ADDIS ABABA UNIVERSITY

IMPACT OF COVID-19 ON TUBERCULOSIS AND HIV CARE AND TREATMENT SERVICES IN ADDIS ABABA, ETHIOPIA

By:

Dagmawi Chilot Haile

Academic Advisors:

Dr. Tsegahun Manyazewal, PhD
Dr Yimtubezinash Woldeamanuel, MD, PhD

A proposalsubmitted to Addis Ababa University (AAU), College of Health Sciences, Center for Innovative Drug Development and Therapeutic Trial for Africa (CDT-Africa), in partial fulfillment of the requirements for the Master of Science in Clinical Trials

June 2021
Addis Ababa, Ethiopia

ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

CDT-AFRICA

IMPACT OF COVID-19 ON TUBERCULOSIS AND HIV CARE AND TREATMENT SERVICES IN ADDIS ABABA, ETHIOPIA

By: Dagmawi Chilot Haile

This is to certify that the thesis prepared by Dagmawi Chilot, titled "IMPACT OF COVID-19 ON TUBERCULOSIS AND HIV CARE AND TREATMENT SERVICES IN ADDIS ABABA, ETHIOPIA" and submitted to the Center for Innovative Drug Development and Therapeutic Trials for Africa (CDT-Africa), College of Health Sciences, Addis Ababa University; in partial fulfillment for the requirement of master of science degree in clinical trials, compiles with the regulations of the University and meets the accepted standards originality and quality.

Approved by the Examining Board

_____	_____	_____
Chairman, Department of Graduate Committee	Signature	Date
_____	_____	_____
Advisor, Dr. Tsegahun Manyazewal	Signature	Date
_____	_____	_____
Co- Advisor, Dr. Yimtubezinash Woldeamanuel	Signature	Date
_____	_____	_____
External Examiner	Signature	Date
_____	_____	_____
Internal Examiner	Signature	Date

DECLARATION

I, the undersigned, declare that this thesis (research work) entitled “Impact of COVID-19 on tuberculosis and HIV care and treatment services in Addis Ababa, Ethiopia” is my original work, has not been presented for a degree in any other University and that all sources of materials used for the thesis have been acknowledged.

Declared by:

Name: Dagmawi Chilot Haile

Date: June 2021

Signature: _____

ACKNOWLEDGMENT

First and foremost, I would like to thank almighty God for his care and love throughout my life.

I express my genuine gratitude to my advisors Dr. Tsegahun Manyazewal and Dr. Yimtubezinash Woldeamanuel for their unreserved support throughout the study period, without their help completion of my thesis would have not been possible.

My thank also goes to Addis Ababa University, CDT Africa and the University of Gondar for giving me an opportunity for my education and financial support.

Last but not least I would like to express gratitude to the supervisors, all data collectors for their involvement and study participants who were voluntary and spent their precious time to give valuable evidence during the data collection time.

LIST OF ACRONYMS/ABBREVIATIONS

AAU:	Addis Ababa University
AOR:	Adjusted Odds Ratio
ART:	Antiretroviral therapy
ARV:	Antiretroviral
COVID-19:	Coronavirus Disease 2019
DOT:	Directly observed therapy
HC:	Health center
HIV:	Human immunodeficiency virus
ICU:	Intensive care unit
MDR:	Multidrug-resistant tuberculosis
PLWH:	People Living with HIV
PPE:	Personal Protective Equipment
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
TB:	Tuberculosis
WHO:	World Health Organization

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

Background: Coronavirus disease 2019 (COVID-19) pandemic has infected 173,674,509 people globally resulting in 3,744,408 deaths as of 09 June 2021.Ethiopia is categorized under COVID-19 epidemic phase III (advancing outbreak). There are global concerns and predictions that COVID-19 would severely affect tuberculosis (TB) and HIV care and treatment services in resource-constrained countries.

Objective: To assess the real-time impact of COVID-19 on TB and HIV care and treatment services in Addis Ababa, Ethiopia.

Methods: This was a facility-based, multicentre, cross-sectional study in 10 health centers with high TB/HIV patients in Addis Ababa, Ethiopia. Participants were patients with TB and/or HIV who have been attending TB and/or HIV clinical care and treatment in the study sites in the COVID-19 pandemic period. Data were collected using adapted, interviewer-based questionnaires to investigate the impact of COVID-19 in their routine care and treatment services. Data were entered into Epi Info version 7 and exported to SPSS version 26 for analysis. Variables with a *P-value ≤ 0.25* in the bivariate analysis were included in the multivariate logistic regression. Statistical significance was declared if P-value < 0.05.

Results: The study included a total of 424 informed and consented participants.Study participants who missed appointments for medication refill were 98 (23.1%).When the effects of other independent variables on appointments/visits for refill were controlled,the following characteristics were found to be the most important pridictors of missed appointments (*P < 0.05*):age ≥55 [AOR=13.74, 95% CI (4.331-436.428)], monthly income 3001-10000 [AOR=0.05, 95% CI (0.003-0.803)], fear of COVID-19 [AOR=59.14, 95% CI (3.804-9195.85)], transport disruption [AOR=56.91, 95% CI (1.930-16781.4)], reduced income for traveling to health facility [AOR=12.52, 95% CI (19.115-8194.9)],contacting healthcare providers quickly[AOR=0.11, 95% CI (0.017-0.742)], soap availability [AOR=0.01, 95% CI (0.000-0.845)], pharmacy accessibility, [AOR=0.01, 95% CI (0.000-0.611)], shortage of some medications [AOR=10.72, 95% CI (1.033-111.290)], and tremendous shortage of non-medical support [AOR=15.30, 95% CI (1.075-218.039)].

The participants were well aware of the COVID-19 preventive measures. According to the participants, the most effective COVID-19 preventive measures were use of facemask (88.4%), frequent handwashing with soap (81.4%), and staying at home (76.4%). The most costly COVID-19 preventive measures that cause financial burden to the patients were costs for buying facemasks [242 (57.1%)], soaps for handwashing [97 (22.9%)], and disinfectants [223 (52.6%)]. Participants responded that the healthcare providers were polite and respectful (99.5%), and willing to listen and answer their questions (99.5%) and give attention to their individual needs (98.6%).

Participants who missed follow-up dignositic tests were 97 (22.9%). Variables which were found to be statisticaly significant included the following: age ≥55 [AOR=0.14, 95% CI (0.021-0.909)], denied helth services [AOR=0.20, 95% CI (0.054-0.729)], reduced income for traveling to health facility [AOR=0.06, 95% CI (0.008-0.408)], much harder non medical support [AOR=0.02, 95% CI (0.001-0.404)].

Participants who missed counseling services were 92 (21.7%). In multivariate logistic regression, the following were statisticaly significant: age ≥55 [AOR= 0.11,95% CI (0.016-0.733)], denied health services [AOR= 0.25, 95% CI (0.078-0.787)], fear of COVID-19 [AOR= 0.02, 95% CI (0.001-0.396)],reduced income [AOR= 0.04, 95% CI (0.005-0.333)], availability of soap [AOR= 22.65, 95%CI (1.302-393.974)], availability of sanitizer [AOR= 3.87, 95% CI (1.069-14.041)], slightly shortage of medicines [AOR= 0.26, 95% CI (0.081-0.846)].

Conclusion: COVID-19 pandemic impacted the care and treatment services of patients with HIV and TB negatively. The impact was primarily on their appointments for scheduled medication refills, clinical and laboratory follow-ups. The impact could be mitigated by providing education to the public, compensating travel expenses for eligible patients and their healthcare providers, continuing delivery of TB/HIV care and treatment services.

Keywords: Coronavirus disease 2019 (COVID-19), Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), tuberculosis (TB), HIV, clinical care, treatment, Ethiopia

1. INTRODUCTION

1.1 Background

Coronavirus disease 2019 (COVID-19) is an illness caused by the novel Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and its symptoms can range from mild to severe illness. Since the World Health Organization (WHO) first received a report of a cluster pneumonia cases in Wuhan, China on 31 December 2019, and was later confirmed as a novel coronavirus on 7 January 2020, it has infected over 173, 674,509 people globally resulting in more than 3,744,408 deaths as of 09 June 2021(1). COVID-19 pandemic overwhelmed the health systems and has exposed its weaknesses in preparedness and response. In the future, because of those weaknesses and the transmissibility of the pandemic, cases and deaths are likely to occur in larger numbers (2).

Africa was not exempt from the COVID-19 pandemic, and the first case of COVID-19 in Africa was reported from Cairo on the 14th of February 2020 (3). A total of 5,009,823 COVID-19 cases and 133,746 deaths have been reported in 55 African countries as of 09 June 2021 (4). Because of the multifaceted health challenges in Africa, COVID-19 could overburden existing infectious diseases, including Human Immunodeficiency Virus (HIV) and Tuberculosis (TB) (5).

Because of the expansion of air traffic between sub-Saharan Africa (SSA) and China, African countries have been at high risk of COVID-19 (5,6). On February 27, the first case in sub-Saharan Africa (SSA) was reported from Legos by the Nigerian Ministry of Health (7). The rising numbers of COVID-19 in SSA imposed countries to shift their limited resources to fight the pandemic (8).

Ethiopia, a country in SSA, is categorized under COVID-19 epidemic phase III (advancing outbreak) according to the Africa Centers for Disease Control and Prevention (Africa CDC) classification (4). A shortage of health care facilities, mass use of public transportation, very low health care workforce density (about 0.96 for every 1000 population), shortages of personal protective equipment, and spiritual and communal life are among major risk factors for the spread of COVID-19 in Ethiopia (9). Despite the country's success in reducing common infectious diseases in the last two-and-a-half decades, diseases such as TB, HIV/AIDS, lower

respiratory infections, and diarrheal diseases remain the major causes of mortality (10). In many parts of the world, TB and HIV are the major public health problems, particularly in developing counties (11).

TB is a contagious and airborne disease, caused by the bacillus *Mycobacterium tuberculosis (M tb).* It is one of the top 10 causes of death globally. Approximately 25% of the world's population is infected with *M. tb*, with 10.0 million people fell ill in 2018 (12). Africa continues to have the highest TB incidence, 231 per 100,000 populations (13). In Ethiopia, although there is a major decline in TB-associated death and incidence rates, the country is among the 30 high TB, TB/HIV, and MDR-TB burden countries (12). Both TB and COVID-19 are transmitted by the airborne route and share the three cardinal symptoms of cough, fever, and breathlessness. But TB takes more prolonged contact with an infected patient, unlike SARS-CoV-2 which transmits more easily (14).

Globally, 38.0 million people were living with HIV at the end of 2019 and 690 000 people died of HIV-related illnesses. Since the beginning of the epidemic, 76 million people have been infected and about 33 million people have died of HIV/AIDS. HIV remains highly prevalent in Africa, accounting for more than 67% of the people living with HIV/AIDS (PLWH) worldwide (15). Concern exists that possible disruptions in HIV programs due to COVID-19 could result in more HIV-related mortality and new HIV infections.

As the world responds to the COVID-19 crisis and pledges billions of dollars to tackle the pandemic, other health programs, including the provision of healthcare services for other diseases, are neglected. It is more important than ever to take into account the impact of COVID-19 on public health and clinical service provisions in SSA (16).

Ethiopia is a resource-poor country with a challenged health system and a fragile economy. In the beginning of the pandemic, many health care facilities are being prepared to provide services to COVID-19 patients and have completely stopped the provision of out-patient and in-patient services for other health problems. Such preparations are leading to adverse consequences for other health care needs including TB (17). But this has changed later and health care facilities started to give usual services with COVID-19 precautions.

1.2 Statement of the problem

COVID-19 pandemic could potentially impact the care and treatment services for a range of diseases(18). The containment measures have led to restrictions of health facilities to the management of emergency medical conditions as well as limitation of access to and delivery of infectious diseases including TB and HIV care and treatment services. In addition to containment measures taken by governments, health care shortfalls (access and availability of health services) and fear of contracting COVID-19 induce a reduced number of individuals to seek medical attention(18,19). It is being consistently reported that COVID-19 Patients with comorbidities are more likely to be hospitalized with poor outcomes.

A meta-analysis suggested that the prevalence of respiratory system comorbidities is 1.5% higher among the COVID-19 cases(20). Individuals with latent or active TB were more susceptible to SARS-CoV-2 infection, increased disease severity, and more rapid disease progression(21). COVID-19 has an impact on TB care and treatment services including, the diagnosis of new cases of active TB, monitoring and supply of Anti-TB medications, and TB immunization program(22). COVID-19 also causes disruptions to care and treatment services for PLWH, such as counseling services, testing, pharmacy, and other essential services (availing condoms) (23). Drug supply interruptions and suspension of HIV testing, have substantial population-level effects in preventing HIV-related opportunistic infections(24).

Research in Addis Ababa depicts that TB and HIV patients face a problem in accessing care and treatment services during this pandemic although, there should be no break in the continuity of essential services for people with TB and HIV patients during the COVID-19 pandemic(25). This could be due to the high cost of transportation, lockdown, and other essential government measures to prevent and control the pandemic. Bearing in mind this situation and limited research in this area in Ethiopia, it is necessary to assess the overall impact of the novel COVID-19 on TB and HIV care and treatment services.

The purpose of this study is to assess the impact of COVID-19 on TB and HIV care and treatment services in Addis Ababa. This study is also expected to contribute to the target group on the need for COVID-19 prevention and control measures and not discontinue TB and HIV services during the COVID19 response.

1.3 Rationale of the study

The impact of the COVID-19 pandemic on disease control for TB and HIV at a population level is not well known. With the limited level of evidence in the world and as to our knowledge no research done regarding the impact of the pandemic on both TB and HIV care and treatment services in Ethiopia, more adequately powered studies should be conducted to prove the association. COVID-19 approach without considering TB and HIV control will inevitably be less effective and will be a missed opportunity for ending TB and HIV infection. Finding and treating patients with TB and HIV remain the fundamental pillars of TB and HIV prevention and care, thus gathering evidence as this pandemic rises is very important. In Ethiopia, as the prevalence of HIV and TB is high, targeted public health interventions must be adopted to minimize the impact of COVID-19.

This study is considered necessary because it helps understand the impact of COVID-19 on HIV and TB care and services. It is also important to reveal the needs of priority populations, tailoring HIV and TB health services to meet their needs, can minimize long-term health impacts and help reduce health disparities. It is also essential for a country like Ethiopia, that primary prevention would be the most essential aspect to create change in the health care system and related policy.

The health profession and the wider community should be informed that special attention is critical to preventive measures and that vulnerable groups should be monitored regularly. If an association exists between COVID-19 and TB and HIV patients, it will help the health sector guide vulnerable populations and assess the risk of deterioration. Therefore, this study looking at the perceptions of ART and TB clients and contribute to much-needed evidence base on the impact of COVID-19 on HIV and TB care and services. Moreover, this study will contribute a lot to the target group by implying the need for regular visits, consulting health caregivers, following COVID-19 prevention and control measures, and respecting the scientific and medical suggestions that have a significant impact on TB and HIV care, treatment, and mortality.

