal CXR • Abnormal, not suggestive of TB (CAD4TB <60%) • Abnormal, suggestive of TB (CAD4TB≥60%) • Confirmed TB (specify signs) _____
49. Have you been in contact with someone who has the above symptoms in question 48 above? • Yes, Specify period □ 3 months, □ 6 months, □ 12 months □ More than 12 months • No • Don't know		
50. If yes to any of the S/S in QN 48 above, Did you seek medical care for your cough? (Check one) • 1-Yes (Go to QN 51) • 2-No (Go to QN 52) • 3- Don't know	51. If yes,what care did you receive? (Check all that apply) • 1-Given medicine • 2-Got a Chest x-ray • 3-Asked to provide sputum • 4-Referred elsewhere for care • 5-Physical examination • 6-Other(Specify) _____	52. If no, what is the **main** reason for not seeking care? (Check one) • 1- Self-treatment • 2 - Not recognized as illness • 3 - Ignored • 4 – Didn't receive permission • 5- Services not available

53. Have you ever been in contact with someone who has TB	• 1- Yes • 2- No • 3 Don't know
54a. Have you been in contact with someone who has COVID-19	• 1-Yes • 2- No • 3-Don't know
54b. Have you had COVID 19 disease before 1- **Yes** 2- **No** 3- Don't know	
Physical examination	
55.Weight (Kilograms)	
56. Height (Centimetres)	
57. MUAC □ Green □ Yellow □ Red	
58. Evidence of BCG immunisation scar	• 1-Yes • 2-No
59. Medical Records/Laboratory Test Review and Abstraction	

• Most recent HIV test result and date (if <3m prior to interview) • For known HIV+ - date of first positive HIV test • If HIV positive, ever recevied TB preventive therapy (TPT)? • Currently on ART • If on ART, indicate start date • HIV Viral Load result and date (if within <6 months prior to this interview)	Results (State as written on report form/results slip) • ..... • ..... • ..... • Yes/No • Yes/No..... • ____/____/_____ (dd/mm/yyyy). • ..... • ..... • ..... • ..... • .....
Testing/investigations done	
60. Tests done/samples taken • Chest X ray • Sputum for gene Xpert • HIV testing per national algorithm • HIV Viral Load • IGRA -TB Gold plus (QFT plus) • Nasal swab fo COVID-19 PCR • Oral swab for COVID-19 PCR • Blood for COVID-19 antibody test • COVID Xpert Ultra • COVID serology • TB culture • TB Drug Sensitivity Testing • Genetic sequencing	Results (State as written on report form/results slip • ..... • ..... • ..... • ..... • ..... • ..... • ..... • ..... • ..... • ..... • .....

Appendix 11.6: Prison room assessment tool for ventilation & crowding

Region	.....	**District**	.....	**Date**	...../...../.....
Name of Prison	.....	**Name/Number of Prison ward**	.....	**Name/Number of Prison room**	.....
Prescribed room population (total area in feet/40) ☐	.....	**Actual room population**	.....	**Room crowded; {floor space per individual less than 40 sq feet)**	Yes ☐ No ☐
Ventilator Surface Area					
Ventilator Type A		Window (or ventilator Type B)		Door (or ventilator Type C)	
Height	.....	***Height***	.....	***Height***	.....
Width	.....	***Width***	.....	***Width***	.....
Surface area	.....	***Surface area***	.....	***Surface area***	.....
Number of ventilators	.....	***Number of ventilators***	.....	***Number of ventilators***	.....
Combined surface area	.....	***Combined surface area***	.....	***Combined surface area***	.....
Total surface area for ventilation (ventilator, window & door)			.....	**Floor surface area**	.....
Percentage openable surface areas for ventilation / floor surface area			.....	**Ventilation surface area adequate (≥20%)?**	Yes ☐ No ☐
Note: Only open ventilators, windows or doors should be measured.					

Appendix 11.6: A letter from MOH to the Commissioner General, UPS

Telephone: General Lines: 256 – 417 –712260
Permanent Secretary's Office: 256 – 417 – 712221
Toll Free 0800100066
E-mail: ps@health.go.ug
Website: www.health.go.ug

Ministry of Health
P. O. Box 7272
Plot 6, Lourdel Road,
Wandegeya
KAMPALA
UGANDA

IN ANY CORRESPONDENCE ON
THIS SUBJECT PLEASE QUOTE No:**ADM.105/309/05**

October 7th, 2021

The Commissioner General
UGANDA PRISONS SERVICES

Dear Sir,

RE: TUBERCULOSIS PREVALENCE SURVEY AMONG PRISON INMATES AND STAFF

The Ministry of Health in collaboration with Makerere University School of Public Health, Uganda Prisons Services and the United States Centres for Disease Control & Prevention (CDC) plan to conduct a tuberculosis (TB) prevalence survey in all the Uganda Prisons services in order to estimate the disease burden in that population. Globally, the risk of TB disease in Prisons is far much higher than the general population. This survey therefore intends to achieve the following specific objectives in order to generate evidence that will guide future interventions;

- to estimate the prevalence of latent TB infections among inmates and staff in the Uganda prisons
- to determine the prevalence of active TB in Uganda prisons
- to determine the prevalence of other TB related diseases (drug-resistant TB, TB/HIV and TB-Covid 19) co-infections in Uganda prisons
- to establish the correlates of prevalent Tuberculosis infection among inmates and staff in Uganda prisons.