2. LITERATURE REVIEW

2.1 COVID-19 and Public health interventions in Ethiopia

On March 13, 2020, the first known case of COVID-19 in Ethiopia was reported in the capital city(26). As of June 09, 2021, people that have been diagnosed with the coronavirus were 273,398, of whom 4,226 (1.55%) died, 20,887 (7.64%) are still sick, 248,285 (90.81%) have recovered (27). Addis Ababa became the first major city in Ethiopia to report cases and deaths from COVID-19. In Addis Ababa, the numbers of cases are almost half of the total number of COVID-19 patients in the country. City Administration took different strategies including, a door-to-door COVID-19 screening operation (28).

Since Ethiopia reported its first COVID-19 case, the government has been taking strong measures in response to the pandemic, despite resource constraints and a weaker economic base. As a result, Ethiopia put in place several precautionary measures to mitigate the pandemic in its early stages. The government created a Ministerial Committee for mobilizing a coordinated response to COVID-19 and interventions related to public health and social measures (29).

As of March 2020, the authorities in Ethiopia moved swiftly to implement containment measures such as closing schools and universities, shutting nightclubs and entertainment outlets, and prohibiting religious, sporting, and other large public gatherings, issuing stay-at-home orders for all but necessary staff. Ethiopia suspended more than 80 international country flights, subjecting passengers from international destinations to a mandatory 14-day quarantine, internet, and voice package offered by Ethio telecom. The government also closed Ethiopia's land borders and deployed the army. The central government, regional, and two city administration authorities ban trains, taxis, and other public transportations, and dictate to reducing the maximum number of passengers to half of their load capacity. Prisoners convicted of minor crimes, with less than a year left on their sentences, and women with babies granted pardon to slow the pandemic. It also postponed general elections scheduled for August 2020. The Ethiopian government also provides free telephone lines for information and mass disinfection of critical urban locations(17,30).

As of April 2020, the government has declared a five-month state of emergency, supersedes the powers of regional governments, and grants additional authorities to impose restrictions for the

federal government. The premier of Ethiopia met and discussed with political party leaders about containment measures. Ethiopian Religious Council declared a one-month prayer program. The Ethiopian Islamic Affairs Supreme Council closed all mosques and suspended all teaching and learning as well as prayer activities (17,30,31).

As of May 2020, Ethiopia has announced additional measures to curb the spread of COVID-19. All residents were required to wear face masks in public places, government officials have changed working hours to reduce congestion on public transport, restrictions on the use of private vehicles according to their registration plate numbers. Ethiopian Orthodox Church ordered followers of the Church should pray from home and the holy liturgy conducts only with a limited number of priests(26,32).

2.2 Impact of COVID-19 on Health Systems in Ethiopia

The health system of the Federal Democratic Republic of Ethiopia is structured into a three-tier health-delivery system: primary, secondary, and tertiary levels of care. The primary level consists of primary healthcare units (health posts and health centers) and primary hospitals; secondary level services are provided by general hospitals, and tertiary services by specialized hospitals(33). Almost every country in the world is confronted with the increasing burden of COVID-19 on their health systems. The focus thus far has been on executing emergency interventions to prevent, detect and respond to the COVID-19 epidemic. In Ethiopia, although there are limited data on the exact impact of COVID-19 on the health system, it is likely to exacerbate the preexisting weaknesses of health systems.

2.2.1 Financing

Ethiopia is the second-most populous nation in Africa after Nigeria; however, it is also one of the poorest, with a per capita income of $857.5 in 2019 (34). Health financing in Ethiopia comes from the government, public enterprises, donors and NGOs, households, and other private employers and funds(35). By disease area, HIV, TB, and malaria account for the largest share of health financing(36). In 2019, Ethiopia budgeted 12.8bn Birr for health-related expenses(37). As Ethiopia suffers from limited public health financing, the situation is expected to worsen with COVID-19.

2.2.2 Service delivery

Ethiopia is one among low-quality of care countries as measured by health system outcomes. As the pandemic has spread, the country faces gaps in terms of infection control practices and the availability of equipment. In addition, limited health capacity in clinics, hospitals, and community care centers, reduces the structural quality of care and the readiness of health facilities to deliver both COVID-19 and other disease care and treatment services. Many populations have already experienced a lack of access to routine, essential health services and these have disproportionately affected vulnerable populations (16). Because of the lockdowns or social distancing, there has been an overall decline in care-seeking. Even including individuals with chronic conditions that require to regularly go to health facilities for check-ups and DOTs will not be able to access these services(38).

Many health facilities in Ethiopia, even at the national level, have sub-optimal infection prevention and control measures and sanitation facilities. As regular emergency health services are redirected to COVID-19, an outbreak of other diseases could be expected. Given the expected significant increase in the demand for hospital and ICU bed capacity due to COVID-19, conditions that require inpatient visits or stays have been negatively impacted(30). A study in Ethiopia shows, only 12.8% of respondents were able to buy enough medicine and about 14% do not get a medical treatment service due to the COVID-19 effect(39).

2.2.3 Human and physical resources

COVID-19 imposes a shock in physical infrastructure. Limited numbers of hospitals and ICU beds in various settings present a significant challenge in Ethiopia. Shortly after the first case, the government mobilized resources including, converting universities into quarantine centres, providing isolation centres and treatment facilities, and preparing Millennium Hall into a 1,000-bed hospital. The Ethiopian Ministry of health called up volunteers and retired health care professionals. Addis Ababa city also launched its school feed programme with 1200 food banks. International help was sought and Chinese billionaire Jack Ma donated testing kits and personal protective equipment(30).

In Ethiopia, the number of doctors and nurses, midwives is below the WHO recommended threshold of 45 doctors, nurses, and midwives per 10,000 population(40). The COVID-19 pandemic has put health systems under pressure and has created hostile environments for health care providers who have reported incidents of violence, discrimination, and harassment, some have been assaulted, others were denied transport while traveling to work, and evicted from their homes.

2.2.4 Medicines and supply chains

In Ethiopia, the supply chains were not very strong even before COVID-19. Because of the pandemic, there have been exacerbated weak supply chains, essential medicine stock-outs, lack of medical equipment such as personal protective equipment and laboratory reagents which pose a significant challenge, both for COVID-19 and other health services. This led to an increase in the prices of commodities in markets and a lack of basic equipment such as face mask and disinfectants. Some of the challenges with transportation and supplies are being diverted from other health interventions towards COVID-19, which jeopardizes the delivery of non-COVID interventions(41).

2.3 Impact of COVID-19 on HIV care and treatment

2.3.1 ART Access

Governments are executing measures including limitations of traveling, to curb the spread of the pandemic. However, PLWHA might face unprecedented difficulties in accessing health services to retrieve antiretroviral and prophylactic drugs(42). Countries took different measures to make sure that PLWH has ART on their hand. Some recommended providing all persons on ART with a 3–6 months' supply of the medicines (43). While others like in Italy, many local charities began to offer home delivery services for ART medications through volunteers (44).

Opportunistic infections including respiratory infections are common with PLHIV. A cohort study in Italy noted that the number of hospitalizations in HIV-positive patients was almost doubling in comparison with 2018(44). As COVID-19 causes upper respiratory tract infections, adhere to ART is very essential(45). A study in Kenya indicated that HIV patients faced challenges as they seek HIV care and treatment services and in managing comorbidities(46). The

same scenario noted in China that PLWH faced problems getting to the clinic and obtaining drug refills on time(47).

As to the World Health organization, on July 6, 2020, seventy-three countries warned that they were at risk of stock-outs of ARV medicines and 24 had critically low stock of ARVs as a result of the COVID-19 pandemic (48). Telephone Interviews in Uganda explained that PLWH were doubtful regarding the availability of ART services, stock outages, and uncertainty regarding which HIV clinic to attend(49). Inability to continue ART visits due to transport, violence, and money also negatively impacted ART access for those individuals(49). In the USA, 3 months of supplies of medication were given instead of the typical one-month supply, to avoid the need for extra pharmacy visits(23).

2.3.2 HIV testing and counseling services

Countries implemented several new testing strategies including phone COVID-19 symptoms screening before they come to testing locations, and home-based self-testing for HIV under supervision(23). Counseling is vital for PLWH to address mental health needs and avoid medication interruptions. Study participants in Uganda described that government measures such as travel restrictions and closure of businesses produced significant barriers in accessing voluntary HIV testing and counseling services. In addition, they express that fear of becoming infected with the pandemic, encourages avoidance of voluntary HIV testing and healthcare services(50). Furthermore, individuals with HIV may develop a stronger stress response than the rest of the population, as an increased risk of contracting COVID-19 due to a compromised immune system(51).

Partner notification is also one issue concerning HIV testing. In Kenya, barriers such as lack of transport funds fear of contracting COVID-19 at the clinics, and inability to afford a mask led the number of testing of HIV-exposed partners to decrease dramatically(43). Participants interviewed in a study mentioned stigma as the main barrier to pursuing HIV testing and treatment services(46). In another study, clients were concerned that if infected with COVID-19, they might receive poorer care due to HIV-related stigma and this affected their seeking for HIV testing and counseling(49). Exacerbated food insecurity and COVID-19 protective behaviors hindered their health care services(52). In addition, the extensive demand for physicians has led

to the rescheduling of routine patient reviews and hospital visits for patients with HIV(53). Fear and anxiety with PLWH during the pandemic shifted health provider discussions(counseling service) away from reducing HIV acquisition and transmission risk(23).

2.3.3 Other care and services

Due to limited disposable income to support transportation expenses, as well as other direct and indirect medical costs, HIV patients are struggling to access other related services. HIV prevention services including condom access outside health facilities affected during lockdown(24). Health promotion program involves empowering and strengthening community action for continuous management and direct support to those HIV patients impacted by this pandemic COVID-19.

As the HIV response in sub-Saharan Africa relies heavily on Non-Governmental Organizations and Community-Based Organizations, the COVID-19 pandemic may complicate efforts by those organizations programs including, identifying new HIV cases such as outreach activities and recruiting those people to come to health facilities to get tested and subsequently be placed on ART(45). Services including partner Notification, community education regarding HIV transmission, prevention, and other related services are likely to be disturbed in this pandemic. In addition viral load testing, enhanced adherence counseling, and drug regimen switches could be difficult.

2.4 Impact of COVID-19 on TB care and treatment

2.4.1 TB detection and case notification

There is a bidirectional link between TB and COVID-19, immunosuppression induced by TB could expose patients to COVID-19, and COVID, in turn, also increase susceptibility to TB. A case-control study in Shenyang, China, indicates that TB infection rates were significantly higher (36.11%) among COVID-19 patients(54). TB patients in India faced challenges with reduced access to TB diagnostic and treatment services. They were less able to visit directly observed therapies (DOTS) centers and their health care provider(14). Following the lockdown, TB notification rates have fallen. In China, case detection dropped by 20% as well as in India,

weekly case reports fallen by 75% in the 3 weeks(55). In the South-East Asia region, there have been more than 50% reductions in case notifications (56).

As both TB and COVID-19 share respiratory symptoms, similar infrastructure, skills, and expertise are needed for containment, diagnosis, and management of the pandemic. Common symptoms including cough, not only create diagnostic confusion but also TB patients stigmatized. This led to TB patients being afraid of visiting healthcare services when they have such symptoms that result from TB(57). Due to COVID-19, hospitals and health centers as well as healthcare providers diverted to the COVID-19 response and impacted tuberculosis service provision including TB detection and notification. In addition, as tuberculosis diagnostic test platforms such as GeneXpert® and TrueNat® diverted to detect the SARS-CoV-2, limited TB diagnoses and less chance for early detection of drug resistance TB (56).

In developing countries, TB stigmatization is a problem, which is associated with fear confounded by COVID-19. This is likely to create stress among TB patients to go to health centers for diagnosis and services(58). Modeling work suggests a 3-month lockdown and a 10-month restoration might cause 6.3 million additional TB cases and an additional 1.4 million TB deaths during 2020 and 2025, respectively(59). A study from San Francisco, depicted evaluations for active TB dropped by more than 60% compared to pre-pandemic levels in a preceding couple of years(60).In China, compared to 2015–2019, TB notifications decreased by more than 50% in 2020. Moreover, there was a reduction in TB treatment outcomes and diagnostic screening for MDR, and these were maybe because of interventions such as quarantine and social distancing(18). From January to May 2020, in Nigeria, there was a 35% and 34%reduction in the number of presumptive and active tuberculosis notifications respectively (61).In South Korea, TB notifications decreased by 24% in 2020 compared to previous years(62).

The diagnosis of new TB cases in India faced a dramatic reduction (78% decreases) compared to in April 2019, due to COVID-19 prevention and control measures such as lockdown(63). Some of the factors were the closure of out-patient departments (OPD), poor access to treatment, refusal by government and private hospitals. In addition to the above reasons, patients and health care providers faced difficulty in reaching DOTS centres because of transport restrictions.

Patients with MDR TB who are on injectable medications faced the same challenge for injection administration(64).

2.4.2 Monitoring and supply of anti-TB medications

Countries adopt different methods to supply TB medications, including outreach services to reach patients,multi-month dispensing, and postal delivery of TB medications. Digital health interventions are increasingly being used to support TB treatment in various countries and are changing healthcare delivery worldwide(14). To help patients to complete their TB treatment, WHO recommended use of digital health technologies such as telemedicine, electronic medication monitors, and video-supported therapy(65). In India, the government took the measure of providing TB medications for 1 month and 2 months in exceptional circumstances, to reduce the need for patients to attend clinics(63).

The extensive demand on health providers challenged TB patients in routine patient reviews and hospital visits. Patients in need of minor procedures, change their TB medications, analgesics to stabilize their illness have been denied(53). A study from Ethiopia shows that factors including, shifting of human and material resources to COVID-19, health care providers being frightened of COVID-19 transmission, lack of PPE affected the TB case finding and care. In addition, those reasons have led transfer of patients' follow-up to nearby health facilities(66).

2.4.3 Other services

Service such as tuberculosis vaccination (BCG) was suspended due to COVID-19 pandemic lockdown. This could result in increased vaccine-preventable disease-related death. Contact tracing is also another critical element in managing TB in the community. Increased demand for care of COVID-19 patients has raised concerns about the distraction of contact tracing(22). In addition to anti-tuberculosis treatment, other care and supports including lifestyle modification for TB patients are mandatory. But as the pandemic disrupts access to medical consultation, information what the patients should eat, refrain from and the like was not available.

3. CONCEPTUAL FRAMEWORK

As depicted in Figure 1, a conceptual framework was developed for this proposal after reviewing the relevant literature. This framework does not dare to exhaustively investigate the labyrinth of interactions. Rather a simple linear association among variables of interest is considered.

COVID-19 containment measures, health system conditions, and socio-demographic factors assumed to have a direct link with HIV and TB care and treatment services or could impact those services. In the present study, selected factors out of those enlisted (within the underlined variables) were investigated for having a relationship with HIV and TB care and treatment services (16,18,19,36,38–40).

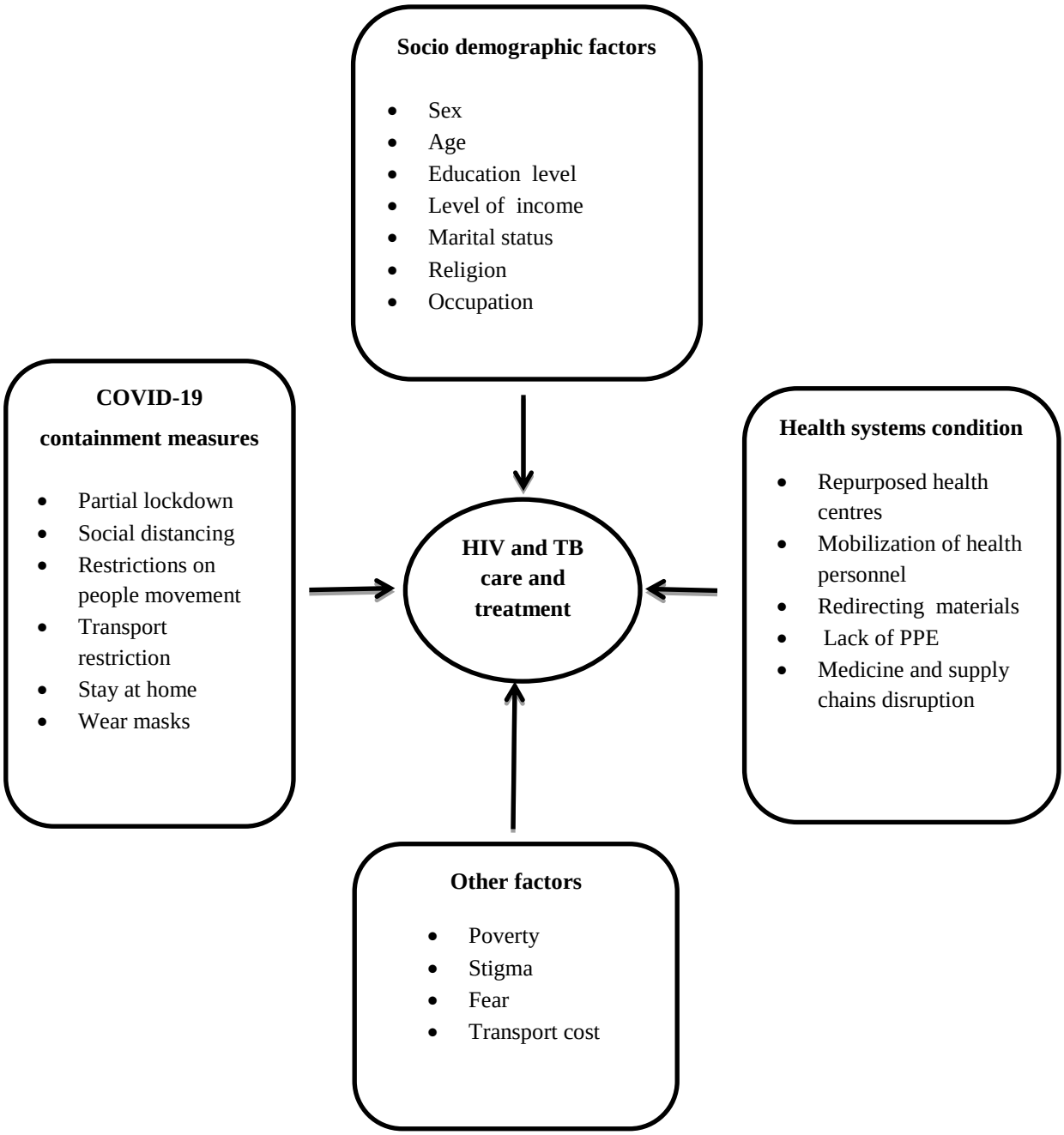

Figure 1**.**Conceptual framework of factors impacting HIV and TB care and treatment services

4. OBJECTIVES

4.1 General objective

To assess the impact of COVID-19 on TB and HIV care and treatment services in Addis Ababa, Ethiopia, 2021.

4.2 Specific objectives

To assess the impact of COVID-19 on TB care and treatment services, Addis Ababa.

To assess the impact of COVID-19 on HIV care and treatment services, Addis Ababa.

5. METHODS AND MATERIALS

5.1 Study Area and Period

A multi-center study was conducted at ten primary health care centres in Addis Ababa, from April 15 to March 30, 2021. According to United Nations population estimates, Addis Ababa's population is estimated at 5,005,524 in 2021(67). The city is divided into ten sub-cities and 116 woredas for administrative purposes. Addis Ababa Health Bureau is responsible for the overall health activity in the city. There are numerous health facilities, among them government hospitals and public health centres in the city 6 and 106, respectively. In Ethiopia, the COVID-19 pandemic is higher in the capital Addis Ababa (68). As a lot of people live in the city and are crowded by housing, the risk for TB transmission is high. Addis Ababa is also the highest in HIV prevalence next to Gambella regional state(69). The study was stratified all those public health centres in each sub-city and conduct at ten selected health centres. Study areas are chosen based on the TB and HIV patient's load. The study health centres were Addis Raey Health Center (Addisketema), Akaki Health Center (Akaki kality), Kebena Health Center (Arada), Goro Health Center (Bole), Adisu Gebeya Health Center (Gulele), Kazanchis Health Center (Kirkos), Alem Bank Health Center (Kolfe), Teklehaymanot Health Center (Lideta), Woreda 02 Health Center (Nifasilk lafto), Woreda 13 Health Center (Yeka).

5.2 Study design

A facility-based, multicentre, cross-sectional study was conducted using quantitave method.

5.3 Source Population

All TB and HIV patients of age >18 years attending care and treatment in the selected health facilities.

5.4 Study population

All TB and HIV patients of age >18 years attending care and treatment in the selected health facilities during the data collection period.

5.5 Eligibility criteria

5.5.1 Inclusion criteria:

- Patients with TB or HIV, as confirmed within the study facilities or result referred from another health facility, attending care and treatment services in the study facilities during the data collection period.
- Volunteer to participate in the study and able to give consent
- Ages ≥ 18 years

5.6 Sample size determination

The sample size in this cross-sectional survey is determined using a single Proportion formula. To determine the sample size for this design, it was assumed that the precision to an acceptable approximation of the population taking a difference of no more than 5% from the actual figures in the source population and a confidence level of 95%. Since the impact of COVID-19 on both HIV and TB diseases is not known, 50% prevalence (p) was taken to get the largest sample size. Based on this calculation, the sample size was 385 for both HIV and TB patients and adding for 10% possible non-response rate, the total sample size was 424 patients.

$$\mathbf{n= (Z\alpha/2)^2 P (1-P)/ (d)^2}$$

$$\mathbf{n= (1.96)^2\ 0.5(1-0.5)/ (0.05)^2}$$

$$\mathbf{n=385}$$

Where,

n =the required sample size

Z =standard score(1.96) corresponding to 95% confidence interval

P = the estimated proportion of the impact in TB patients and HIV patients assumed to be 50%

d = the margin of error (precision) 5%

5.7 Sampling procedure

Stratified Random Sampling was used, which involves dividing the population into TB and HIV subgroups and then taking a simple random sample in each subgroup. The sample population for each health facility was taken by dividing the total sample size into the respective number of health facilities proportionate to the size of TB and/or HIV patients. HIV patients and/or TB patients who attend ART and Anti-TB services during data collection period were taken based on the numbers set for each health facility.

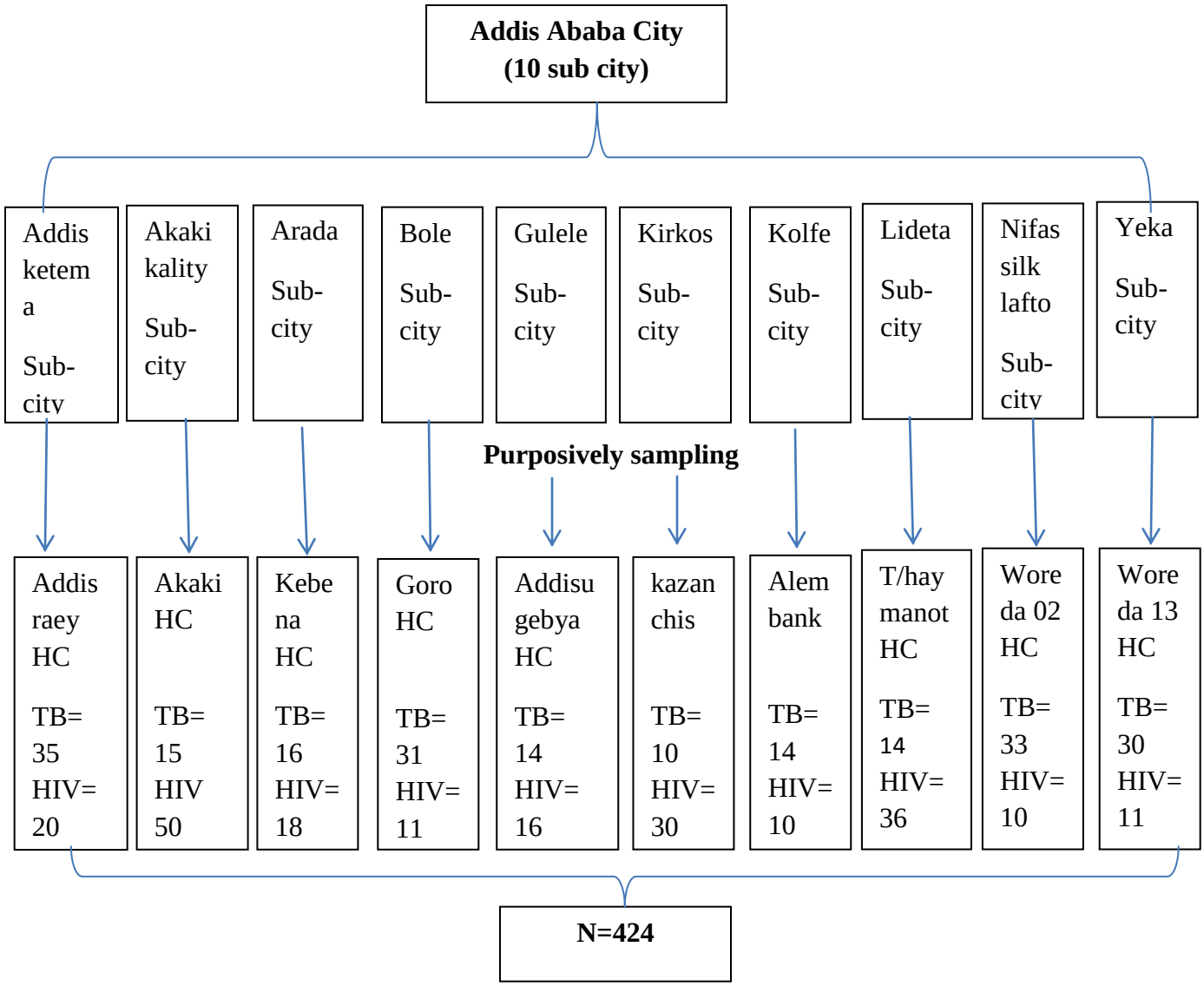

Figure 2. Schematic presentation of sampling procedure and technique of public health centers; Addis Ababa, 2021

5.8 Methods of data collection

5.8.1 Instrument

A pre-tested and structured questionnaire was used for the assessment of the overall impact of COVID-19. The data collection instrument format was developed in English and the English version was translated to Amharic, and later back-translated to English.

5.8.2 Data collection process

The data were collected using a structured questionnaire and interviewing study subjects. Eligible participants who were attending the selected health centers were invited to participate. Participants were given information about the study through an information sheet and signed a consent form if they agreed to be part of the study. Pretesting before the actual study was conducted by the investigator and the pretest result was not included in the study. Two supervisors and ten data collectors were recruited and trained for a half-day on data collection techniques by the principal investigator. Data were collected on socio-demographic characteristics, COVID-19 containment measures, patient characteristics, health system services.

5.9 Operational definitions

Impact-Statements and claims about the effect of COVID-19, on HIV and TB care and treatment services (51,70).

Treatment- Statements and claims about diagnostic tests, ARV drugs, and anti TB medicines.

Care-Statements and claims about supporting, counseling, and discussing, provided by health professionals.

COVID-19 containment measures- refers to actions taken in the absence of a vaccine or effective treatments, this includes lockdown, contact tracing, isolation and quarantine for infected people, and social distancing (71).

5.10 Variable

5.10.1 Dependent variable

- HIV care and treatment, TB care and treatment

5.10.2 Independent variables

- COVID-19, prevention and control measures (lockdown, social distancing, repurposing health centre),
- Socio-demographic status (age, sex, marital status, education, economical status etc)
- Health systems (closure of health facilities for COVID-19 only, mobilization of health personnel to COVID-19, redirecting materials, lack of PPE)
- Other factors (poverty, fear, stigma,)

5.11 Data quality control and management

The questionnaire was developed by reviewing relevant literature to ensure reliability. The questionnaire was pre-tested and supervision was made during data collection process. During data collection procedures, all the collected data were reviewed and checked daily for their completeness.

5.12 Data processing and analysis

The data collection tool was checked for completeness and internal consistency. Then, data entry and cleaning were done by the principal investigator.The analysis was done using bivariate and multivariate logistic regression to observe the effects of independent variables on the outcome variable while simultaneously controlling for other potential confounding factors. The raw data were entered to Epi Info version 7 and exported to SPSS 26 for analysis.

5.13 Ethical considerations

Ethical approval was obtained from the Scientific and Ethics Review Committee of the Center for Innovative Drug Development and Therapeutic Trials for Africa (CDT-Africa), College of Health Sciences, Addis Ababa University. Ethical approval and support letters were obtained from Addis Ababa public health research and emergency directorate. Before starting data collection, a detailed explanation was given about the purpose of the study to all potential participants. They were informed that they had full right to say “no”, and it was clearly stated that their decision of “no” by any means could not affect the service that they obtained from those facilities. Before the interview was launched signed informed consent was obtained, Privacy was ensured by conducting the interview privately in a single room, and confidentiality

of all information collected was maintained by omitting their names on the questionnaire and assigning a unique identification number.

5.14 Dissemination of the results

The study results will be presented to Addis Ababa University, CDT Africa and documents will be disseminated to all stakeholders in the study area. In addition, the result will be shared with Addis Ababa public health research and emergency directorate. The manuscript will be submitted to journals for publication.

6. RESULTS

6.1 Socio-Demographic Characteristics

A total of 424 HIV and TB patients were enrolled in the study, with a response rate of 100%, and 243 (57.3%) were female. Of the total, 220 (51.9%) and 131 (30.9%) were in the age group 35-54 and 18-34 years, respectively. One hundred and eighty-three (43.2%) were married and 116 (27.4%) had attended primary education.Two hundred and seventy-three (64.4%) were Orthodox Christian, and ninety-nine (23.3%) were housewives/unemployed (**Table 1**).

Table 1. Sociodemographic characteristics of respondents, Addis Ababa, Ethiopia, May 2021.