The technical research activities are being spearheaded by the Makerere School of Public Health. Currently, the team is in the process of finalizing the protocol and the entire research process. This entails putting together a technical team, develop study tools and procedures and also finalizing the sampling procedures and submit for ethical approval of the study.

The purpose of this letter therefore is to request you to nominate one of your officers who will be the contact for activity and also to give permission to the team to access data which is related to the prisons set up (number of prisons per region, capacity of each prison, wards, number of inmates per ward, gender distribution and the staff) in order to complete sampling scientifically. Your quick feedback will help the ethical review approval process and study implementation.

The United States Centres for Disease Control & Prevention has already earmarked funds for this activity. The activity is expected to be completed within this financial year (2021/2022).

For further inquiries on this subject, feel free to contact Dr. Simon Kasasa (0772376202 or skasasa@musph.ac.ug) form Makerere University School of Public Health or Dr. Turyahabwe Stavia on Tel no.0772783932; turyahabwestavia@gmail.com the Assistant Commission, National TB and Leprosy Program (NTLP), Ministry of Health.

Dr. Henry G. Mwebesa
DIRECTOR GENERAL OF HEALTH SERVICES

Cc. Permanent Secretary
Cc. Country Director - CDC
Cc. Commissioner - NDC
Cc. Assistant Commissioner - NTLP
Cc. Dean, School of Public Health

Appendix 11.7: A letter from the Commissioner General, UPS

TELEGRAMS: "COMPRISONS"

TELEPHONE: 256-414-256752
FAX: 256-414-343330

A REPLY TO THIS LETTER SHOULD BE ADDRESSED TO THE COMMISSIONER GENERAL OF PRISONS AND THE FOLLOWING

UGANDA PRISONS SERVICE
PRISONS HEADQUARTERS
P. O. BOX 7182,
KAMPALA, UGANDA

REFERENCE NO. QUOTED: **ADM/MS314/01**

October 28th, 2021

The Director General of Health Services

MINISTRY OF HEALTH

RE: TUBERCULOSIS PREVALENCE SURVEY AMONG INMATES AND STAFF OF UGANDA PRISONS SERVICE

Reference is made to yours ADM.105/309/05 of October 7th, 2021.

As noted in your letter, people in detention suffer higher vulnerabilities to infectious diseases and yet experience limited access to treatment options. Uganda Prisons Service is committed to providing support to all efforts aimed at controlling infectious diseases including TB and related infections in the prison.

This is therefore to firstly Appoint Dr. Malungu Leonard the TB focal person to represent the service during this engagement. He can be contacted on mobile; 0782938121 or on email; malunguleonard@gmail.com

Secondly to give you permission to access prisons data to facilitate the completion of the sampling procedures.

This also serves to remind you that entry to all prison units is still restricted as an intervention measure against COVID-19. All personnel visiting the facilities are prohibited from getting in contact with prisoners without prior permission and are expected to be fully vaccinated against COVID-19. Each visitor must be bearing valid negative PCR results for COVID-19 that are within the last 72 hours of sample collection.

This being a security institution, all prison rules and regulations must be strictly adhered to without exception.

Samuel Baker Emiku
FOR: COMISSIONER GENERAL OF PRISONS

MakSPH
Dean's Office
01 NOV 2021
RECEIVED

Appendix 11.8: A Letter to PIP

HEADED PAPER

Date: ____/____/______
To All PIP,
Uganda Prison Services
Thru: Prisons Peer Leaders
Attn: PIP of _____ Prison Station

Dear All,

RE: **Request to participate in a national survey to determine the prevalence of latent and active Tuberculosis, COVID-19 and HIV Among PIPand Prisons staff in Uganda Prisons**

A team from Makerere University School of Public Health (MakSPH) in collaboration with the National Tuberculosis and Leprosy Program-Ministry of Health, Uganda Prisons Services with support from The U.S. Centers for Disease Control and Prevention will be conducting a study about TB, HIV and COVID-19 disease among PIP and prisons staff in Uganda. The team would like to establish how big the problem is, and to understand what increases the risks of PIP and staff getting infected and developing TB, COVID-19, and HIV. In addition, the team will also assess the ventilation and overcrowding status of the rooms where you reside to generate evidence for future interventions. A total of 4,715 PIP aged 18 and above will be randomly selected for this activity.

If you are selected, we would like you to participate in this survey. If you join, we shall conduct a face-to-face interview with you and also offer you tests to learn more about your health. Depending on the results of these tests, you will be referred for treatment for the diseases under UPS system.

Participation in this survey is entirely voluntary. You have the right to refuse to participate in this survey and this decision will not affect your prison sentence, treatment, nor any services you are entitled to in the future. If you choose to participate in this survey, you have the right to withdraw from the survey at any time.

Permission has already been though from the Commissioner General of Prisons and Officer in charge to conduct this survey in your prison. This study has already received ethical review clearance from Makerere School of Public Health Research and Ethics Committee and registration by the Uganda National Council of Science and Technology. The team will follow the current COVID-19 standard operating procedures to avoid contracting or transmitting the disease.

The research team will be led by Dr. Simon Kasasa (0772 376202) from MakSPH, Dr. Simon Muchuro (0772 835073) from the Ministry of Health and Dr. Leonard Marungu (700393038) from UPS. Data collection in your prison will take place between (Dates).

Looking forward to your full participation in this important activity

Yours sincerely

Dr. Rhoda Wanyenze
Professor and Dean
Makerere University School of Public Health

CC Commissioner General, UPS

Officer in Charge

MAKERERE UNIVERSITY
SCHOOL OF PUBLIC HEALTH

CONTACT US

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