Variables	Category	Frequency	Percentage
Sex	Male	181	42.7%
	Female	243	57.3%
Age	18-34	131	30.9%
	35-54	220	51.9%
	≥55	73	17.2%
Marital status	Single	109	25.7%
	Married	183	43.2%
	Widowed	65	15.3%
	Divorced	47	11.1%
	Separated	20	4.7%
Level of education	No education	74	17.5%
	Can read and write	71	16.7%
	Primary education	116	27.4%
	Secondary education	87	20.5%
	Diploma and above	76	17.9%
Religion	Orthodox	273	64.4%
	Muslim	87	20.5%
	Protestant	42	9.9%
	Catholic	11	2.6%
	Others	11	2.6%
Occupation	Student	16	3.8%
	Daily laborer	83	19.6%
	Merchant	59	13.9%
	Governmental employee	88	20.8%
	Private/NGO employee	72	17.0%
	Farmer	7	1.7%
	Housewife/unemployed	99	23.3%
Family size	One	111	26.2%
	Two	99	23.3%
	≥ three	214	50.5%
Average monthly income	≤1000 Eth. Birr	43	10.1%
	1001-3000 Eth. Birr	118	27.8%
	3001-10000 Eth. Birr	213	50.2%
	>10000 Eth. Birr	50	11.8%

6.2 Most effective preventive measure of COVID-19

Of the total study participants, 324 (76.4%) responded “stay at home” was the most effective preventive measure of COVID-19. Study participants' responses on maintaining physical distancing,avoid close contact,cover mouth nose with facemask,frequent hand washing with soap as the most effective preventive measures were 62.5%, 63.4%, 88.4%, and 81.4% respectively. Three hundred and nine participants (72.9%) said avoiding touching of eyes nose and mouth with unwashed hands were the most effective preventive measure.Study participants' responses on preventive measures such as “avoid mass gathering”, “restrict movement”, and “use disinfectant” as a most effective preventive measure were 59.9%, 56.0%, 79.7% respectively (**Table 2**).

Table 2.Respondents' awareness on COVID-19 preventive measures,Addis Ababa, Ethiopia. May 2021.

Variables	Category	Frequency	Percentage
Stay at home	Yes	324	76.4%
Maintain physical distancing	Yes	265	62.5%
Avoid close contact	Yes	269	63.4%
Cover mouth nose with facemask	Yes	375	88.4%
Frequent hand washing with soap	Yes	345	81.4%
Avoid touching of eyes nose and mouth with unwashed hands	Yes	309	72.9%
Avoid mass gathering	Yes	254	59.9%
Restrict movement	Yes	237	56.0%
Use disinfectant	Yes	338	79.7%

6.3 The financial burden of COVID-19

The most costly COVID-19 preventive measures that cause financial burden to the patients were costs for buying facemasks [242 (57.1%)], soaps for handwashing [97 (22.9%)], and disinfectants [223 (52.6%)] (**Table 3**).

Table 3. Respondents' financial burden of COVID-19 preventive measures, Addis Ababa, Ethiopia May 2021.

Variables	Category	Frequency	Percentage
Stay at home	Yes	0	0.0%
Maintain physical distancing	Yes	0	0.0%
Avoid close contact with people	Yes	0	0.0%
Cover mouth nose with facemask	Yes	242	57.1%
Frequent hand washing with soap	Yes	97	22.9%
Avoid touching eyes nose and mouth with unwashed hands	Yes	0	0.0%
Avoid mass gathering	Yes	0	0.0%
Restrict movement	Yes	0	0.0%
Use disinfectant	Yes	223	52.6%

6.4 TB/HIV care and treatment services during COVID-19

All of the participants have gone to a healthcare facility during the high COVID-19 time. Of these, 349 (82.3%) were treated differently. Two hundred and seventy-three (64.4%) passed through new procedures, and for most participants, the procedure was COVID-19 screening test (69.0%) COVID-19 laboratory testing (31.0%). Nine (2.1%) participants were obliged to change the health facility, and 60 (14.2%) have been denied health services because of this pandemic. Almost all participants said health care providers were polite and respectful (99.5%), willing to listen and answer their questions (99.5%), give attention to their individual needs (98.6%), neverphysically assaulted (99.3%). Less than a quarter (22.2%) said the staff seemed uncomfortable due to the pandemic transmission. More than half (54.0%) of the participants contacted quickly a health care provider when they had a problem with health condition or comorbidities **(Table 4)**.

Table 4. Response of study participants on health care facility and service delivery, Addis Ababa, Ethiopia May 2021.

Variables	Category	Frequency	Percentage
Have you gone to the health facility during the high COVID-19 time?	Yes	424	100.0%
Were you treated differently?	Yes	349	82.3%
Were there any different procedures?	Yes	273	64.4%
what are they doing that is different?	Screening test	189	69.0%

	PCR test	85	31.0%
	Chest CT scan test	0	0.0%
	Others	0	0.0%
Were you obliged to change the health centre because of this pandemic?	Yes	9	2.1%
Have you ever denied health services?	Yes	60	14.2%
Politeness and respect of service providers to you?	Yes	422	99.5%
Willingness of professionals to listen and answer your questions?	Yes	422	99.5%
Attention of professionals to your individual needs?	Yes	418	98.6%
Have you ever physically assaulted by health professionals?	Yes	3	0.7%
Did the staff seemed uncomfortable with you?	Yes	94	22.2%
Have you contact a health care provider when you have a problem with your health condition or comorbidities quickly?	Yes	229	54.0%

6.5 Main barriers to access health care during the pandemic

Among study subjects, 362 (85.4%) said transport disruption was the main barrier to access health care. Fear of getting infected with COVID-19 (78.5%) was the second main barrier for the participants (**Table 5**).

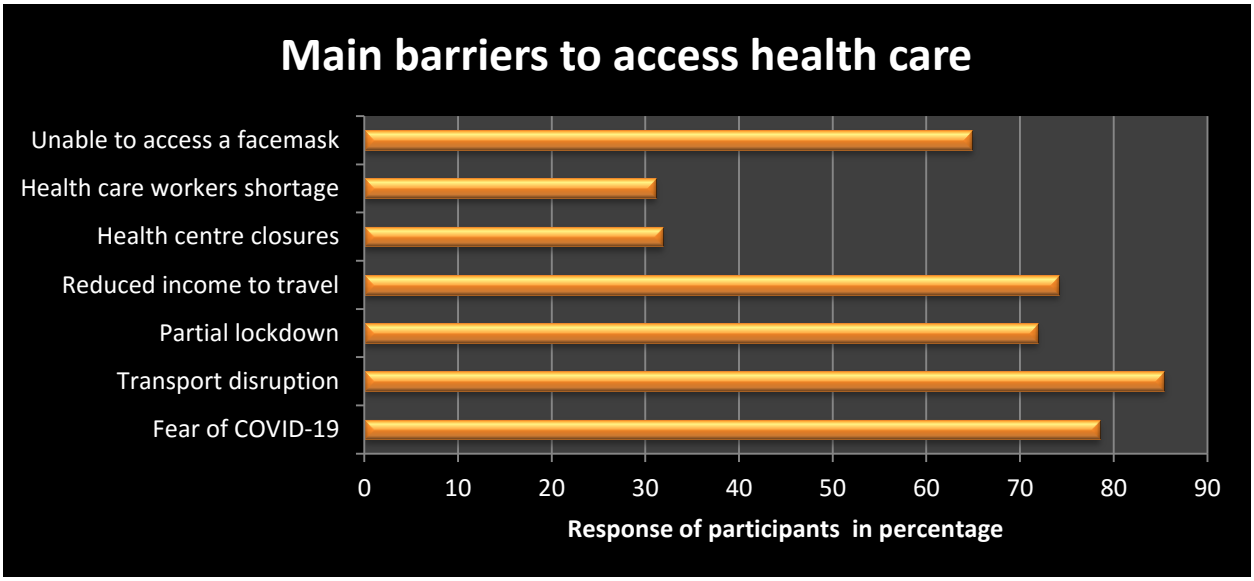

Figure 3. Response of study participants on barriers to access health care during the pandemic, Addis Ababa, Ethiopia May 2021.

6.6 COVID-19 precaution measures in healthcare facilities

From the total study subjects, 403 (95%) responded that health professionals provided health education on COVID-19, and 276 (65.1%) said the health centers provided screening services. Almost all health professionals wear gloves (99.5%) and masks (99.8%). According to the participants, there was frequent availability of water (96.5%) and soap (95.5%) at the gate of the healthcare facilities, but not sanitizer (31.6%) (**Table 6**).

Table 5. Response of study participants on health facilities precautions for COVID-19 protection, Addis Ababa, Ethiopia, May 2021.

Variables	Category	Frequency	Percentage
Health professionals provide health education on COVID-19?	Yes	403	95.0%
Health centre provide screening service for COVID-19?	Yes	276	65.1%
Health professionals wear the gloves during caregiving?	Yes	422	99.5%
Health professionals wear the mask During caregiving?	Yes	423	99.8%
Water available at the entrance of the health centre for hand washing?	Yes	409	96.5%
Soap available at the entrance of the health centre for hand washing?	Yes	405	95.5%
Sanitizer available at the entrance of the health centre for cleaning of hands?	Yes	135	31.8%

6.7 Medications and follow-ups during COVID-19

Among the total no of participants, 410 (96.7%) responded the pharmacy was accessible, and all participants had taken their drugs; however, 52.6% of the participants were unable to receive their multi-month drug supply. Participants who missed appointments,follow-up tests, and counseling services were 98 (23.1%), 97 (22.9%), and 92 (21.7%), respectively (**Table 7**).

Table 6. Response of study participants on medications and follow-up, Addis Ababa, Ethiopia May, 2021.

Variables	Category	Frequency	Percentage
Was the pharmacy accessible?	Yes	410	96.7%

Whether or not drugs/supplies are ordered for you?	Yes	424	100.0%
Have you had multi-month drug supply	Yes	201	47.4%
Fo how many months	3 months	90	45.0%
	6 monthes	110	55.0%
Have you missed appointments (visits)	Yes	98	23.1%
Follow-up tests done	Yes	327	77.1%
Counselling done on your medication or health status?	Yes	332	78.3%

6.8 Medical and non medical support during COVID-19

Since COVID-19, participants who said that availability of medicines were the same as before, were 298 (70.2%). Respondets who said it was impossible to get medicines since the pandemic were 9 (2.12%). Meanwhile, study subjects response for nonmedical support such as food as it was the same as before was 373 (88.97%), and those who said it was impossible were 11(2.59%) **(Figure 3)**.

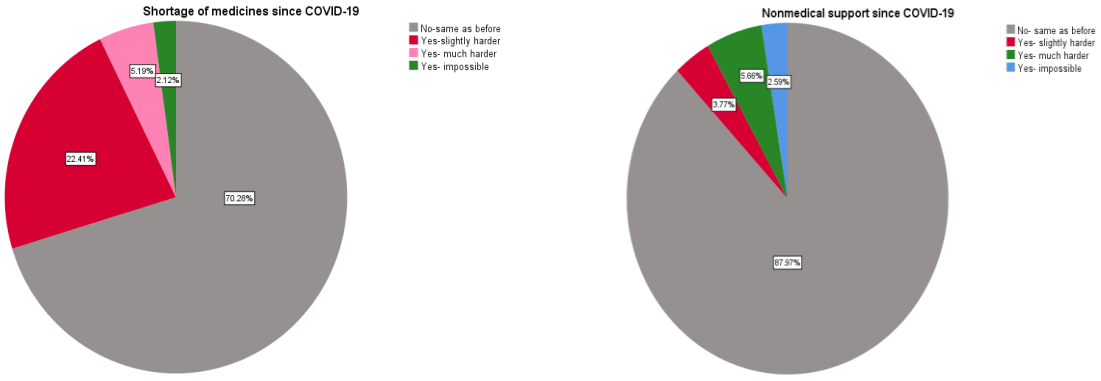

Figure 4. Medical and nonmedical supports of TB and HIV patients during COVID-19

6.9 Logistic Regression analysis of missing appointments/visits for medication refill variable

By Bivariate and Multivariate Logistic Regression analysis of missing appointments/visits for medication refill variable, independent variables such as age, marital status, education, monthly income, fear of COVID- 19, transport disruption, reduced income, immediate access to provider, soap available, pharmacy accessible, shortage of medicine and non medical support since COVID-19 were significantly associated (**Table 8**).

Table 7. Bivariate and Multivariate Logistic Regression analysis of missing appointments/visits for medication refill variable, Addis Ababa, Ethiopia, 2021.

Variables	Category	Missed appointments		Odds ratio		P value
		Yes	No	COR(CI)	AOR(CI)	
Age	18-34	18 (18.4%)	101 (31.0%)	1	1	
	35-54	19 (19.4%)	181 (55.5%)	0.59 (0.296-1.173)	0.39 (0.036-4.162)	0.435
	≥55	61 (62.2%)	44 (13.5%)	7.78 (4.127-14.662)	13.74 (4.331-436.428)	0.005*
Marital status	Single	22 (22.4%)	87 (26.7%)	1	1	
	Married	37 (37.8%)	146 (44.8%)	1.00 (0.555-1.809)	2.20 (0.213-22.698)	0.508
	Widowed	18 (18.4%)	47 (14.4%)	1.52 (0.739-3.102)	0.02 (0.001-0.694)	0.030*
	Divorced	18 (18.4%)	29 (8.9%)	2.46 (1.158-5.204)	0.71 (0.055-9.147)	0.793
	Separated	3 (3.1%)	17 (5.2%)	0.70 (0.188-2.595)	0.12 (0.002-5.886)	0.281
Education	No education	50 (51.0%)	24 (7.4%)	1	1	
	Read + write	24 (24.5%)	47 (14.4%)	0.25 (0.123-0.490)	0.05 (0.006-0.355)	0.003*
	Primary edu.	13 (13.3%)	103 (31.6%)	0.06 (0.028-0.129)	0.05 (0.006-0.419)	0.006*
	Secondary edu.	10 (10.2%)	77 (23.6%)	0.06 (0.027-0.141)	0.066 (0.004-0.984)	0.049*
	≥ Diploma	1 (1.0%)	75 (23.0%)	0.01 (0.001-0.049)	0.000 (0.000-0.041)	0.001*
Monthly income	≤1000	21 (21.4%)	22 (6.7%)	1	1	
	1001-3000	43 (43.9%)	75 (23.0%)	0.60 (0.297-1.217)	0.28 (0.026-2.973)	o.289
	3001-10000	31 (31.6%)	182 (55.8%)	0.18 (0.088-0.363)	0.046 (0.003-0.803)	0.035*
	>10000	3 (3.1%)	47 (14.4%)	0.07 (0.018-0.248)	0.582 (0.008-43.896)	0.806
Fear of COVID- 19	No	2 (2.0%)	89 (27.3%)	1	1	
	Yes	96 (98.0%)	237 (72.7%)	18.03 (4.351-74.670)	59.14 (3.804-9195.85)	0.013*
Transport disruption	No	1 (1.0%)	61 (18.7%)	1	1	
	Yes	97 (99.0%)	265 (81.3%)	22.33 (3.053-163.279)	56.91 (1.930-16781.4)	0.029*
Reduced income	No	4 (4.1%)	106 (32.5%)	1	1	
	Yes	94 (95.9%)	220 (67.5%)	11.32 (4.054-31.624)	12.52 (19.115-8194.9)	0.001*
Immediate access to provider	No	78 (79.6%)	117 (35.9%)	1	1	
	Yes	20 (20.4%)	209 (64.1%)	0.14 (0.084-0.247)	0.11 (0.017-0.742)	0.023*
Soap available	No	7 (7.1%)	12 (3.7%)	1	1	
	Yes	91 (92.9%)	314 (96.3%)	0.50 (0.190-1.299)	0.01 (0.000-0.845)	0.042*
Pharmacy accessible	No	10 (10.2%)	4 (1.2%)	1	1	
	Yes	88 (89.8%)	322 (98.8%)	0.11 (0.033-0.357)	0.006 (0.000-0.611)	0.030*
Shortage of medicine since COVID-19	No-same as before	63 (64.3%)	235 (72.1%)	1	1	
	Yes-slightly harder	27 (27.6%)	68 (20.9%)	1.48 (0.876-2.505)	10.72 (1.033-111.290)	0.047*
	Yes- much harder	6 (6.1%)	16 (4.9%)	1.40 (0.526-3.722)	4.06 (0.132-124.374)	0.423
	Yes- impossible	2 (2.0%)	7 (2.1%)	1.07 (0.216-5.257)	60775574747.4(0.000	0.999
Non medical support since COVID-19	No- same as before	72 (73.5%)	301 (92.3%)	1	1	
	Yes- slightly harder	4 (4.1%)	12 (3.7%)	1.39 (0.437-4.447)	2.54(0.041-157.629)	0.658
	Yes- much harder	13 (13.3%)	11 (3.4%)	4.94 (2.126-11.480)	15.30 (1.075-218.039)	0.044*
	Yes- impossible	9 (9.2%)	2 (0.6%)	18.81 (3.979-88.954)	29.25 (2.408-355.4)	0.028

*Statistically significant at p-value<0.05, COR = crude odds ratio at 95% confidence interval; AOR = adjusted odds ratio at 95% confidence interval.

6.10 Logistic Regression analysis of follow-up tests variable

In Bivariate and Multivariate Logistic Regression analysis of follow-up tests variable, the following variables were found to be significant: age, education, denied health services, reduced income/ money to travel and non medical support since COVID19 **(Table 9).**

Table 8. Bivariate and Multivariate Logistic Regression analysis of follow-up tests variable, Addis Ababa, Ethiopia, 2021.

		Follow up test		Odds ratio		
Variables	Category	Yes	No	COR(CI)	AOR(CI)	P value
Age	18-34	100 (30.6%)	19 (19.6%)	1	1	
	35-54	182 (55.7%)	18 (18.6%)	1.92 (0.964-3.827)	4.44 (0.943-20.947)	0.059
	≥55	45 (13.8%)	60 (61.9%)	0.14 (0.076-0.266)	0.14 (0.021-0.909)	0.039*
Education	No education	26 (8.0%)	48 (49.5%)	1	1	
	Can read + write	47 (14.4%)	24 (24.7%)	3.62 (1.822-7.174)	5.29 (1.333-21.052)	0.018*
	Primary edu.	103 (31.5%)	13 (13.4%)	14.63 (6.918-30.926)	9.21 (1.955-43.387)	0.005*
	Secondary edu.	77 (23.5%)	10 (10.3%)	14.22 (6.302-32.068)	5.217 (0.929-29.286)	0.061
	≥ Diploma	74 (22.6%)	2 (2.1%)	68.31 (15.497-301.088)	54.72 (4.401-680.491)	0.002*
Denied health services	No	309 (94.5%)	55 (56.7%)	1	1	
	Yes	18 (5.5%)	42 (43.3%)	0.08 (0.041-0.142)	0.20 (0.054-0.729)	0.015*
Reduced income/ money to travel	No	105 (32.1%)	5 (5.2%)	1	1	
	Yes	222 (67.9%)	92 (94.8%)	0.12 (0.045-0.291)	0.06 (0.008-0.408)	0.004*
Non medical support since COVID19	No- same as before	301 (92.0%)	72 (74.2%)	1	1	
	Yes- slightly harder	12 (3.7%)	4 (4.1%)	0.72 (0.225-2.290)	0.77 (0.042-14.172)	0.863
	Yes- much harder	12 (3.7%)	12 (12.4%)	0.24 (0.103-0.554)	0.38 (0.073-1.942)	0.243
	Yes- impossible	2 (0.6%)	9 (9.3%)	0.05 (0.011-0.251)	0.02(0.001-0.404)	0.012*

*Statistically significant at p-value<0.05, COR = crude odds ratio at 95% confidence interval; AOR = adjusted odds ratio at 95% confidence interval.

6.11 Logistic Regression analysis of counseling variable

Bivariate and Multivariate Logistic Regression analysis of counseling variable, factors such as age, education, denied health services, fear of COVID-19, reduced income money to travel, soap available, sanitize ravailable and shortage of medicine were significant(**Table 10**).

Table 9. Bivariate and Multivariate Logistic Regression analysis of counseling variable, Addis Ababa, Ethiopia, 2021.

Variable Category		Counslingdone		Odds ratio		
		Yes	No	COR(CI)	AOR(CI)	P value
Age	18-34	102 (30.7%)	17 (18.5%)	1	1	
	35-54	182 (54.8%)	18 (19.6%)	1.69 (0.832-3.413)	1.90 (0.473-7.613)	0.366
	≥55	48 (14.5%)	57 (62.0%)	0.14 (0.074-0.266)	0.11 (0.016-0.733)	0.023*
Education	No education	27 (8.1%)	47 (51.1%)	1	1	
	Read + write	48 (14.5%)	23 (25.0%)	3.63 (1.829-7.216)	7.32 (1.975-27.107)	0.003*
	Primary edu.	104 (31.3%)	12 (13.0%)	15.09 (7.039-32.333)	9.27 (2.124-40.427)	0.003*
	Secondary edu.	78 (23.5%)	9 (9.8%)	15.10 (6.534-34.831)	5.53 (1.059-28.856)	0.043*
	≥Diploma	75 (22.6%)	1 (1.1%)	130.56 (17.164 993.030)	94.24 (6.518-1362.668)	0.001*
Denied health services	No	311 (93.7%)	53 (57.6%)	1	1	
	Yes	21 (6.3%)	39 (42.4%)	0.09 (0.050-0.168)	0.25 (0.078-0.787)	0.018*
Fear of COVID-19	No	89 (26.8%)	2 (2.2%)	1	1	
	Yes	243 (73.2%)	90 (97.8%)	0.06 (0.015-0.252)	0.02 (0.001-0.396)	0.010*
Reduced income money to travel	No	106 (31.9%)	4 (4.3%)	1	1	
	Yes	226 (68.1%)	88 (95.7%)	0.10 (0.035-0.271)	0.04 (0.005-0.333)	0.003*
Soap available	No	12 (3.6%)	7 (7.6%)	1	1	
	Yes	320 (96.4%)	85 (92.4%)	2.20 (0.839-5.749)	22.65 (1.302-393.974)	0.032*
Sanitize ravailable	No	220 (66.3%)	69 (75.0%)	1	1	
	Yes	112 (33.7%)	23 (25.0%)	1.53 (0.904-2.579)	3.87 (1.069-14.041)	0.039*
Shortage of medicine since COVID-19	No-same as before	241 (72.6%)	57 (62.0%)	1	1	
	Yes-slightly harder	68 (20.5%)	27 (29.3%)	0.60 (0.350-1.013)	0.26 (0.081-0.846)	0.025*
	Yes- much harder	16 (4.8%)	6 (6.5%)	0.63 (0.236-1.683)	0.67 (0.096-4.671)	0.685
	Yes- impossible	7 (2.1%)	2 (2.2%)	0.83 (0.168-4.091)	0.52 (0.008-35.090)	0.762

*Statistically significant at p-value<0.05, COR = crude odds ratio at 95% confidence interval; AOR = adjusted odds ratio at 95% confidence interval.

7. DISCUSSION

To the best of our knowledge, this study was the first of its kind to assess the impact of COVID-19 on TB and HIV care and treatment services in Ethiopia. The findings underscore several factors rendering TB and HIV care and treatment services more difficult, such as significant reductions in income, fear of getting infected with COVID-19, unable to get face mask, and the like.The city of Addis Ababa, therefore, has done well to introduce innovative measures such as giving anti-TBmedications for 3-15 days (no DOT) and ART medications for 3-6 months respectively, to mitigate these challenges.As a result of these changes, we anticipate incomplete TB and HIV treatment records, which will affect the determination of treatment outcomes.

There was widespread fear and stigma about COVID-19 in the Addis Ababa community, with TB and HIV patients reluctant to visit health facilities due to fear of contracting COVID-19 and being diagnosed with the disease. In multivariable analysis,age, marital status, education, monthly income, fear of COVID- 19, transport disruption, reduced income money to travel, contact health care provider quickly, soap available, pharmacy accessible, shortage of medicine and non-medical support since COVID-19 were significantly associated with missing appointments/visits for a medication refill.

According to this study, for patients ≥55 years old, the odds of missing appointments were 13.74 times higher than patients who were in the age group of 18-34, keeping other variables constant. This is in agreement with the study done in Addis Ababa in Tikur Anbessa Specialized Hospital (TASH) where older chronic patients were more likely to miss appointments/visits (25). A study in Dessie town government and private hospitals also supports this finding (72). The result of another study in Uganda was also consistent with this finding that older people were more likely to miss appointments and other services (73).

Adjusting other factors, those who were widowed were 98% lower than singles in missing appointments/ visits for a refill. This was not significant in other studies (72).This inconsistency might be due to differences in socioeconomic status, the study setting, and time difference, the difference in HIV and TB patients' management strategies across the health facilities.

In this study, those who can read and write were 95% less likely to miss visits for medication refill compared to those who had no education. Those who attended primary education were 95%

less likely to miss visits for medication refill compared to those who had no education. Those who attended secondary education were 93.4% less likely to miss visits for medication refill compared to those who had no education. Those who had diploma and above were 100% less likely to miss visits for medication refill compared to those who had no education.This might be because respondents who had formal education may request and access information about HIV and TB-related services from the health facility more than uneducated and therefore they might be less likely to miss appointments for refill.

HIV and TB patients with a salary of 3001-10000 were 95.4% less likely to miss appointments/visits for refill compared to those with a salary of ≤1000, keeping other variables constant. This result is in agreement with that of a study in Uganda that HIV patients were unable to continue ART medication as they ddn't have sufficient money to go to the clinic(60).

For those who believed fear of getting infected with COVID-19 was themain barrier to access healthcare, the odds of missing visits was 59.14 times higher, keeping other factors constant. Similarly, the study conducted at TASH indicated that for those who reported fear of COVID-19, 70% of the participants missed appointments from March 15 to June 15, 2020(25). In another study, some TB patients were fearful of going to health centers because they felt more at risk from COVID-19 (74). Other studies also supported this finding that fear was the main barrier for those patients to attend appointments for medication refill (75–78).

Among participants who said transport disruption was the main barrier to access healthcare, the odds of missing visits was 56.91 times higher, adjusting for other variables.This is consistent with the study in Addis Ababa and Dessie Referral Hospital were more likely to miss follow-up (25,76). Another study in Uganda also revealed that HIV patients were unable to visit the health centres for a refill. This was because only essential personnel who had special car stickers or travel in vehicles with special government permission were permitted to drive personal cars (73). A study in Nigeria showed a decline in clinic attendance among TB patients since the onset of the COVID-19, due to containment measures such as a ban on public transport(79). Research in the Philippines, showed that TB patients also faced the same problem(74).

Study subjects who said reduced income/ money to travel was the main barrier to access healthcare, the odds of missing visits were 12.52 times higher, adjusting for other variables. This

is consistent with a research in Uganda that insufficient money for transportation was commonly reported effects of the COVID-19 restrictions on clients' travel to HIV clinics(60). In a study in Australia, although the pandemic impacted HIV patients' income, access to ART was largely uninterrupted. This may be because ART services were assisted by telehealth(80).

Participants who contact health professionals quickly were 89% less likely to miss visits for a refill, keeping other variables constant.Data from 33 centers in 16 countries also showed a general decrease in the use of health services, including emergency services(75).

Those who said soap was available at the entrance of the health centre were 99% less likely to miss their visit. However, this was not significant in other studies(81).This difference might be due to variances in the study area and time difference of data collection the difference in HIV and TB patients management strategy across the health facilities. Those who said the pharmacy was accessible were 99.4% less likely to miss their visit. In Addis Ababa, TB and COVID-19 were given in an integrated way including shared rooms for screening, and in some health centres patients may find it difficult to find a pharmacy for medication.

Among participants who said there was a slightly shortage of medicines since COVID-19, the odds of missing visits was 10.72 higher than those who said no shortage of medicines, keeping other variables constant. For those who said nonmedical support was much harder, the odds of missing visits was15.30 times higher than those who said no same as before, keeping other factors constant. Similar observations were made in other reports as well (41,82). Furthermore, WHO stated that the COVID-19 pandemic has affected the availability of medicines in many countries(83).

Multivariate logistic regression analysis made to identify factors associated with the follow-up tests in this study indicated that age, education, denied health services, reduced income/ money to travel, and nonmedical support since COVID-19 were significantly associated variables.

Participants who are in the age group of ≥55 were 86% less likely to have follow-up tests, adjusting other variables. This finding is consistent with a study in Nigeria (84). This finding is also in agreement with a study conducted in Addis Ababa, were older patients experienced the scenario(25).

Those who can read and write had 5.29 times the odds of follow-up tests compared to those who have no education. The odds of having follow-up tests was 9.21 times higher in those who attended primary education than in no education. The odd follow-up test was 54.72 times higher for those who have a diploma and above than no education, keeping other variables constant.This might be because respondents who had formal education may have more knowledge about how HIV and TB-related follow-up tests are critical than uneducated and therefore they might be more likely to have follow-up tests.

Those who were denied health services due to COVID-19 were 80% less likely to have follow-up tests, keeping other factors constant. In a study performed in Dessie Referral Hospital, the number of samples sent for diagnosis of tuberculosis by GeneXpert decreased by more than 70%. For HIV patients, appointments were spaced to reduce patient load, which made follow-up tests more difficult(76). A study in China also supports this result(85).

Study participants who said reduced income/ money to travel as the main barrier to access healthcare were 94% less likely to have follow- up test adjusting other variables. This finding is in agreement with a study in Nigeria(82). Another finding also supports this result (84,86).

Those who said nonmedical support was impossible were 98% less likely to have follow-up tests than those who said not same as before, keeping other factors constant. A similar result was found in India where shortage of nonmedical support such as food disrupted TB care and treatment services(87). A study from Nigeria also stated that HIV funding declined and this has an impact on HIV patients to access follow-up services(82).

Age, education, denied health services, fear of COVID-19, reduced income/money to travel, soap available, sanitize availablity, and shortage of medicine since COVID-19 were significantly associated with counseling services in multivariate logistic regression.

Participants who were in the age group of ≥55 were 89% less likely to have counseling, adjusting other variables. This finding is consistent with other findings in Addis Ababa, TASH (25), Dessie town government and private hospitals(72) and in Uganda(73).

For those who can read and write, the odds of having counseling was 7.32 times higher than those who had no education. Those who attended primary education had 9.27 times higher odds

of having counseling compared to those who had no education. For participants who attended secondary education, the odds of having counseling was 5.53 times higher. Study subjects who had diploma and above, the odds were 94.24 times higher in having counseling.This might be because respondents who had formal education may have more knowledge about the importance of counseling and therefore they might be more likely to have counseling.

Study subjects who denied health services because of the pandemic were 75% less likely to have counseling, keeping other factors constant. Studies at referral hospitals in Ethiopia (76) and China(85), were in agreement with this finding.

HIV and TB patients who said fear of COVID-19 as the main barrier to access healthcare were 98% less likely to have counseling, adjusting other variables. This finding was also significant in another study in Addis Ababa(25). Several researchs findings also supported this result (75,76).

Among participants who said reduced income/ money to travel as the main barrier to access healthcare were 96% less likely to have counseling, adjusting other variables.The finding of a research in Uganda is consistent with this result that reduced income for transportation was a problem to travel to clinics(60).Another study on PLHIV in Australia showed, 25% of participants responded that the pandemic has impacted their income negatively(86).

For participants who said soap availablity at the entrance of the health centre, the odds of having counseling was 22.65 times higher, adjusting for other variables. For participants who said sanitizer was available at the entrance of the health centre, the odds of having counseling was 3.87 times higher, adjusting for other variables. These results are in line with a finding from North Shoa health care facilities(81), where patients who got soap and sanitizer were more satisfied by health services. This may encourage them to visit health centres for counseling as there are precautions for COVID-19 prevention.

Among participants who said there was slight shortages of medicines since COVID-19 were 74% less likely to have counseling than those who said no shortage of medicines. This is in agreement with a study from low and middle-income countries(41). Several other researchs also supported this finding(82,83).

8. LIMITATION OF THE STUDY

The study was limited to health facilities in Addis Ababa, and therefore may not be representative of Ethiopia as a whole. As the study design was a cross-sectional study, it did not show a causal relationship and only provides a view of the impacts of COVID-19 in a specific period.

9. CONCLUSIONS AND RECOMMENDATIONS

COVID-19 pandemic impacted the care and treatment services of patients with HIV and TB negatively. This impact was higher among TB and HIV patients appointments for a medication refill, those with fear of COVID-19, transportation disruption, reduced income money to travel, shortage of medical and nonmedical supports. Education and high monthly income is assocaited with contacting health care providers quickly. Accessibility of pharmacy and availability of soap reduces the effect of missing appointments for a medication refill.

This pandemic also negatively affected follow-up tests for those patients. A higher impact was found among older patients , denied health services, reduced income money for travel, and shortage of nonmedical support. Education lowers the impact of the pandemic for follow-up visits. Counseling service was also affected and it was high among those who are aged, denied health services, have fear of COVID-19, with reduced income for travel, shortage of medicines, soap, and sanitizer availablity.

We have recommended the following based on the findings of our study

1. The scientific community should conduct researches in this and related areas to adress impactes of the pandemic. As we believe that additional findings could help to come up with a very good stratiegies and plocies to solve such problems.
2. Health care providers should give attention especially to the uneducated. They should continue giving services in different mechanisms such as digital systems.
3. Stakeholders such as Addis Ababa health bureau, the ministry of health, and others should work in partnership to reduce the impact of this pandemic on those patients.

In addition, Non-governmental organizations, as well as voluntary charties, should support TB and HIV patients economically and morally. The impact could be mitigated by providing education to the public, compensating travel expenses (if feasible) for eligible patients and their healthcare providers, continuing delivery of TB/HIV care and treatment services.

10. REFERENCES

1. World Health Organization. Coronavirus disease 2019 (COVID-19) dashboard. Geneva; 2020.
2. Aggarwal A, Mehta S, Gupta D, Sheikh S, Pallagatti S, Singh R, Singla I. Clinical & immunological erythematosus patients characteristics in systemic lupus Maryam. J. Dent. Educ. 2012;76(11):1532-9.
3. World Health Organization. Update on COVID-19 in the Eastern Mediterranean Region Feb, 16, 2020.
4. Pearson CA, Van Schalkwyk C, Foss AM, O'Reilly KM, Pulliam JR, CMMID COVID-19 working group. Projected early spread of COVID-19 in Africa through 1 June 2020. Eurosurveillance. 2020 May 7;25(18):2000543.
5. Nkengasong JN, Mankoula W. Looming threat of COVID-19 infection in Africa: act collectively, and fast. The Lancet. 2020 Mar 14;395(10227):841-2.
6. Ayers AJ. Beyond myths, lies and stereotypes: The political economy of a 'new scramble for Africa'. New Political Economy. 2013 Apr 1;18(2):227-57.
7. Covid NC. outbreak in Nigeria: Situation report. National Centre for Disease Control: Abuja, Nigeria. 2020:2.
8. Tarkang EE. The fight against COVID-19 in sub-Saharan Africa-a threat to the continuous management of HIV patients: application of the action areas of the Ottawa charter for health promotion. The Pan African Medical Journal. 2020;35(Suppl 2).
9. Ayenew B, Pandey D. Challenges and opportunities to tackle COVID-19 spread in Ethiopia. Journal of PeerScientist. 2020;2(2):e1000014.
10. Misganaw A, Haregu TN, Deribe K, Tessema GA, Deribew A, Melaku YA, Amare AT, Abera SF, Gedefaw M, Dessalegn M, Lakew Y. National mortality burden due to communicable, non-communicable, and other diseases in Ethiopia, 1990–2015: findings from the Global Burden of Disease Study 2015. Population health metrics. 2017 Dec;15(1):1-7.
11. Harrington M. From HIV to tuberculosis and back again: a tale of activism in 2 pandemics. Clinical Infectious Diseases. 2010 May 15;50(Supplement_3):S260-6.
12. World Health Organization. Global tuberculosis report 2020. Geneva, Switzerland: World Health Organization; 2018. https://www.who.int/tb/publications/global_report/en/

13. MacNeil A, Glaziou P, Sismanidis C, Maloney S, Floyd K. Global epidemiology of tuberculosis and progress toward achieving global targets—2017. Morbidity and Mortality Weekly Report. 2019 Mar 22;68(11):263.
14. Udwadia ZF, Vora A, Tripathi AR, Malu KN, Lange C, Raju RS. COVID-19-Tuberculosis interactions: when dark forces collide. Indian Journal of Tuberculosis. 2020 Jul 15.
15. World Health Organization. summary of the global HIV epidemic. Geneva; 2019. Available from: https://www.who.int/gho/hiv/en/
16. Ooms G. COVID-19 and it's far-reaching health impacts in sub-Saharan Africa. Health Action International. 2020.
17. Mohammed H, Oljira L, Roba KT, Yimer G, Fekadu A, Manyazewal T. Containment of COVID-19 in Ethiopia and implications for tuberculosis care and research. Infectious Diseases of Poverty. 2020 Dec;9(1):1-8.18.
18. Gopalan HS, Misra A. COVID-19 pandemic and challenges for socio-economic issues, healthcare and National Health Programs in India. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2020 Sep 1;14(5):757-9.
19. Bhatia V, Mandal PP, Satyanarayana S, Aditama TY, Sharma M. Mitigating the impact of the COVID-19 pandemic on progress towards ending tuberculosis in the WHO South-East Asia Region. WHO South-East Asia journal of public health. 2020;9(2):95-9.
20. Yanga J, Zhenga Y, Goua X. Prevalence of comorbidities and its effects in coronavirus disease 2019 patients: a systematic review and meta-analysis. Int. J. Infect. Dis. 2020;94:91-5.
21. Liu Y, Bi L, Chen Y, Wang Y, Fleming J, Yu Y, Gu Y, Liu C, Fan L, Wang X, Cheng M. Active or latent tuberculosis increases susceptibility to COVID-19 and disease severity. MedRxiv. 2020 Jan 1.
22. Jain VK, Iyengar KP, Samy DA, Vaishya R. Tuberculosis in the era of COVID-19 in India. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2020 Sep 1;14(5):1439-43.
23. Beima-Sofie K, Ortblad KF, Swanson F, Graham SM, Stekler JD, Simoni JM. “Keep It Going if You Can”: HIV service provision for priority populations during the COVID-19 pandemic in Seattle, WA. AIDS and Behavior. 2020 Oct;24(10):2760-3.

24. Jewell BL, Mudimu E, Stover J, Ten Brink D, Phillips AN, Smith JA, Martin-Hughes R, Teng Y, Glaubius R, Mahiane SG, Bansi-Matharu L. Potential effects of disruption to HIV programmes in sub-Saharan Africa caused by COVID-19: results from multiple mathematical models. The Lancet HIV. 2020 Sep 1;7(9):e629-40.
25. Aklilu TM, Abebe W, Worku A, Tadele H, Haile T, Shimelis D, Mekonen D, Amogne W, Moges A, Habtamu A, Argaw R. The Impact of COVID-19 on Care Seeking Behavior of Patients at Tertiary Care Follow-up Clinics: A Cross-Sectional Telephone Survey. Addis Ababa, Ethiopia. medRxiv. 2020 Jan 1.
26. Ethiopian Public health institute. Covid-19 update 2020. Available from: https://www.ephi.gov.et/index.php/2014-04-10-07-22-18/
27. Corona Scanner. Realtime coronavirus statistics, Ethiopia 2021. Available from: https://corona-scanner.com/country/ethiopia
28. Abdela SG, van Griensven J, Seife F, Enbiale W. Neglecting the effect of COVID-19 on neglected tropical diseases: the Ethiopian perspective. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2020 Oct;114(10):730-2.
29. Baye K. COVID-19 prevention measures in Ethiopia: current realities and prospects. Intl Food Policy Res Inst; 2020 May 12.
30. Shigute Z, Mebratie AD, Alemu G, Bedi A. Containing the spread of COVID-19 in Ethiopia. Journal of global health. 2020 Jun;10(1).
31. borkena. Ethiopian Islamic Affairs Council suspends Mosque prayers as COVID 19 poses a threat 2020.
32. Gebrselassie E, Istratii R. Restricting religious practice in the era of COVID-19: The case of the Ethiopian Orthodox Täwahədo community. Orthodox Outlet for Dogmatic Enquiries (Amharic). 2020 May 5.
33. World Health Organization. Primary health care systems (primasys): case study from Ethiopia: abridged version. World Health Organization; 2017.
34. Kabeta ZE, Sidhu IS. Service sector: The source of output and employment growth in Ethiopia. Academic Journal of Economic Studies. 2016 Dec 1;2(4):139-56.
35. Miljeteig I, Defaye FB, Wakim P, Desalegn DN, Berhane Y, Norheim OF, Danis M. Financial risk protection at the bedside: How Ethiopian physicians try to minimize out-of-pocket health expenditures. Plos one. 2019 Feb 12;14(2):e0212129.

36. Fagan T, Lang E, Lee B. Achieving Sustainable Health Financing in Ethiopia : Prospects and Advocacy Opportunities for Domestic Resource Mobilization. 2019;(March).
37. Tolla BB. A framework for competitive intelligence in strategic decision-making (SDM) in an Ethiopian conglomerate (Doctoral dissertation).
38. Alexandrowicz CH. The Secretary-General of the United Nations. Int Comp Law Q. 1962;11(4):1109–30.
39. Goshu D, Ketema M, Diriba G, Ferede T. Assessment of COVID-19 Effects and Response Measures in Ethiopia: Livelihoods and Welfare Implications.
40. Shannon G, Minckas N, Tan D, Haghparast-Bidgoli H, Batura N, Mannell J. Feminisation of the health workforce and wage conditions of health professions: an exploratory analysis. Human resources for health. 2019 Dec;17(1):1-6.
41. Rewari BB, Mangadan-Konath N, Sharma M. Impact of COVID-19 on the global supply chain of antiretroviral drugs: a rapid survey of Indian manufacturers. WHO South-East Asia journal of public health. 2020;9(2):126-33.
42. Amimo F, Lambert B, Magit A. What does the COVID-19 pandemic mean for HIV, tuberculosis, and malaria control?. Tropical medicine and health. 2020 Dec;48(1):1-4.
43. Lagat H, Sharma M, Kariithi E, Otieno G, Katz D, Masyuko S, Mugambi M, Wamuti B, Weiner B, Farquhar C. Impact of the COVID-19 pandemic on HIV testing and assisted partner notification services, Western Kenya. AIDS and Behavior. 2020 Nov;24:3010-3.
44. Quiros-Roldan E, Magro P, Carriero C, Chiesa A, El Hamad I, Tratta E, Fazio R, Formenti B, Castelli F. Analysis of the consequences of the COVID-19 pandemic on the continuum of the care in a cohort of HIV-positive patients followed in a single center of Northern Italy. Res Square. 2020 Jul 2.
45. Tarkang EE. The fight against COVID-19 in sub-Saharan Africa-a threat to the continuous management of HIV patients: application of the action areas of the Ottawa charter for health promotion. The Pan African Medical Journal. 2020;35.
46. Kiplagat J, Mwangi A, Chasela C, Huschke S. Challenges with seeking HIV care services: perspectives of older adults infected with HIV in western Kenya. BMC Public Health. 2019 Dec;19(1):1-2.
47. Guo W, Weng HL, Bai H, Liu J, Wei XN, Zhou K, Sande A. Quick community survey on the impact of COVID-19 outbreak for the healthcare of people living with HIV.

Zhonghua liu xing bing xue za zhi= Zhonghua liuxingbingxue zazhi. 2020 Mar 30;41(5):663-7.

48. Jewell BL, Mudimu E, Stover J, Ten Brink D, Phillips AN, Smith JA, Martin-Hughes R, Teng Y, Glaubius R, Mahiane SG, Bansi-Matharu L. Potential effects of disruption to HIV programmes in sub-Saharan Africa caused by COVID-19: results from multiple mathematical models. The Lancet HIV. 2020 Sep 1;7(9):e629-40.
49. Linnemayr S, Mayo-Wilson LJ, Saya U, Wagner Z, MacCarthy S, Walukaga S, Nakubulwa S, Karamagi Y. HIV care experiences during the COVID-19 pandemic: Mixed-methods telephone interviews with clinic-enrolled HIV-infected adults in Uganda. AIDS and Behavior. 2021 Jan;25(1):28-39.
50. Ponticiello M, Mwanga-Amumpaire J, Tushemereirwe P, Nuwagaba G, King R, Sundararajan R. "Everything is a mess": how COVID-19 is impacting engagement with HIV testing services in rural Southwestern Uganda. AIDS and Behavior. 2020 Nov;24:3006-9.
51. Chenneville T, Gabbidon K, Hanson P, Holyfield C. The impact of COVID-19 on HIV treatment and research: a call to action. International journal of environmental research and public health. 2020 Jan;17(12):4548.
52. Kalichman SC, Eaton LA, Berman M, Kalichman MO, Katner H, Sam SS, Caliendo AM. Intersecting pandemics: impact of SARS-CoV-2 (COVID-19) protective behaviors on people living with HIV, Atlanta, Georgia. Journal of acquired immune deficiency syndromes (1999). 2020 Sep 1.
53. Kretchy IA, Asiedu-Danso M, Kretchy JP. Medication management and adherence during the COVID-19 pandemic: perspectives and experiences from low-and middle-income countries. Research in social and administrative pharmacy. 2021 Jan 1;17(1):2023-6.
54. Liu Y, Bi L, Chen Y, Wang Y, Fleming J, Yu Y, Gu Y, Liu C, Fan L, Wang X, Cheng M. Active or latent tuberculosis increases susceptibility to COVID-19 and disease severity. MedRxiv. 2020 Jan 1.
55. Glaziou P. Predicted impact of the COVID-19 pandemic on global tuberculosis deaths in 2020. MedRxiv. 2020 Jan 1.
56. Sahu S, Ditiu L, Sachdeva KS, Zumla A. Recovering from the impact of the Covid-19

pandemic and accelerating to achieving the United Nations General Assembly tuberculosis targets. International Journal of Infectious Diseases. 2021 Mar 11.

57. Togun T, Kampmann B, Stoker NG, Lipman M. Anticipating the impact of the COVID-19 pandemic on TB patients and TB control programmes. Annals of clinical microbiology and antimicrobials. 2020 Dec;19:1-6.
58. Gupta A, Singla R, Caminero JA, Singla N, Mrigpuri P, Mohan A. Impact of COVID-19 on tuberculosis services in India. The International Journal of Tuberculosis and Lung Disease. 2020 Jun 1;24(6):637-9.
59. Cilloni L, Fu H, Vesga JF, Dowdy D, Pretorius C, Ahmedov S, Nair SA, Mosneaga A, Masini E, Sahu S, Arinaminpathy N. The potential impact of the COVID-19 pandemic on the tuberculosis epidemic a modelling analysis. EClinicalMedicine. 2020 Nov 1;28:100603.
60. Louie JK, Reid M, Stella J, Agraz-Lara R, Graves S, Chen L, Hopewell P. A decrease in tuberculosis evaluations and diagnoses during the COVID-19 pandemic. Int J Tuberc Lung Dis. 2020 Aug 1;24(8):860-2.
61. Adewole OO. Impact of COVID-19 on TB care: experiences of a treatment centre in Nigeria. Int J Tuberc Lung Dis. 2020 Jul;24(9):981-2.
62. Kwak N, Hwang SS, Yim JJ. Effect of COVID-19 on tuberculosis notification, South Korea. Emerging infectious diseases. 2020 Oct;26(10):2506.
63. Iyengar KP, Jain VK. Tuberculosis and COVID-19 in India-double trouble. Indian J Tubercul. 2020 Jul 17;7.
64. Bedi A, Yadavar S. TB patients badly hit by lockdown 80% drop in diagnosis, huge struggle for medicines. The Print. 2020 Apr;30.
65. Amimo F, Lambert B, Magit A. What does the COVID-19 pandemic mean for HIV, tuberculosis, and malaria control?. Tropical medicine and health. 2020 Dec;48(1):1-4.
66. Mohammed H, Oljira L, Roba KT, Yimer G, Fekadu A, Manyazewal T. Containment of COVID-19 in Ethiopia and implications for tuberculosis care and research. Infectious Diseases of Poverty. 2020 Dec;9(1):1-8.
67. Kii M. Projecting future populations of urban agglomerations around the world and through the 21st century. npj Urban Sustainability. 2021 Feb 23;1(1):1-2.
68. Manyazewal T, Woldeamanuel Y, Holland DP, Fekadu A, Blumberg HM, Marconi VC.

Electronic pillbox-enabled self-administered therapy versus standard directly observed therapy for tuberculosis medication adherence and treatment outcomes in Ethiopia (SELFTB): protocol for a multicenter randomized controlled trial. Trials. 2020 Dec;21:1-3.

69. Kibret GD, Ferede A, Leshargie CT, Wagnew F, Ketema DB, Alebel A. Trends and spatial distributions of HIV prevalence in Ethiopia. Infectious diseases of poverty. 2019 Dec;8(1):1-9.
70. Togun T, Kampmann B, Stoker NG, Lipman M. Anticipating the impact of the COVID-19 pandemic on TB patients and TB control programmes. Annals of clinical microbiology and antimicrobials. 2020 Dec;19:1-6.
71. Deb P, Furceri D, Ostry JD, Tawk N. The effect of containment measures on the COVID-19 pandemic.
72. Singh K, Kondal D, Mohan S, Jaganathan S, Deepa M, Venkateshmurthy NS, Jarhyan P, Anjana RM, Narayan KV, Mohan V, Tandon N. Health, psychosocial, and economic impacts of the COVID-19 pandemic on people with chronic conditions in India: a mixed methods study. BMC public health. 2021 Dec;21(1):1-5.
73. Muwanguzi PA, Kutyabami P, Osingada CP, Nasuuna EM, Kitutu FE, Ngabirano TD, Nankumbi J, Muhindo R, Kabiri L, Namutebi M, Nabunya R. Conducting an ongoing HIV clinical trial during the COVID-19 pandemic in Uganda: a qualitative study of research team and participants' experiences and lessons learnt. BMJ open. 2021 Apr 1;11(4):e048825.
74. Ferrer JP, Suzuki S, Alvarez C, Berido C, Caballero M, Caraig B, Flores PI, Juson RJ, Lustresano A, Opinion T, Saavedra M. Experiences, challenges and looking to the future in a clinical tuberculosis cohort in the time of COVID-19 in the Philippines. Transactions of The Royal Society of Tropical Medicine and Hygiene. 2021 Jun;115(6):579-82.
75. Migliori GB, Thong PM, Akkerman O, Alffenaar JW, Álvarez-Navascués F, Assao-Neino MM, Bernard PV, Biala JS, Blanc FX, Bogorodskaya EM, Borisov S. Worldwide effects of coronavirus disease pandemic on tuberculosis services, January–April 2020. Emerging infectious diseases. 2020 Nov;26(11):2709.
76. Abdela SG, Berhanu AB, Ferede LM, van Griensven J. Essential healthcare services in

the face of COVID-19 prevention: experiences from a referral hospital in Ethiopia. The American Journal of Tropical Medicine and Hygiene. 2020 Sep;103(3):1198.

77. Alene KA, Wangdi K, Clements AC. Impact of the COVID-19 pandemic on tuberculosis control: an overview. Tropical Medicine and Infectious Disease. 2020 Sep;5(3):123.
78. Fuady A, Houweling TA, Richardus JH. COVID-19 and tuberculosis-related catastrophic costs. The American Journal of Tropical Medicine and Hygiene. 2021 Feb;104(2):436.
79. Aduh U, Ewa AU, Sam-Agudu NA, Urhioke O, Kusimo O, Ugwu C, Fadare OA, Anyaike C. Addressing gaps in adolescent tuberculosis programming and policy in Nigeria from a public health perspective. International Journal of Adolescent Medicine and Health. 2021 Apr 27.
80. Weerasuria M, Ko C, Ehm A, O'Bryan J, McMahon J, Woolley I, Hoy J, Lau J. The impact of the COVID-19 pandemic on people living with HIV in Victoria, Australia. AIDS Research and Human Retroviruses. 2021 Apr 1;37(4):322-8.
81. Deriba BS, Geleta TA, Beyane RS, Mohammed A, Tesema M, Jemal K. Patient satisfaction and associated factors during COVID-19 pandemic in North Shoa Health Care Facilities. Patient preference and adherence. 2020;14:1923.
82. Oladele TT, Olakunde BO, Oladele EA, Ogbuoji O, Yamey G. The impact of COVID-19 on HIV financing in Nigeria: a call for proactive measures. BMJ Global Health. 2020 May 1;5(5):e002718.
83. Rewari BB, Mangadan-Konath N, Sharma M. Impact of COVID-19 on the global supply chain of antiretroviral drugs: a rapid survey of Indian manufacturers. WHO South-East Asia journal of public health. 2020;9(2):126-33.
84. Adewole OO. Impact of COVID-19 on TB care: experiences of a treatment centre in Nigeria. Int J Tuberc Lung Dis. 2020 Jul;24(9):981-2.
85. Fei H, Yinyin X, Hui C, Ni W, Xin D, Wei C, Tao L, Shitong H, Miaomiao S, Mingting C, Keshavjee S. The impact of the COVID-19 epidemic on tuberculosis control in China. The Lancet Regional Health-Western Pacific. 2020 Oct 1;3:100032.
86. Weerasuria M, Ko C, Ehm A, O'Bryan J, McMahon J, Woolley I, Hoy J, Lau J. The impact of the COVID-19 pandemic on people living with HIV in Victoria, Australia.

AIDS Research and Human Retroviruses. 2021 Apr 1;37(4):322-8.

87. Bhargava A, Shewade HD. The potential impact of the COVID-19 response related lockdown on TB incidence and mortality in India. Indian Journal of Tuberculosis. 2020 Jul 10.

11. ANNEX

Annex I: Information sheet

Addis Ababa University College of Health Sciences Department of CDT Africa- information sheet on the impact of COVID-19 on HIV and TB care and treatment services, in Addis Ababa city

Hello! How are you? My name is _____.I am a health professional and I am collecting data for the research being conducted to assess the impact of COVID-19 on HIV and TB care and treatment services in Addis Ababa by Dagmawi Chilot who is working on his thesis for an award of masters in clinical trials in Addis Ababa university college of health science, CDT Africa. If you agree to be part of this study, I will ask you some questions, which will take 15 to 20 minutes. All the information obtained from you will be strictly kept confidential, your participation is purely voluntary, and no monetary incentives will be given for your participation in the study. You are free to refuse to take part in the study. You have a right to withdraw at any giving time if you choose to. The report produced will be used mainly for academic purposes shared with the University and Addis Ababa public health centers with health offices to understand the impact of COVID-19 on HIV and TB care and treatment services. Your name will not be recorded on this form. If you have any question Mr. Dagmawi Chilot is the contact person and can be reached through Mobile No. 0918333145.

Are you willing to participate in the interview and stay with me for few minutes (15-20)?

□Yes, Go to the next page □ No, Thanks! Proceed to the next eligible participant

Annex II: Consent form

I am informed that my identity and the information I give will be treated confidentially. I have had the purpose and nature of the study explained to me in writing and I have had the opportunity to ask questions about the study. I understand that in any report on the results of this research my identity will remain anonymous. I understand that I am free to contact any of the people involved in the research to seek further clarification and information. I am informed that no monetary incentives will be given for my participation in the study.

If the study participant agrees to participate in the study, thank her/him and start the interview.

Signature of researcher _____ Date _____/_____/_____

Annex III: Questionnaire (English Version)

For each question, make a circle and fill the blanks with the answer or mark "X"

Participants code number_____

Name of the health centre _____

Patient type_____ (HIV) _____ (TB)

Name of interviewer _____		Date (*dd/mm/yy*) _____/_____/_____
Socio-demographic characteristics		
1	Sex	1. Male 2. Female
2	Age (years)	_____years
3	What is your marital status?	1. Single 2. Married 3. Widowed 4. Divorced/Separated
4	What is your level of education?	1. No education 2. Can read & write 3. Primary education 4. Secondary education 5. Diploma & above
5	What is your religion?	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Others
6	What is your occupation?	1. Student 2. Daily laborer 3. Merchant 4. Governmental employee 5. Private/NGO employee 6. Farmer 7. Housewife/unemployed
7	Family size	_____
8	How much is your average monthly income in birr	_____
Awareness on COVID-19		
1	Of the following COVID-19 preventive measures, which one do you think is the most effective preventive measure? • Stay at home • Maintain physical distancing • Avoid close contact with people • Cover mouth/nose with face/cloth mask when going outdoor • Frequent hand washing with water	 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No

	and soap • Avoiding touching your eyes, nose and mouth with unwashed hands • Avoid mass gathering • Restrict movement • Use of disinfectant	1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No
2	Of the following COVID-19 preventive measures, which one do you think is the most expensive in-terms of cost? • Stay at home • Maintain physical distancing • Avoid close contact with people • Cover mouth/nose with face/cloth mask when going outdoor • Frequent hand washing with water and soap • Avoiding touching your eyes, nose and mouth with unwashed hands • Avoid mass gathering • Restrict movement • Use of disinfectant	1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No
Health care facility and service delivery		
1	Have you gone to the health facility during the high COVID-19 time?	1. Yes 2. No
2	Were you treated differently?	1. Yes 2. No
	Were there any different procedures? If yes, what are they doing that is different?	1. Yes 2. No _____ _____ _____
3	Were you obliged to change the health centre because of this pandemic?	1. Yes 2. No
4	Have you everdenied health services?	1. Yes 2. No
	If your answer is "yes" what are the reasons	1. Health centers repurposed for COVID-19 2. Health professionals shifted to COVID-19 3. Health professionals afraid to contact me 4. Lack of PPE 5. Other (specify…..)
5	Has it been harder for you to come to health centers since COVID-19?	1. No- same as before 2. Yes - it is slightly harder 3. Yes - it is much harder 4. Yes - it is impossible
6	What do you think are the main barriers for you to access healthcare since COVID-19?	1. Fear of getting infected with COVID-19

		2. Transport disruption 3. Lockdown 4. Reduced income/ money to travel 5. Health centre closures 6. Health care workers shortage 7. Unable to access a face mask 8. Others (specify)
7	Politeness and respect of service providers to you?	1. Yes 2. No
8	Willingness of professionals to listen and answer your questions?	1. Yes 2. No
9	Attention of professionals to your individual needs?	1. Yes 2. No
10	Have you everphysically assaulted by health professionals?	1. Yes 2. No
11	Did the staff seemed uncomfortable with you?	1. Yes 2. No
12	Have you contact a health care provider when you have a problem with your health condition or comorbidities quickly?	1. Yes 2. No
Health facilities precautions for COVID-19 protection		
1	Health professionals provide health education on COVID-19?	1. Yes 2. No
2	Health centre provide screening service for COVID-19?	1. Yes 2. No
3	Health professionals wear the gloves during caregiving?	1. Yes 2. No
4	Health professionals wear the mask during caregiving?	1. Yes 2. No
5	Water available at the entrance of the health centre for hand washing	1. Yes 2. No
6	Soap available at the entrance of the health centre for hand washing	1. Yes 2. No
7	Sanitizer available at the entrance of the health centre for cleaning of hands	1. Yes 2. No
Medications and follow-up		
1	Was the pharmacy accessible?	1. Yes 2. No
2	Whether or not drugs/supplies are ordered for you?	1. Yes 2. No
3	Availability of ordered drugs/supplies in the health centrs	1. Yes 2. Some 3. Not at all
	If the answer is “Not at all”	1. No enough medication 2. Prices of medications is high 3. No pharmacy services 4. Other (specify)
4	Have you had multi month drug supply	1. Yes 2. No
	If “yes” for how many moths	_____months
5	Have you had shortages of medicines since COVID-19?	1. No- same as before 2. Yes - it is slightly harder 3. Yes - it is much harder

		4. Yes - it is impossible
6	Has it been harder for you to access nonmedical support such as food supplementation since COVID-19?	1. No- same as before 2. Yes - it is slightly harder 3. Yes - it is much harder 4. Yes - it is impossible
7	Have you missed appointments (visits)	1. Yes 2. No
	If your answer is yes what are the reasons	1. Lockdown 2. Lack of transport 3. Transportation tariff is high 4. Health centers repurposed for COVID-19 5. Health professionals shifted to COVID-19 6. Fear of COVID-19 infection 7. Stigma 8. Others
8	Follow-up tests done	1. Yes 2. No
	If the answer is NO	1. Lockdown 2. Lack of transport 3. Transportation tariff is high 4. Health centers repurposed for COVID-19 5. Health professionals shifted to COVID-19 6. Fear of COVID-19 infection 7. Stigma 8. Others
9	Counseling done on your medication or health status?	1. Yes 2. No
	If the answer is NO	1. Lockdown 2. Lack of transport 3. Transportation tariff is high 4. Health centers repurposed for COVID-19 5. Health professionals shifted to COVID-19 6. Fear of COVID-19 infection 7. Stigma 8. Others

ክፍል አንድ: የ ሚ ጃ ቅጽ

ይህ ጥና ት የ ሚከ ራው የ ኮሮና ቫይረስን ተፅዕኖ በ ቲቪ እና ኤችአይቪ ህከምና እንክብካቤ አገ ልግሎት ለ ማወቅ ነ ው ፡

ጤ ና ይስጥልኝ ፤ ስ ሜ----------ይባላል፡ ፡ የ ጤ ና ባለ ሞ ያ ስሆን በዚህ ዳ ግ ሚ ች ሎት ለሁለተኛ ዲ ግሪ ው መ ሚ ቂያ በ ሜ ርገ ው ጥና ት ላይ ሚ ጃ እየ ሰበሰብኩ ነ ው ፡ በ ቃለ ማ ከይቁ ወቅት የ ሚከ ሉት ሚ ጃዎች ለ ጥና ቱ ዓላማ ብቻ የ ሚ ውሉና ሚ ስጢራዊነ ቱ ም ሉ በ ም ሉ የ ተጠበ ቀ ነ ው ፡ በዚህ ማ ከይቅ ውስጥ ስ ሞ ትንና እ ርሶን ለ ማ ለየ ት የ ሚያገ ለግል ነ ገ ር አይጻ ፍ ም ፡ ቃለ ማ ከየ ቁ የ ሚ ወስድብዎት ግዜ ከ 15-20 ደ ቂቃ ብቻ ነ ው ፡ ግልጽ ያልሆነ ነ ገ ር ካለ ሊጠይቁን ይችላሉ፡ ፡ ማ ንኛ ውም ጥያ ቄ ካ ሉት የ ጥና ቱ ሚ የ ሆኑትን ዳ ግ ሚ ች ሎት በ ስልክ ቁ ጥር 0918333145 ማ ገ ኘት ይችላሉ፡ ፡ ስለተባበሩን እ ና መ ሰ ግ ና ለን ፡ ፡

በ ቃለ ማ ከይቁ ተስ ማ ም ቻ ለሁ_____ ወደ የ ስ ም ማ ት ቅጽ ይለፉ

በ ቃለ ማ ከይቁ አልተስ ማ ሚ ም_____ አ ማ ኝ ነ ው በዚህ ያ ብቁ

ክፍል ሁለት: የስምምነት ቅጽ

ተሞክሮው የጥናቱን አላማ በሚገባ ግልጽ በሆነ ቋንቋ አስረድተውኛል፡፡ በዚህም ማህረት የጥናቱን አላማ ስለተረዳሁ ለማካተፍ ውሳኔዬን በሚከተለው መንገድ አረጋግጣለሁ፡፡ የሚጃ ሰብሳቢ ፊርማበቃል ስምምነት ማህጡኑን ያረጋግጣል፡፡

የሚጃ ሰብሳቢ ስም ፊርማ_____ቀን_____/_____/_____

ክፍል ሶስት: ቃለ ማኪይቅ

የ ተሳታፊዋ ማእያ ቁጥር _____

የ ጤፍ ተቋምስም_____

የ በሺታውአይነ ት_____ (ኤችአይቪ) _____ (ቲቪ)

ተ.ቁ.	ጥያቄ _____	መልስ ና የ ኮድ ምድብ _____/_____/_____
1	ፆታ	1. ወንድ 2. ሴት
2	ዕድሜዎት ስንት ነ ዉ?	_____ በአ ሜት
3	የ ጋብቻ ሁኔ ታ	1. ያላገ ባች 2. ያገ ባች 3. በሏየ ሞታባ ት 4. የ ተፈተች/የ ተለየ ያች
4	የ ትምህር ት ደረጀዎ?	1. ያልተሚ ች 2. ማን በብና ሜ ፍ 3. የ መጀሚ ያ ደረጀ 4. የ ሁለተኛ ደረጀ 5. ዲፕሎማእና ከዛ በላይ
5	ሀይሞትዎ ምነድነ ው?	1. አ ቶዶክስ 2. ሞስሊም 3. ፕሮትስታት 4. ካቶሊክ 5. ሌላ ይገ ለጽ(----------)
6	ሥራዎ ምነድን ነ ው?	1. ተሚሪ 2. የ ቀን ሰራተኛ 3. ነ ጋዴ 4. የ ማነግስት ሰራተኛ 5. ማነግስታዊ ያለሆነ ተቀጣሪ 6. ገ በሬ 7. ቤት እ ሜቴት/ስራ የ ለሌው
7	የ ቤተሰብ ብዛ ት	
8	አ ማካይ የ ወር ገ ቢ ስንት ብር ነ ው?	----------
እ ውቀተዎ ስለ ኮቪድ 19		

1	ከሚሉት የኮቪድ-19 ሞከላከያ መንገዶች ውስጥ በእርሰዎ አሚላካከት የትኛው በጣም ውጤታማ ይሚለዎታል • ከቤት መቆየት • ሚሀረሰባዊ እርቀትን ማከበቅ • ከሰዎች መቅረብን ማስወገድ • አፍነ ጨና አፍን ሞሸፈን • እጅን በተደጋጋሚበውሃና በሳሙና ሞተጡበ • ሳይታጡቡ፤ አየንዎትን፡ አፍንጩዎትን፤ አፍዎትን አለመነካካት • ሞስባሰብን ማስወገድ • እንቅስቃሴን ማደብ • ተህዋስ ማስወገጃ ማጠቀም	1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም
2	ከሚሉት የኮቪድ-19 ሞከላከያ መንገዶች ውስጥ ከዋጋ አንጻር በእርሰዎ አሚላካከት የትኛውበጣም ወድ ይሚለዎታል • ከቤት መቆየት • ሚሀረሰባዊ እርቀትን ማከበቅ • ከሰዎች መቅረብን ማስወገድ • አፍነ ጨና አፍን ሞሸፈን • እጅን በተደጋጋሚበውሃና በሳሙና ሞተጡበ • ሳይታጡቡ አየንዎትን፡ አፍንጩዎትን፤ አፍዎትን አለመነካካት • ሞስባሰብን ማስወገድ • እንቅስቃሴን ማደብ • ተህዋስ ማስወገጃ ማጠቀም	1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም 1. አዎ 2. አይደለም

		1. አዎ 2. አይደለም
ከአገልገሎት አሰጣጥ ጋር ተያያዝነት ያላቸውጥያቄዎች		
1	በኮቪድ-19 ከፍተኛ በሆነበት ወቅት ወደ ጤፍ ጣቢያ ሂደው ያቃሉ	1. አዎ 2. አይደለም
2	በተለየ ነበር የተስተናገዱት	1. አዎ 2. አይደለም
	የተለየ ፕሮሲጀር ነበር አወ ከሆነ ምን ነበር	1. አዎ 2. አይደለም _____ _____
3	በኮቪድ ምክኒያት የጤፍ ጣቢያ እንዲቀይሩ ተገደውያቃሉ	1. አዎ 2. አይደለም
4	የጤፍ አገልግሎት ተከልክለውያቃሉ	1. አዎ 2. አላውቅም
	ሜልስዎ አዎ ከሆነ ምክኒያቱ ምን ነበር	1. የጤፍ ሚዛከላች ለኮቪድ ብቻ አገልግሎት ሰለሚሰጡ 2. የጤፍ ባለሞያዎች ወደ ኮቪድ አገልገሎት ስለተዛወሩ 3. የጤፍ ባለሞያዎች እኔን ለማገኘት ስለሚፈሩ 4. እራሴን የምከላከልበት ስለሌለኝ 5. የአገልግሎት ጥራት ዝቅተኛ ስለሆነ
5	ከኮቪደ-19 ጀምሮ ወድ ጤፍ ጣቢያ ለማምጣት አስቸጋሪ ነበር	1. አይደለም- እነደበፊቱ ነበር 2. አዎ - በትንሹ አስቸጋሪ ነበር 3. አዎ - በጣምአስቸጋሪ ነበር 4. አዎ - አልቻልኩምነበር
6	ከኮቪደ-19 ጀምሮ ወደ ጤፍ ጣቢያ ለማምጣት ዋና ማነክሎቹ ምን ይመስልዎታል	1. ኮቪድ እያዛለሁብየ ስለሚፈራ 2. የትራነሰፖርት ችግር 3. የእንቅስቃሴገደብ 4. የትራንሰፖርትገንዘብሰለሌለኝ 5. ጤፍ ጣቢያዎች ስለተዘጉ 6. የባለሞያዎች እጥረት ስላለ 7. የፊት ማሽፈኛ ሰለሌለኝ 8. ሌላ (ይገለጽ)
7	የአገልገሎት ሰጭዎች አክበሮትና ጨዋነት	1. አዎ 2. አይደለም
8	የጤፍ ባለሞያዎች የሚጠጭና ጥያቄዎችን የመመለስ ፈቃደኝነት	1. አዎ 2. አይደለም

9	የጡፍ በለሞያዎች ለእርሰዎ ፍላጎት ያላቸው አትኩሮት	1. አዎ 2. አይደለም
10	በጡፍ ባለሞያዎች ጥቃት ደርሶብዎት ያቃሉ	1. አዎ 2. አይደለም
11	የጡፍ ባለሞያዎች የሚመኟ ፀባይ ያሳያሉ(ያልተሞቻቸውይሚላሉ)	1. አዎ 2. አይደለም
12	የጡፍ ችግር ሲአጋጠምዎት የጡፍ ባለሞያዎችን በአፋጣኝ አግኝተዋል	1. አዎ 2. አላገኝሁም
	የጡፍ ጣቢያዎች ቅደመጥንቃቄ ኮቪደ-19ን ለሚከላከል	
1	የጡፍ ባለሞያዎች ሰለ ኮቪድ-19 ትምህርት ይሰጣሉ	1. አዎ 2. አይደለም
2	ጡፍ ጣቢያውኮቪደ-19ን የሚለየት አገልግሎት ይሰጣል	1. አዎ 2. አይደለም
3	የጡፍ ባለሞያዎች ግላቭይለብሳሉ	1. አዎ 2. አይደለም
4	የጡፍ ባለሞያዎች ጭምብል ይለብሳሉ	1. አዎ 2. አይደለም
5	ከጡፍ ጣቢያውበር ላይ ዉሃ አለ	1. አዎ 2. አይደለም
6	ከጡፍ ጣቢያውበር ላይ ሳሙና አለ	1. አዎ 2. አይደለም
7	ከጡፍ ጣቢያውበር ላይ ሜጅ አለ	1. አዎ 2. አይደለም
	ህክምና ክትትል	
1	የሜሂኒት ቤቱ ተደራሽ ነበር	1. አዎ 2. አይደለም
2	ሜሂኒት ወይምሜሂኒት ያለሆኑ ታዛልዎት ነበር ወይሰ አልነበረም	1. አዎ 2. አይደለም
3	የታዛዘልዎት ሜሂኒት ወይም ሌላ ነገሮች በጡፍ ጣቢውይገኛሉ	1. አዎ 2. በማከሉ 3. ምንምአይገኝም

	ሜልስዎ ምንምአይገኝምከሆነ	1. በቂ ሞድሃኒት ሰሌለለ 2. የሞደሃኒቱ ዋጋ ከፍተኛ ሰለሆነ 3. የሞድሃኒት ቤት አገልግሎት ሰለሌለ 4. ሌላ ምክኒያት (ይጠቀስ)
4	ለብዙ ወራት የሚያን ሞድሃኒት በአንዴ ተሰጥቶታል	1. አዎ 2. አልተሰጠኝም
	ከተሰጠዎት ለስንት ወር	----------ወር
5	ከኮቪድ በኋላ የሞድሃኒት እጥረት አጋጥሞዎታል	1. አይደለም- እነ ደበፊቱ ነ ው 2. አዎ - በትንሹ እጥረት አለ 3. አዎ - በጣምእጥረት አለ 4. አዎ - ፈጽሞሞድሃኒት የለም
6	ሌላ ከህክምና ውጭ የሆነ ለምሳሌ የምግብ አቅርቦት ችግር ነ በር	1. አይደለም- እነ ደበፊቱ ነ ው 2. አዎ - በትንሹ እጥረት አለ 3. አዎ - በጣምእጥረት አለ 4. አዎ - ፈጽሞሞድሃኒት የለም
7	በቀጠሮዎ ቀርተውያቃሉ	1. አዎ 2. አይደለም
	ሜልስዎ አዎ ከሆነ	1. የእንቅስቃሴ ገደብ 2. የትራነ ስፖርት እጥረት 3. ታሪፉ ከፍተኛ ስለሆነ 4. የጤፍ ሜዕከላት ለኮቪድ ብቻ አገልግሎት ሰለሚሰጡ 5. የጤፍ ባለሞያዎች ወደ ኮቪድ አገልገሎት ስለተዛወሩ 6. ኮቪድን ስለሜፈራ 7. ማለል ስላለ 8. ሌላ
8	ተከታታይ ምርሞራ ተደረጎልዎታል	1. አዎ 2. አልተደረገልኝም
	አልተደረገላኝምከሆነ ምክንያቱ ምን ነ በር	1. የእንቅስቃሴ ገደብ 2. የትራነ ስፖርት እጥረት 3. ታሪፉ ከፍተኛ ስለሆነ 4. የጤፍ ሜዕከላት ለኮቪድ ብቻ አገልግሎት ሰለሚሰጡ 5. የጤፍ ባለሞያዎች ወደ ኮቪድ አገልገሎት ስለተዛወሩ 6. ኮቪድን ስለሜፈራ 7. ማለል ስላለ 8. ሌላ
9	የምክር አገልገሎት አግኝተዋል	1. አዎ 2. አልተደረገልኝም
	አልተደረገላኝምከሆነ ምክንያቱ ምን ነ በር	1. የእንቅስቃሴ ገደብ 2. የትራነ ስፖርት እጥረት 3. ታሪፉ ከፍተኛ ስለሆነ

		4. የጡት ማዕከላት ለኮቪድ ብቻ አገልግሎት ሰለሚሰጡ 5. የጡት ባለሞያዎች ወደ ኮቪድ አገልገሎት ስለተዛወሩ 6. ኮቪድን ስለምፈራ 7. ማለልስላለ 8. ሌላ